INTERVENTION PROGRAM FOR CHILDREN WITH CEREBRAL PALSY AND MENTAL RETARDATION - A MULTI DISCIPLINARY APPROACH

PHASE I

KRPLLD MOA - 242/99

PROJECT REPORT

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ABSTRACT

The Phase I of the project titled "Intervention program for children with Cerebral Palsy and Mental Retardation – A multi disciplinary Approach" was carried out in 15 wards of the Sreekaryam Panchayat with the following objectives:

1. *To identify children with CP, MR, CP & MR based on the survey and detailed assessment by a multidisciplinary team of specialists.*
2. *To find the epidemiological factors (age, sex, socioeconomic factors etc) related to CP, MR, CP & MR by identifying them based on the Survey.*
3. *To relate type and degree of CP, MR, CP and MR to the etiological/high risk factors and to identify associated problems present with these disorders.*
4. *To identify mothers who are at risk for having children with CP, MR, CP & MR and follow them up to find the number of affected children.*

All the children in the age group of 0 – 16 years, in these wards were screened with an initial questionnaire containing possible indicators for having CP and MR. Those children who obtain a positive response in at least one question of the screening pro-forma were subjected to a detailed evaluation by Speech Pathologists, Clinical Psychologists and Neurologist using a diagnostic pro-forma to arrive at a final diagnosis. All the pregnant mothers were screened with a high-risk questionnaire to find those mothers who were at risk for having children with CP, MR and CP&MR.

61 children were identified to have either CP, MR or CP&MR and the results showed an incidence of 1.37 per thousand for CP, 5.08 per thousand for MR and 1.92 per thousand for CP&MR. These results agree with reports from other developed countries indicating an effective maternal and neonatal healthcare. Etiological factors and Associated Problems studied in these 61 children showed no dramatic results and were similar to those reported in literature. Though prenatal factors like consanguinity seem to play a major role, which is specific to the Indian context. All children born to the high-risk mothers were found to be normal which could be a possible indicator of reduced incidence of CP, MR and CP&MR in generations to come.

T*he major findings of the present study are as follows:*

- *The incidence per 1000 of CP, MR and CP & MR in the Sreekaryam panchayat agree with reports in the literature.*
- *Males have a higher incidence in all the three disorders identified.*
- *The highest incidence was seen for MR.*
- *Rural areas had the highest incidence for all the three disorders.*
- *The disorders were seen more in the lower and middle SES groups.*
- *Most of the children identified belong to nuclear type of family.*
- *Incidence was more in the Hindu community for CP, MR and CP & MR.*
- *A majority of the children identified were the results of consanguineous unions.*
- *Overlapping prenatal, natal and postnatal factors were found to contribute to the disorders identified.*
- *In the milder degree of CP prenatal factors were more frequently observed.*
- *The prenatal and natal factors were common for both CP & MR.*
- *Directly influencing factors like birth asphyxia and unnatural delivery types had a higher etiological correlation with CP than with MR.*
- *The degree of impairment in development was more in the CP and CP & MR group when compared to the pure MR category.*
- *The milder severity of CP, MR and CP & MR generally showed a better trend of school attendance.*
- *The major problem in the CP and CP & MR group were the result of their physical limitations while the MR children seem to have more of behavioural problems.*
- *Abnormalities in general physical appearance and associated syndromes were more in MR than CP.*
- *Functional activities/abilities were more impaired with increase in severity of the problem irrespective of the disorder.*
- *A screening using a highrisk register indicated a negative result in the occurrence of CP, MR or CP&MR on mothers identified as highrisk indicating improved maternal healthcare and awareness.*

Improved health care especially maternal and neonatal care seem to be the major reason for the relatively low incidence of CP, MR and CP & MR which is on par with numbers from developed countries. But even in this improved health scenario practices like consanguineous marriages is a major positive factor unique to the Indian context which should be abolished.

Delivery by unnatural methods like LSCS, Vacuum was observed frequently in the mothers of the identified population. This might have aided in the increased survival rate of low birth weight and premature infants leading to higher occurrence of these disorders in the population.

Awareness on rehabilitation facilities and aids available to these children are generally poor which is proved by the lesser attendance rates in schools by the higher severity groups in these disorders. This could also mean a lack of adequate rehabilitation facilities in the country.

INTRODUCTION

Human beings have the most elaborate, sophisticated, versatile & creative means of communication, which is made possible by their more complex neurophysiological mechanisms. As societies have become more complex, organized and inter-related, both within and among themselves, effective communication has become a primary concern.

An individual's communication skills may be impaired due to various etiological factors starting from the prenatal period to old age. This may affect one or more components of communication such as voice, fluency, articulation, language and hearing. These problems are more prevalent in children. Nearly 10% of child population has been found to have one or the other form of communication problems according to a large-scale survey conducted in and around Trivandrum (Suresh & Swapna, 1997). Mental Retardation (MR) and Cerebral Palsy (CP), many a time coexisting, constitute a sizeable proportion of these childhood communication disorders requiring early identification and management strategies for effective rehabilitation and mainstreaming.

Mental Retardation (MR) refers to restricted or limited global intellectual functioning of the individual including cognitive, motor, social and behavioral skills, which in turn will influence the communicative abilities of the child. Nearly 2% of children born at any one time may be classified as MR (Hedge, 1991). Mental Retardation varies from borderline to profound degree of retardation requiring various levels of intervention strategies.

Cerebral Palsy like the mental retardation is also a childhood problem, especially of the first 2 years of life, whose origin may be prenatal or congenital. It is a neurological condition caused by injury to the brain, characterized by a non-progressive disturbance of the motor system. CP is categorized into 3 main clinical types depending on the site of lesion in the brain. Spasticity due to lesion in pyramidal system, Dyskinesia (most common being Athetosis), due to lesion in the extra pyramidal system and Ataxia, due to

lesion in the cerebellar system. CP is associated with paralysis, intellectual deficiency, attending and behavioural problems, problems of physical growth, locomotion, communication, potential sensory complications and epilepsy. The common typological involvements in these children are hemiplegia, diplegia and quadriplegia. CP is prevalent in about 2-3 in 1000 births and the rate increases with the increased early risk factors such as prematurity, anoxia, kernicterus, birth trauma and infections during prenatal period.

CP generally is considered to be a static encephalopathy that is non-progressive in nature. However, the clinical expression of CP is subject to change as children and their developing nervous systems mature. Despite advances in neonatal care, CP remains a significant clinical problem.

Many patients with the diagnosis of CP have normal or above average intelligence. Expression of intellectual capacity may be limited by impairment in communication due to oro-motor, fine motor, and gross motor difficulties. Without appropriate compensation, these difficulties have the potential to impair the ability of the child to fully integrate academically and socially. Complications associated with CP include cognitive difficulties (primary intellectual impairment), GI dysfunction, dental caries, sensory deficits, and seizure disorder. A greater understanding of CP and the realization that patients with CP have significant potential to be unmasked allows medical professionals to approach CP in a multidisciplinary manner to maximize rehabilitative efforts.

Pathophysiology CP is defined as a persistent disorder of movement and posture caused by non-progressive defects or lesions of the immature brain. A clinical presentation of CP may result from an underlying structural abnormality of the brain; early prenatal, perinatal, or postnatal injury due to vascular insufficiency; toxins or infections; or the pathophysiologic risks of prematurity. Evidence suggests that prenatal factors result in 70-80% of cases of CP. In most cases, the exact cause is unknown but is most likely multi-factorial. During the prenatal period, abnormal development may occur

at any time (whether due to a genetic abnormality, toxic or infectious etiology, or vascular insufficiency).

Causes

The etiology may be multi-factorial but in most cases is unknown. Neuro-imaging may be entirely normal.

- An increasing amount of literature suggests a link between various prenatal, perinatal, and postnatal factors and CP.
- Interpretation of the literature is limited by the lack of strict definitions in studies attempting to define a pathogenesis of CP and the relatively small size of certain studies.
- Epidemiological studies suggest that prenatal factors play a significant role in the etiology of CP.
- Prenatal risk factors statistically correlated with CP include the following :
- Maternal thyroid disorder →
- Long menstrual cycle →
- Previous pregnancy loss →
- Previous loss of newborn →
- Maternal mental retardation→
- Maternal seizure disorder →
- History of delivering a child of less than 2000 g birth weight or with motor deficit, mental retardation, or sensory deficit. →
- Factors during pregnancy that also are correlated statistically with CP include the following:
    - Polyhydraminos
    - Treatment of the mother with thyroid hormone
    - Treatment of the mother with estrogen or progesterone
    - A fetus with congenital malformation
    - Maternal seizure disorder, severe proteinuria, or high blood pressure
    - Bleeding in the third trimester

- The apparent over representation of CP in multiple gestation pregnancies may relate more to the presence of prematurity or intrauterine growth retardation:
    - Multiple gestations may not be an added risk for CP.
    - The exception is when I twin dies; the surviving twin has a higher chance than a singleton of developing CP.
- During the perinatal period, infants of mothers whose placentas show evidence of chorionitis were more likely than others to have CP. Chorionitis is thought to contribute either directly or indirectly by increasing the risk of prematurity.
- Increased risk of CP is associated with non-vertex and face presentations of the fetus.
- In 10% of fewer cases of CP, birth asphyxia can be determined as the definitive cause:
    - Even when birth asphyxia is thought to be associated clearly with CP, abnormal prenatal factors (e.g. growth retardation or congenital brain malformations) may have contributed to perinatal fetal distress.
    - In attributing CP to birth asphyxia, documenting clear evidence of oxygen deprivation, organ system damage related to tissue hypoxia, or hypoxic ischemic encephalopathy (e.g. hypotonia, paucity of spontaneous movement, neonatal seizures) is important.
    - While APGAR scores provide a method for documenting cardiopulmonary and neuro-motor status in the minutes following birth, low scores cannot be used as an indicator of birth asphyxia. Such scores may reflect circumstances unrelated to birth asphyxia, such as infections and other preexisting prenatal conditions.
- Multiple postnatal factors that may contribute to CP include infections (e.g. meningitis, encephalitis), parenchymal-intraparenchymal hemorrhage, and hypoxia-ischemia from meconium aspiration and persistent fetal circulation.

Problems associated with Cerebral Palsy

Many individuals who have cerebral palsy have no associated medical disorders. However, disorders that involve the brain and impair its motor function can also cause seizures and impair an individual's intellectual development, attentiveness to the outside

world, activity and behavior, and vision and hearing. Problems associated with cerebral palsy include:

- **Mental Impairment**

About one-third of children who have cerebral palsy are mildly intellectually impaired, one-third is moderately or severely impaired, and the remaining third are intellectually normal. Mental impairment is even more common among children with spastic quadriplegia.

- **Seizures or Epilepsy**

As many as half of the children with cerebral palsy have seizures. In the person who has cerebral palsy and epilepsy, this disruption may be spread throughout the brain and cause varied symptoms all over the body -- as in tonic - clonic seizures -- or may be confined to just one part of the brain and cause more specific symptoms -- as in partial seizures.

Tonic - clonic seizures generally cause patients to cry out and are followed by loss of consciousness, twitching of both legs and arms, convulsive body movements, and loss of bladder control.

Partial seizures are classified as simple or complex. In simple parietal seizures, the individual has localized symptoms, such as muscle twitches, chewing movements, and numbness or tingling. In complex partial seizures, the individual may hallucinate, stagger, perform automatic and purposeless movements, or experience impaired consciousness or confusion.

- **Growth Problems**

A syndrome called failure to thrive is common in children with moderate-to-severe cerebral palsy, especially those with spastic quadriparesis. Failure to thrive is a general

term physicians use to describe children who seem to lag behind in growth and development despite having enough food. In babies, this lag usually takes the form of too little weight gain; in young children, it can appear as abnormal shortness; in teenagers, it may appear as a combination of shortness and lack of sexual development. Failure to thrive probably has several causes, including, in particular, poor nutrition and damage to the brain centers controlling growth and development. In addition, the muscles and limbs affected by cerebral palsy tend to be smaller than normal. This is especially noticeable in some patients with spastic hemiplegia, because limbs on the affected side of the body may not grow as quickly or as large as those on the more normal side. This condition usually affects the hand and foot most severely. Since the involved foot in hemiplegia is often smaller than the unaffected foot even among patients who walk, this size difference is probably not due to lack of use. Scientists believe the problem is more likely to result from disruption of the complex process responsible for normal body growth.

- **Impaired Vision or Hearing**

A large number of children with cerebral palsy have strabismus, a condition in which the eyes are not aligned because of differences in the left and right eye muscles. In an adult, this condition causes double vision. In children, however, the brain often adapts to the condition by ignoring signals from one of the misaligned eyes. Untreated, this can lead to very poor vision in one eye and can interfere with certain visual skills, such as judging distance. In some cases, physicians may recommend surgery to correct strabismus.

Children with hemiparesis may have hemianopia, which is defective vision or blindness that impairs the normal field of vision of one eye. For example, when hemianopia affects the right eye, a child looking straight ahead might have perfect vision except on the far right. In homonymous hemianopia, the impairment is on the same part of the visual field of both eyes. Impaired hearing is also more frequent among those with cerebral palsy than in the general population.

- **Abnormal Sensation and Perception**

Some children with cerebral palsy have impaired ability to feel simple sensations like touch and pain. They may also have stereognosia, or difficulty perceiving and identifying objects using the sense of touch. A child with stereognosia, for example, would have trouble identifying a hard ball, sponge, or other object placed in his hand without looking at the object.

Causes of Mental Retardation

Mental Retardation can be caused by any condition, which impairs development of the brain before birth, during birth or in the childhood years. Several hundred causes have been discovered, but in about one-third of the people affected, the cause remains unknown. The three major known causes of mental retardation are Downs Syndrome, Fetal Alcohol Syndrome and Fragile X Syndrome. The causes can be categorized as follows:

- **Genetic conditions**

These results from abnormality of genes inherited from parents, errors when genes combine, or from other disorders of the genes caused during pregnancy by infections, overexposure to x-rays and other factors. More than 500 genetic diseases are associated with mental retardation. Some examples include PKU (phenylketonuria), a single gene disorder also referred to as an inborn error of metabolism because it is caused sporadically and are caused by too many or too few chromosomes, or by a change in structure of a chromosome. Fragile X syndrome is a single gene disorder located on the X chromosome and is the leading inherited cause of mental retardation.

- **Problems during pregnancy:**

Use of alcohol or drugs by the pregnant mother can cause mental retardation. Recent research has implicated smoking in increasing the risk of mental retardation.

Other risks include malnutrition, certain environmental contaminants, and illnesses of the mother during pregnancy, such as Toxoplasmosis, Cytomegalovirus, Rubella and Syphillis. Pregnant women who are infected with HIV may pass the virus to their child, leading to future neurological damage.

- **Problems at birth:**

Although any birth condition of unusual stress may injure the infant's brain, prematurity and low birth weight predicts serious problems more often than any other conditions.

- **Problems after birth:**

Childhood diseases such as whooping cough, chicken pox, measles, and such diseases, which may lead to meningitis and encephalitis, can damage the brain, as can accidents such as a blow to the head or near drowning. Lead, mercury and other environmental toxins can cause irreparable damage to the brain and nervous system.

- **Poverty and cultural deprivation:**

Children in poor families may become mentally retarded because of malnutrition, disease-producing conditions, inadequate medical care and environmental health hazards. Also, children in disadvantaged areas may be deprived of many common cultural and day-to-day experiences provided to other youngsters. Research suggests that such under-stimulation can result in irreversible damage and can serve as a cause of mental retardation.

Causes of mental retardation are numerous, but a specific reason for mental retardation is determined in only 25% of the cases. Risk factors are related to the causes. Mental retardation affects about 1 to 3% of the population. Causes of mental retardation can be roughly broken down into several categories:

- Unexpected (this category is the largest and a catchall for undiagnosed incidences of mental retardation)
- Trauma (prenatal and postnatal):
    - Intracranial hemorrhage before or after birth (for example Periventricular hemorrhage)
    - Hypoxic injury before, during or after birth
    - severe head injury
- Infections (congenital and postnatal):
    - Congenital rubella
    - Meningitis
    - Congenital CMV
    - Encephalitis
    - Congenital toxoplasmosis
    - Listeriosis
    - HIV infection
- Chromosomal abnormalities:
    - Errors of chromosome numbers (Down's syndrome)
    - Defects in the chromosome or chromosomal inheritance (Fragile X syndrome, Angelman syndrome, Prader-Willi syndrome)
    - Chromosomal translocations (a gene is located in an unusual spot on a chromosome, or location on a different chromosome than usual) and deletions (Cri du chat syndrome)
- Genetic abnormalities and inherited metabolic disorders:
    - Galactosemia
    - Tay-Sachs disease
    - Phenylketonuria
    - Hunter syndrome
    - Hurler syndrome
    - Sanfilippo syndrome
    - Metachromatic leukodystrophy

    - Adrenoleukodystrophy
    - Lesch-Nyhan's syndrome
    - Rett syndrome
    - Tuberous sclerosis
- Metabolic:
    - Reye's syndrome
    - Hypernatremic dehydration
    - Congenital hypothyroid
    - Hypoglycemia (poorly regulated diabetes mellitus)
- Toxic:
    - Intrauterine exposure to alcohol, cocaine, amphetamines, and other drugs
    - Methylmercury poisoning
    - Lead poisoning
- Nutritional:
    - Kwashiorkor
    - Marasmus
    - Malnutrition
- Environmental

Associated Problems with Cerebral Palsy and Mental Retardation

Many individuals who have Cerebral Palsy have no associated medical disorders. However, disorders that involve the brain and impair its motor function can also cause seizures and impair an individuals functional abilities.

Respiratory Disorders :

Due to restricted mobility some CP children may have greater susceptibility to upper respiratory tract diseases. Proper and prompt antibiotic treatment is the remedial measure.

Feeding Problems:

Chewing may be difficult. The suck and swallow pattern may continue even after infancy. Chances of aspiration are higher as the pharynx may not close in time for swallow. Food or liquid may enter the lumgs. Regurgitation may occur. All this might put the child off feeding. An appropriate diet with food consistency, minor surgery, insertion of tube is to be adopted after consultation with professionals.

Drooling:

Control of saliva difficult due to inadequate lip seal and pooling of saliva in the buccal cavity. Specific drooling management techniques and surgery to route saliva to the throat are remedial measures.

Dental Problems:

When tongue movements are restricted or difficult food may get lodged in the teeth. In addition uneven teeth might lead to dental problems. Oral hygiene measures of brushing are advised after every meal.

Digestive Problems:

Due to a lack of mobility the CP child may get constipated. Dietary management like incorporation of plenty of fluids and fibre must be done as remedial measure.

Objectives of the Project

The vast effects that CP, MR and CP&MR have on a person's life and the long term medical and supportive treatment that this population requires is a major socioeconomic, socio cultural and healthcare issue. In this context it is very essential that we have a realistic idea about how much these problems are present around us, what are

their major causes etc so as to effectively plan healthcare measures for this population. The present study was designed with these factors in mind.

The major objectives of this study are:

4. To identify children with CP, MR, CP & MR based on the survey and detailed assessment by a multidisciplinary team of specialists.
5. To find the epidemiological factors (age, sex, socioeconomic factors etc) related to CP, MR, CP & MR by identifying them based on the Survey.
6. To relate type and degree of CP, MR, CP and MR to the etiological/high risk factors and to identify associated problems present with these disorders.

.4. To identify mothers who are at risk for having children with CP, MR, CP & MR and follow them up to find the number of affected children.

REVIEW OF LITERATURE

Incidence & Prevalence of CP

An increasing number of epidemiological studies across the globe over the past 2-3 decades have witnessed prevalence rates anywhere between 1 to almost 3 per 1000 live births for the neuro developmental disorder of Cerebral Palsy.

Incidence rates of Cerebral Palsy in suburban Tokyo during 1985 to 1989 showed 2.2/1000 live births (Suzuki H., Iso A., 1992) and yet another study done during 1985 to 1989 showed 2.01/1000 as against a 1.09/1000 school aged children in an Epidemiological Study of Cerebral Palsy done in Japan between 1986 to 1997.

Reports on prevalence rates of Cerebral Palsy from Europe have been at par with the Eastern parts of the Globe. An Epidemiological Study done in England and Scotland during 1984 to 1989 showed a prevalence rate of 2.1/1000 neonatal survivors. Trends in Cerebral Palsy birth prevalence in Eastern Denmark showed an increase from 2.6 to 3/1000 live births from 1979 - 1982 to 1983 - 1986 (Topp M., Uldall P., Langhorff Roos J., 1997). A Swedish population showed a crude live birth prevalence of 2.3/1000 from 1987 - 1990. Prevalence study done in Alberta, Canada showed an overall prevalence of 2.57/1000 (Robertson C.M., Sevenson L.W., Joffres M.R., 1998).

Neighboring home, a population based study on the prevalence of Cerebral Palsy carried out in China in 1997 showed a prevalence rate of 1.6/1000 live births.

In the Indian contest, though not many studies on prevalence rates are available to compete the global panorama, Report No.393 NSSO A Report on Disabled Persons 47th Round July - December 1991, a report on a survey of children aged (0-14) years showed the prevalence rates of physical disability as 22.77/1000 (males) vs. 16.94/1000 (females). Among the persons identified as having locomotor disabilities, 48% of Cerebral Palsy belongs to the rural areas and 43% to the urban areas.

In the current scene, a further breakup has been reported in literature as follows. 78-80% of all Cerebral Palsies have been identified as Spastic type with subtypes Hemiplegia accounting for 30-40%, Diplegia accounting to 20-40% followed by Quadriplegia among the Spastic Cerebral Palsy in various series. Among the nonspastic Cerebral Palsies, Dyskinesia has been accounted by 9% and Ataxia by 7% of all Cerebral Palsy.

Incidence & Prevalence of MR

Literature has revealed higher prevalence rates for mental retardation from studies across the developed and developing countries.

Prevalence rates of mental retardation range from as low as 0.8/1000 for mild mental retardation to overall prevalence rate of almost 12.8/1000 children.

Incidence rates of severe Mental & Motor retardation and Mental Retardation in suburban Tokyo area during 1985 to 1989 were 1/1000 and 11.6/1000 respectively as reported by Suzuki H., Kodama K. Incidence of Mental Retardation and Down's Syndrome in Tokyo during the period 1978 to 1987 reported by Yamada K in 1994 showed 0.868 and 0.099% respectively. By degree of retardation incidence rates for Mild Mental Retardation and Severe Mental Retardation were 0.512% and 0.355% respectively.

Prevalence of Mental Retardation in Norway between 1980 and 1985 was reported as 2.6/1000. Prevalence for Profound, Severe, Moderate and Mild Mental Retardation were 0.8, 0.4, 1.5 and 3.5/1000 respectively (Stromme P. and Valvatne K. 1998).

Prevalence study of Mild Mental Retardation during December 1994 reported 12.8/1000 (Fernell E., 1996).

Among the Asian reports of prevalence rates of Mental Retardation in a study done in Beijing showed an overall prevalence rate of 1.20%. The percentage of Mild, Moderate, Severe and Profound Mental Retardation was 60.6%, 22.7%, 9.6% and 7.1% respectively (Zou Q.H., Lei Z.W., Zhang Z.X., 1994).

Study carried out in Karachi, Pakistan during 1988 to 1989 estimated the prevalence of Mental Retardation as 19/1000 for serious retardation and 65.3/1000 for mild retardation (Durkin M.S., Hasan Z.M., Hasan K.Z., 1998).

Prevalence of Mental Retardation in Bangladesh was reported as 5.9/1000 and 14.4/1000 for Severe and Mild Mental Retardation by Islam S., Durkin M.S., Zaman S.S., in 1993.

An estimated 24 million individuals in India are reported to be suffering from Mental Retardation (0.8 million being adults > 20 years, 15 million children < 10 years) of which approximately 6 million are moderately, severely or profoundly handicapped as reported in Report No.393 NSSO. A Report on Disabled Persons 47th Round July to December 1991 says 91% of the retarded were from the rural area and 90% from the urban area.

Etiological factors associated with CP & MR

A clinical presentation of Cerebral Palsy may result from underlying structural abnormalities of the brain, early pre-natal, perinatal or natal injury due to vascular insufficiency, toxins or infections and the pathophysiological risks of prematurity.

Evidence from literature suggests that pre-natal factors result in 70-80% of cases of Cerebral Palsy. In most cases the exact cause is unknown but is most likely multi factorial. During the pre-natal period abnormal developments may occur at any time due to genetic abnormality, toxins, infections, etiology or vascular insufficiency.

Yamada K., 1994, reported the rates of prenatal brain damage, perinatal damage, post perinatal brain damage and unknown origin with Mental Retardation were 20.5%, 22.7%, 4.5% and 34.1% respectively. The rate of perinatal brain damage with Cerebral Palsy was 81.8%. The rate of perinatal disorders, which play some role in Cerebral Palsy and Mental Retardation, was 12.8%.

A epidemiological study done to find the etiological factors of Mental Retardation (Zou Q.H., Lei Z.W., Zhang Z.X., 1994) reported specific causes in 79.1% of the children studied. Unknown etiology was accounted by 21.9%. However timing of process shows prenatal causes in 34%, perinatal causes in 11.9% and postnatal causes in 33%.

Bottos M.W., Granato T., Allibrio G., Giochin C., Puato M.L., 1999 in their study in North East Italy suggested that prenatal factors could be associated with some types of Cerebral Palsy while in Diplegia, Quadriplegia and Dyskinesia the prenatal factors are notable. Perinatal factors were associated with low birth weight children while prenatal factors were greater for normal birth weight infants.

Hagberg B., Hagberg G., Olow I, van Wendt L, in their study done at Sweden found that in the term Cerebral Palsy, prenatal causes were convincing in 28% of cases and 25% were perinatal in nature. The particular critical period for the brain damage was considered to be 26-34 weeks of gestation (when the periventricular structures are extra ordinarily vulnerable). They concluded that, in total, 2/3rd of Cerebral Palsy lesions might have been acquired during these decisive months of brain damage of brain development.

In a study done in Himejic City in 1983-1992, Periventricular leukomalacia was indicated in the MRIs of 11 of 40 cases (27.5%) during the years 1983 - 1987 and in 25 of 51 (49%) during 1988 to 1992.

A study on the trend in Cerebral Palsy birth prevalence in Eastern Denmark: birth year period 1979-1986 (Topp M., Uldall P., Langhoff - Roos J., 1997) reported that

Cerebral Palsy birth prevalence had increased from birth year period 1979 - 1982 to 1983 - 1986 because of an increased rate in preterm infants below 31 weeks, who at the same time had a reduced risk of early neonatal death.

In a study done by Suzuki J., Ito M., Tomiwa K., in Japan during the years 1977 to 1988 the prevalence of Cerebral Palsy was reported to be 9 fold among low birth weight infants (1500 - 2,499 gms.) and 41 fold among very low birth weight infants (<1000 gms.) compared with that of mature infants (> or = to 2500 gms.).

In their study Naulty C.M., Long L.B., and Pettett G., studied the associations between perinatal infants and subsequent Cerebral Palsy. Nearly half of the very low birth weight infants had evidence of brain injury (intraventricular hemorrhage). Birth asphyxia and congenital malformations occurred no more frequently than commonly reported. 60% of the full term infants who developed Cerebral Palsy continued to be the products of normal pregnancies and had no perinatal events that may have caused their neurological impairments.

Krageloh-Mann I et. al in their comparative study between South West Germany and West Sweden on epidemiological data of a collaborative study on children with bilateral spastic cerebral palsy (BSCP) covered during the years 1975 to 1986. There was an overall increase in BSCP during the periods 1976 to 1977 and 1978 to 1980 but decreased thereafter. The rise was due to an increase of BSCP in low birth weight children especially very low birth weight children. Results were in favour of a predominantly prenatal etiology in normal birth weight and of a predominantly peri and neonatal etiology in low birth weight children.

In a study of prevalence and type of Cerebral Palsy in a British Ethnic Community: the role of consanguinity (Sinha G., Corry P., Subesinghe D., Wild J., Levene M.I - 1997). First cousin marriages occurred in 15 of the 39 Asian families (51.7%) and nine of these families had another first or second-degree family member with a similar type of Cerebral Palsy to the index child. There was no consanguinity in

the non-Asian families. These data highlight the increased need for services in some ethnic populations living in Britain and the likely genetic etiology of a significant proportion of cases of Cerebral Palsy in Asian families.

In a study on differing risk factors for Cerebral Palsy in the presence of mental retardation and epilepsy reported in the journal of child neurology (Arpino C., Curatolo P., Stazi M.A., Pellegri A., Vlahov D., 1999). The group with a triple diagnosis of Cerebral Palsy, Mental Retardation and Epilepsy was significantly more likely than the other two groups to have a history of neonatal convulsions and a history of epilepsy in first degree relations, but less likely to have a mother's age at delivery greater than 33 years, a birth weight less than 1500 g, or gestational age less than 32 weeks. The dual diagnosis group was more likely than the other two groups to have maternal education of less than 8 years. These data suggest the possibility of different etiopathogenetic pathways for various presentations of Cerebral Palsy.

A case control study to identify risk factors for the co-occurrence of partial epilepsy, Cerebral Palsy and Mental Retardation (Curatolo P., Aprino C., Stazi M.A., Medda E., 1995) showed history of epilepsy in first degree relatives, maternal diseases in the two years before pregnancy, placental pathologies, low gestational age, being small for dates, neonatal convulsions and the need for cardiopulmonary resuscitation were associated with partial epilepsy, cerebral palsy and mental retardation. A family history of epilepsy in first-degree relatives was surprisingly frequent in both groups, suggesting that genetic factors play an important role for children with and without cerebral malformations.

A report from Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh stated that acquired Cerebral Palsy, mostly secondary to CNS infections constitute a significant proportion of cases in developing countries.

Associated problems of CP & MR

Parkes J., Dolk H., Hill N. and Pattenden S., in their study of Cerebral Palsy in Northern Ireland during 1981 to 1993 found that the most common Cerebral Palsy subtype was bilateral spastic Cerebral Palsy (55%). 29% of cases were unable to walk (with/without aids) and 22% had no useful hand/arm function. 49% of cases had atleast one or other impairment including sensory impairments/active seizures.

Study done by Suzuki J., Ito M., Tomiwa K., Okuno T., in Japan found 69/202 cases with Spastic Diplegia, 62/202 with Tetraplegia, 32/202 with Hemiplegia, 23/202 with Dyskinetic type and 15/202 with the Ataxic type born between April 1977 and March 1987. The degree of gross motor disability differed among the clinical type, being mild in 45%, moderate in 17% and severe in 39% of cases. Gross motor disability was generally co-related with Mental Retardation. Some known ambulatory cases exhibited a normal or subnormal mentality and most of such cases had been preterm infants with Spastic Diplegia. Most cases with mild gross motor disability and severe or severe or moderate Mental Retardation had been term infants. 48% suffered from epilepsy. Microcephaly was associated in 35% of cases.

It has been estimated that 17 to 60 % of the cases of Cerebral Palsy have no known perinatal or neonatal complications. Undocumented antenatal events may cause brain damage or increase the infant's vulnerability to future events

METHODOLOGY

The present study titled **"Intervention program for children with Cerebral Palsy and Mental Retardation - A multi disciplinary approach"** was designed to be carried out in two phases. The aims of the first phase of the study were:

1. To identify children with CP, MR, CP & MR based on the survey and detailed assessment by a multidisciplinary team of specialists.
2. To find the epidemiological factors (age, sex, socioeconomic factors etc) related to CP, MR, CP & MR by identifying them based on the Survey.
3. To relate type and degree of CP, MR, CP & MR to the etiological/high risk factors and to identify associated problems present with these disorders.
4. To identify mothers who are at risk for having children with CP, MR, CP & MR and follow them up to find the number of affected children.

Area of study

15 wards of the Sreekaryam Panchayat were chosen for the study with a total population of 30812 and a childhood population of 8819. Of this 15 wards 4 were urban and 11 were rural. The map of the surveyed areas is given in APPENDIX - I

The first phase was divided into two parts. PART I being the screening phase and PART II the assessment phase.

PART - I - Screening

PART I involved a house-to-house survey of these 15 wards. An initial socioeconomic pro-forma was filled which included details like the locality, address, family details, socio economic status, religion and other socio economic data of the total population of the 15 wards. A copy of the socioeconomic pro-forma is given in APPENDIX - II

A screening procedure was then adopted to screen all children aged 0-16 years using a questionnaire and those children who failed on the questionnaire were referred to ICCONS for detailed assessment by a multidisciplinary team. Table 1 gives details of the child population in the age group of 0-16 years in the 15 wards.

Table 1: Details of the childhood population aged 0 – 16years in the 15 wards.

AGE GROUP	SEX	TOTAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0-5	Male	1535	90	64	132	73	103	116	93	81	128	77	115	112	111	106	117
	Female	1397	81	69	103	76	107	116	103	85	82	66	109	113	99	79	91
6 - 10	Male	1254	62	63	84	93	100	104	67	65	87	69	113	73	102	70	94
	Female	1220	78	57	95	72	73	114	68	57	83	70	117	86	82	69	91
11 -16	Male	1736	130	71	141	117	120	162	91	92	118	93	140	119	108	104	128
	Female	1677	85	63	147	134	116	157	108	93	86	77	150	122	95	107	133

Data collection was conducted with the assistance of 10 social workers who were trained in data collection by experienced Speech Pathologists and Neurologist.

The screening questionnaire was constructed in consultation with various professionals involved in the diagnosis of various cognitive and communicative disorders including CP and MR. The questionnaire included 10 highly sensitive questions based on factors commonly associated with CP and consisted of:

- Natal and postnatal factors
- Developmental features
- Physical abnormalities
- Sensory abnormalities
- Speech & language delays and difficulties
- Learning problems
- Functional abilities
- Medical conditions

The questionnaire had choices of 'Yes' and 'No' and those children who obtained 'Yes' in at least one question were considered as positive as the questions selected for the questionnaire had core factors and features seen in CP and MR. A copy of the screening questionnaire is given in APPENDIX - III

Few pro-formas filled by the Social Workers were later selected for random checking to find the validity of data collected.

PART - II - Assessment

Those children who obtained even one positive response in the screening questionnaire were called for a detailed assessment. Detailed assessment was carried out at ICCONS and other specified centers within the panchayat.

The detailed assessment involved testing of the children by Speech language Pathologists, Clinical Psychologists and Neurologists who are part of multidisciplinary teams involved in the diagnosis and management of CP and MR. Assessment of each child in the various departments lasted about 3 hours in duration.

A diagnostic pro-forma was constructed for this detailed assessment. The pro-forma also included questions, which were included for the study titled "Epidemiological survey of chronic neurological illness among the elderly in Kerala". Those questions relevant to CP, MR and CP&MR were only considered for the study. The diagnostic pro-forma had questions categorized in 3 sections as shown below.

Section 1 comprised of the following details of the child:

- Age
- Sex
- Handedness
- Birth and related history

- Prenatal, natal and postnatal factors
- Previous investigations and treatment
- Developmental history
- Educational history
- General evaluation (comprising of presence of physical deformities, defects of head and neck, limbs, gait, motor system, sensory organs, unusual behaviors and family history of illness/defects)
- Speech and language evaluation (inclusive of speech mechanism evaluation of structure and function, articulation, voice, prosody, language skills)
- Hearing

Section 2 gave details of psychological evaluation inclusive of the following:

- Test administered
- Intelligence Quotient
- Level of intellectual functioning

Section 3 were inclusive of the following details like:

- General examination (included physical details - like height, weight, head circumference, head shape, facies, spine, feet, presence or absence of congenital deformities and blood pressure)
- Systemic evaluation (included cardiovascular, respiratory, gastrointestinal, endocrine and muscular-skeletal systems evaluation)
- Neurological evaluation (included Mini Mental Status Examination, speech and language skills and functioning of cranial nerves)
- Motor system (checked for bulk, tone, involuntary movements, coordination, sensation, DTR's, plantars, gait, tandem walking, SLR's, primitive reflexes)
- Grading of functional activity (evaluated skills: stair climbing, ambulation, bathing, dressing, grooming and feeding)

- Functional systems (cognitive, pyramidal and extra pyramidal, cerebellar and sensory systems, brain stem, peripheral nerves, neuro-muscular junction, muscles and autonomic system were evaluated)

A copy of the Diagnostic Pro-forma is given in APPENDIX - IV. The description of the various terms used in the Diagnostic Pro-forma and their relevance to CP, MR and CP&MR is given in APPENDIX - V

Scoring

The Scoring of the various aspects checked using the diagnostic pro-forma was highly variable and subjective due to the various factors associated with the disorders studied.

Once the final diagnosis was arrived at, using the diagnostic pro-forma the data was tabulated and analysed to look for the various factors, which form the aim of the study.

Considering the large amount of data occurring in the category of associated problems of these disorders the associated problems were divided in to various sections and then analyzed under each group to make tabulation and analysis easier. Those factors relevant to CP, MR and CP&MR were only considered. The different sections under the associated problems were:

Section 1 Development

- Gross motor Development
- Fine motor Development
- Oral motor Development
- Self help skills Development
- Speech and Language Development
- Auditory Skills Development

- Visual Skills Development
- Other senses Development
- Social skills Development

Section 2 Schooling

Section 3 General, Physical and Behavioural Characteristics

- Physical Deformities
- Head and Neck defects
- Limbs
- Gait
- Motor
- Sensory Organs
- Unusual Behaviours

Section 4 Speech, Language, Hearing Development, Structure and Functions

- Speech Mechanism
- Structure
- Vegetative Functions
- Speech Functions
- Articulation
- Language
- Comprehension
- Expression
- Hearing

Section 5 General Physical Examination

- Head Shape
- Facies
- Spine
- Feet

Section 6 Neurological Examination

- Tone
- Coordination
- DTR
- Plantars
- Gait
- SLR
- Primitive reflexes

Section 7 Functional Activities and Abilities

- Stair Climbing
- Ambulation
- Bathing
- Dressing
- Grooming
- Feeding
- Functional Grading
- Cognitive Functions
- Pyramidal Functions

High Risk Register

To find out the children who are at risk for having CP and MR a questionnaire was constructed to check for high risk factors in the pregnant mothers. The questionnaire was inclusive of the following details:

- Age
- Education
- Occupation

- Number of children
- Month of pregnancy
- Previous miscarriages
- Overall health status of the mother.

Apart from this, nine questions pertaining to factors, which are seen to result in CP and MR children in pregnant mothers, were included in this register. If the mother failed in atleast one question on this register, the baby was classified as at risk for having CP and MR and was followed up at the time of birth with the cooperation of local maternity homes, PHC's and Pediatricians.The questionnaire used to check the High Risk Factors in the pregnant mother is given in APPENDIX - VI

The results of the present study and discussions are given in the following chapter.

RESULTS & DISCUSSIONS

The Phase I of the project titled “Intervention Program for Children with Cerebral Palsy and Mental Retardation - A multidisciplinary approach” was carried out in 15 wards of Sreekaryam Panchayat with a population of 30591 and childhood population (0-16) years of 8819. A door-to-door survey was done by a team of 12 trained social workers who administered a questionnaire to all children aged (0-16) years and identified those who were likely to have Cerebral Palsy and Mental Retardation. 898 children showed atleast one positive response on the questionnaire.

In the second part of phase I, these 898 children had to be evaluated in detail by a team consisting of a Neurologist, Speech language pathologist and Clinical Psychologist to confirm the presence of Cerebral Palsy and Mental Retardation.

Of the 898 children 76 had untraceable addresses and hence only 822 children could be subjected to detailed evaluation. These children were called to ICCONS for the detailed evaluation or were evaluated at specific centers within their locality.

795 children were evaluated in detail. The rest of the children were not evaluated, as they did not appear for evaluation inspite of sending three reminders.

Of the 795 children evaluated 592 were found to be normal. 61 children had MR, CP and CP&MR. The other disorders identified are given in Table 2

TABLE 2: Details of the total childhood population studied and the various disorders identified.

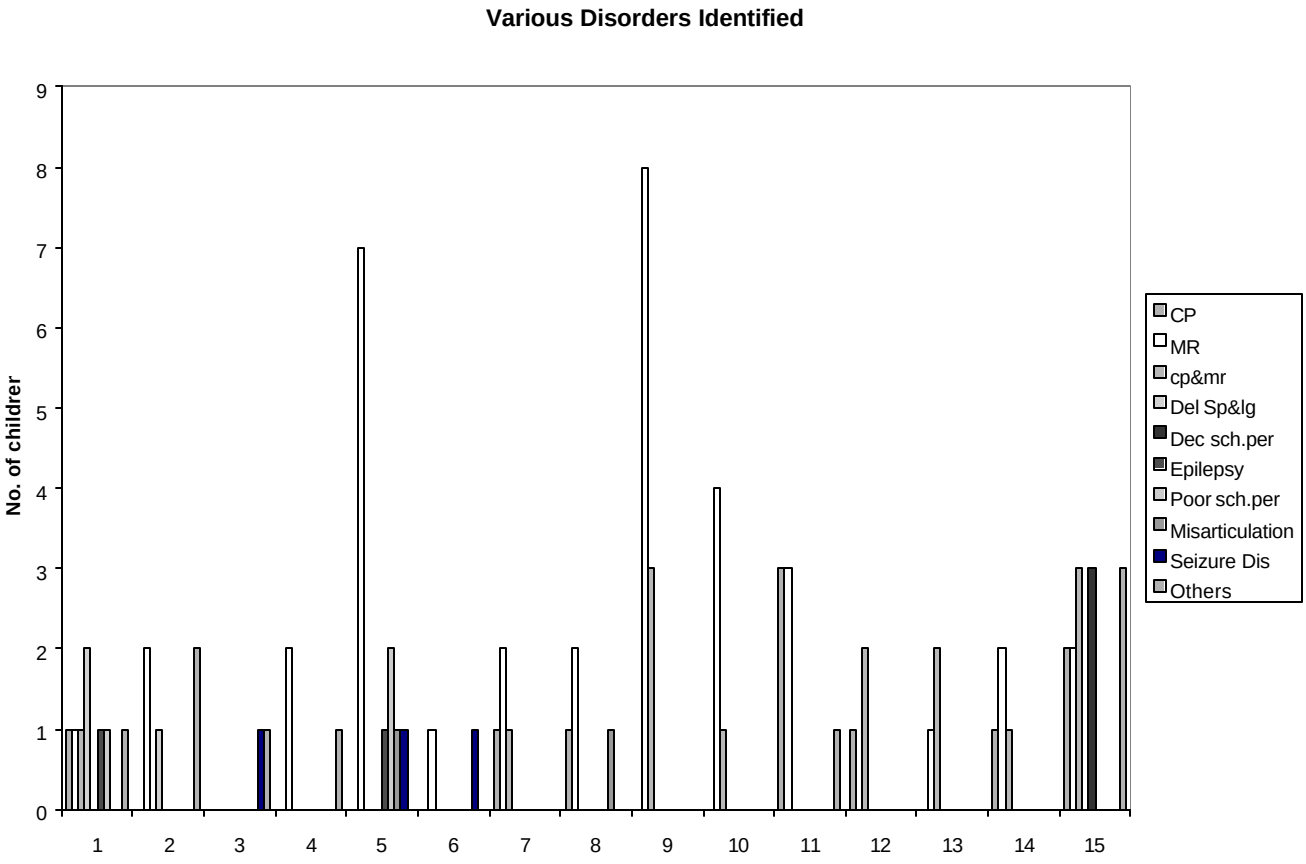
Ward	Screened People	No.of children	Identified	Screened II	NORMAL	Untraced	CP	MR	CP&MR	Del Sp&lg	Dec sch.per	Epilepsy	Poor sch.per	Misarticulation	Seizure Dis	Others
1	1915	526	54	40	12	20	1	1	1	2	0	1	1	0	0	1
2	1251	387	60	39	26	7	0	2	0	1	0	0	0	0	0	2
3	2595	702	42	21	15	4	0	0	0	0	0	0	0	0	1	1
4	2033	565	90	59	51	7	0	2	0	0	0	0	0	0	0	1
5	2054	619	130	108	96	3	0	7	0	0	0	1	2	1	1	0
6	2868	769	6	6	4	1	0	1	0	0	0	0	0	0	1	0
7	1681	530	62	57	53	3	1	2	1	0	0	0	0	0	0	0
8	1815	473	44	45	30	9	1	2	0	0	0	0	0	1	0	0
9	1976	584	28	23	10	2	0	8	3	0	0	0	0	0	0	0
10	1537	452	19	17	9	3	0	4	1	0	0	0	0	0	0	0
11	2432	744	102	94	83	5	3	3	0	0	0	0	0	0	0	1
12	2278	625	11	14	6	3	1	0	2	0	0	0	0	0	0	0
13	2061	597	44	40	37	2	0	1	2	0	0	0	0	0	0	0
14	1747	535	74	61	54	4	1	2	1	0	0	0	0	0	0	0
15	2348	654	132	108	94	4	2	2	3	0	3	0	0	0	0	3
Total	30591	8762	898	732	580	76	10	37	14	3	3	2	3	2	3	9

(Other disorders included Below average Performers, Congenital Meningo Myclocoele, CSOM, Developmental Expressive Aphasia, Hearing Loss, Learning Disability, Prematurity, Rt. Hemidystonia)

The representation of CP, MR and CP&MR in the various wards are marked in the map of the survey area given in APPENDIX –I.

Figure 1:Various disorders identified in the survey.

Incidence of CP, MR, CP&MR



Of the total children evaluated 61 children had CP, MR or CP and MR.

TABLE 3:Number and percentage of children affected with CP, MR and CP&MR

SEX	CP	MR	CP&MR	TOTAL	%
Female	4	13	5	22	0.25
Male	6	24	9	39	0.45
TOTAL	10	37	14	61	0.7

The total percentage of children with CP, MR, CP&MR were 0.7% of the total population studied of which 0.45% were males and 0.25% females.

TABLE 4: Number and percentage of children with CP.

SEX	CP	CP%
Female	4	0.05
Male	6	0.07
TOTAL	10	0.12

The percentage of children with CP was 0.12% of the total population studied, of which 0.07% was males and 0.05% females.

TABLE 5: Number and Percentage of children with MR.

SEX	MR	MR%
Female	13	0.15
Male	24	0.28
TOTAL	37	0.42

The percentage of children with MR was 0.42% of which 0.28% was males and 0.15% females.

TABLE 6: Number and percentage of children with both CP&MR.

SEX	CP&MR	CP&MR%
Female	5	0.06
Male	9	0.10
TOTAL	14	0.16

The percentage of children with CP&MR was 0.16% of which 0.1% was males and 0.06% females.

Incidence per 1000 for CP, MR and CP&MR

Table 7: Incidence per thousand for CP, MR and CP&MR

SEX	CP	MR	CP&MR
Female	0.55	1.78	0.69
Male	0.82	3.29	1.24
TOTAL	1.37	5.08	1.92

The incidence per 1000 children for CP was 1.37

The incidence per 1000 children for MR was 5.08

The incidence per 1000 children for CP&MR was 1.92

Observations and inferences:

The results on percentage occurrences and incidence agree with the studies reported in literature. All these problems had a higher incidence in males than females. Studies supporting these findings are given in the review of literature.

Age Range

The incidence of CP, MR, CP&MR across the age ranges of 0-5 years, 6-10 years and 11 to 16 years are

Table 8: Incidence of CP, MR and CP&MR in the various Age Ranges

AGE RANGE	CP	MR	CP&MR
0 to 5	5	13	5
6 to 11	5	9	4
11 to 16	0	15	5

It was seen that the incidence of CP,MR and CP&MR have remained relatively stable over the years with no drastic increase or reduction in the number of children affected with these disorders.

Observations and inferences:

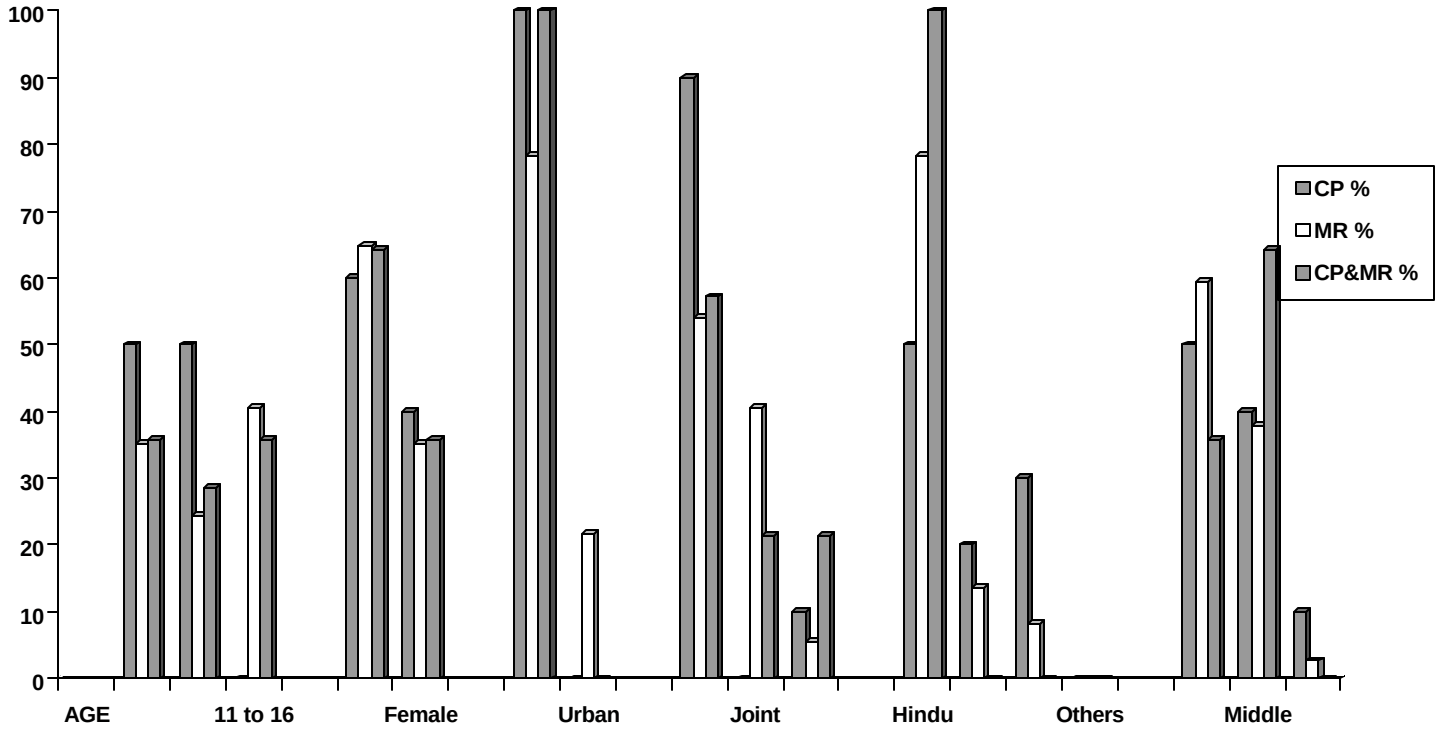
Studies have reported an increase in incidence of CP, MR and CP & MR over the years because of the increase in number of neonatal survivors but no such effects could be seen in the present study.

EPIDEMIOLOGICAL FACTORS RELATED TO CP, MR AND CP&MR

Table 9: Epidemiological Factors Related to CP, MR and CP&MR

	CP	CP %	MR	MR %	CP&MR	CP&MR %
AGE						
0 to 5	5	50	13	35.14	5	35.71
6 to 11	5	50	9	24.32	4	28.57
11 to 16	0	0	15	40.54	5	35.71
SEX						
Male	6	60	24	64.86	9	64.29
Female	4	40	13	35.14	5	35.71
LOCALITY						
Rural	10	100	29	78.38	14	100.00
Urban	0	0	8	21.62	0	0.00
TYPE OF FAMILY						
Nuclear	9	90	20	54.05	8	57.14
Joint	0	0	15	40.54	3	21.43
Extended	1	10	2	5.41	3	21.43
RELIGION						
Hindu	5	50	29	78.38	14	100.00
Christian	2	20	5	13.51	0	0.00
Muslim	3	30	3	8.11	0	0.00
Others	0	0	0	0.00	0	0.00
SE STATUS						
Low	5	50	22	59.46	5	35.71
Middle	4	40	14	37.84	9	64.29
Upper	1	10	1	2.70	0	0.00

Figure 2 : Epidemiological Factors Related to CP, MR and CP&MR



Cerebral Palsy: It was found that 50% of children in the age range 0-5 years and 50% of children in the age range 6-11 years and none in the 11 -16 year age range had CP, of which 60% were males and 40% females. 100% of the CP children identified, belonged to the rural area and none to the urban area. 90% of the children identified, belonged to nuclear type of family, none to the joint type and 10% to extended type of family. 50% of the children identified belonged to the Hindu community, 20% to the Christian community and 30% to the Muslim community. 50% of children belonged to a low socio-economic status, 40% to the middle and 10% to the upper socio-economic classes respectively.

Mental Retardation: It was found that 35.14% of children in the age range 0-5 years and 24.32% of children in the age range 6-11 years and 40.54% in the 11-16 year age range had MR, of which 64.86% were males and 35.14% females. 78.38% of the MR children identified, belonged to the rural area and 21.62% to the urban area. 50.04% of children identified, belonged to the nuclear type of family, 40.54% to the joint type and 5.41% to

the extended type of families. 78.38% of the children identified, belonged to the Hindu community, 13.51% to Christian community and 8.11% to the Muslim community. 59.46% of children belonged to a low socio-economic status, 37.84% to the middle and 2.70% to the upper socio-economic classes respectively.

Cerebral Palsy & Mental Retardation: It was found that 35.71% of children in the age range 0-5 years, 28.57% of children in the age range 6-11 years and 35.71% in the 11-16 year age range had CP & MR, of which 64.29% were males and 35.71% females. 100% of the CP & MR children identified belonged to the rural area and none belonged to the urban area. 57.14% of children identified, belonged to a nuclear type of family, 21.53% to the joint type and 21.43% to the extended type of families. 100% of the children identified, belonged to the Hindu community. None belonged to the Christian and Muslim communities. 35.71% of children belonged to a low socio-economic status, 64.29% to the middle and none to the upper socio-economic classes respectively.

Observation and inferences: The incidence of CP, MR, CP&MR was found to be relatively stable across the three age ranges studied ie.0-5 years, 6-11years and 11-16 years. Most of these disorders identified were from the rural areas with low and middle socio-economic status. Relatively high occurrence was found in the nuclear type of family set up with a majority of children identified were from the Hindu community.

Relatively high no of children being identified from the rural areas could be attributed to the low educational &health awareness levels in the rural areas. Since the trend of family set up was commonly identified as nuclear type and the Hindu community being dominant in these areas, this could validate the above observations.

ETIOLOGICAL FACTORS

Table No.10 Etiological factors associated with CP, MR, CP & MR.

MATERNAL AGE	CP	%	MR	%	CP&MR	%
UP TO 20	1	10	5	13.51	1	7.14
>35	3	30	1	2.70	1	7.14
MISCARRIAGE						
YES	2	20	11	29.73	2	14.29
CONSANGUINITY						
YES	1	10	9	24.32	3	21.43
PRENATAL						
INFECTION	0	0	0	0.00	0	0.00
RADIATION	0	0	1	2.70	0	0.00
DRUGS	1	10	4	10.81	0	0.00
TRAUMA/INJURY	0	0	1	2.70	1	7.14
ALLERGIES	0	0	1	2.70	0	0.00
SEIZURES	0	0	0	0.00	0	0.00
EDOCRINAL	0	0	0	0.00	0	0.00
OTHERS	9	90	30	81.08	13	92.86
GESTATION						
FULL TERM	7	70	29	78.38	11	78.57
PREMATURE	2	20	7	18.92	2	14.29
POST MATURE	1	10	1	2.70	1	7.14
DELIVERY TYPE						
FTND	5	50	18	48.65	7	50.00
FORCEPS DELIVERY	0	0	1	2.70	1	7.14
LSCS	2	20	13	35.14	3	21.43
BREACH DELIVERY	0	0	0	0.00	1	7.14
PRO.INDUCED DELIVERY	2	20	2	5.41	0	0.00
VACCUM EXTRACTION	0	0	0	0.00	1	7.14
OTHERS	1	10	3	8.11	1	7.14
BIRTH COMPLICATIONS						
PROLAPSED CORD	0	0	0	0.00	0	0.00
BIRTH ASPHYXIA	5	50	6	16.22	7	50.00
JAUNDICE	1	10	0	0.00	2	14.29
BLOOD TRANS	0	0	0	0.00	0	0.00
NEONATAL INFECTIONS	0	0	0	0.00	0	0.00
OTHERS	0	0	31	83.78	5	35.71
BIRTH WEIGHT						
	2	20	10	27.03	0	0.00
POSTNATAL						
INFECTION	2	20	3	8.11	1	7.14
RADIATIONS	0	0	0	0.00	0	0.00
DRUGS	0	0	0	0.00	0	0.00
TRAUMA/INJURY	0	0	1	2.70	0	0.00
ALLERGIES	0	0	0	0.00	0	0.00
SEIZURES	1	10	9	24.32	7	50.00
ENDOCRINAL ABN	0	0	0	0.00	0	0.00
OTHERS	5	50	24	64.86	6	42.86

***Cerebral palsy*:** It was found that maternal age of conception > 35 years showed a higher percentage of CP (30%) Vs maternal age of conception upto 20 years contributing to a lesser percentage (only 10%). Miscarriage was found as the etiological factor in 20% of CP children. 10% of the disorder could be accounted for by consanguinity. Prenatal factors that could be accounted, as contributing etiological factors were drug intake (10%) and others (most commonly a high blood pressure) during pregnancy. Considering gestational age, 70% of the CP children identified were full term infants whereas prematurity and post maturity accounted for only 20% and 10% respectively of the identified children.

Considering delivery type 50% of the identified CP children were delivered full term normal (FTND), 20% of children were born through cesarean delivery and delivery was induced in the mothers of another 20%.

Birth Asphyxia was the significant birth complication identified and contributed to the 50% of the Spastic children identified. Jaundice occurred in 10%. 20% of children had birth weight less than 2 Kg.

Postnatal infections (Meningitis, most commonly found) contributed to the 20% of children probably having caused acquired CP due to CNS infections in those identified. Seizures occurred in 10% of the children identified postnataly. Others (Tuberculosis, Bronchitis & Pneumonia) were found in 50% of the children identified.

Observations & inferences

Among the children identified as having CP maternal age of conception greater than 35 years, less than 20 years, miscarriages, consanguinity, drug intake by the mother during pregnancy and high BP during pregnancy were the most common prenatal factors observed. These finding agree with those high risk factors reported in literature.

Prematurity, post maturity, delivery through LSCS section, induced labour, birth asphyxia and low birth weight were the most common natal factors identified.

Postnataly jaundice, meningitis, seizures and other infections like pneumonia and bronchitis were most frequently observed. These postnatal factors could possibly have caused acquired CP due to CNS infection in those identified.

Yokoyama Y, Shimizut, Hayakawa K found the risk factors associated with the Cerebral Palsy and decrease in gestational age and asphyxia. They reported that the likelyhood of the occurrence of CP in infants whose gestational age was less than 32 weeks was 20 times more than in infants with gestational age greater than 36 weeks.

In their study Meberg A, Broch H considered the original CP due to prenatal factors in 20% of children, perinatal 42.7% and undifferentiated in 37.7%.

Mental Retardation: It was found that maternal age of conception > 35 years showed a lower percentage of MR (2.70%) Vs maternal age of conception up to 20 years contributing to a higher percentage (13.51%). Miscarriage was found as the etiological factor in 29.73% of MR children. 24.32% of the disorder could be accounted for by consanguinity. Prenatal factors that could be accounted, as contributing etiological factors were radiation (2.70%), drug intake (10.81%), trauma/injury (2.70%), allergies (2.70%) and others (most commonly being high blood pressure) during pregnancy. Considering gestational age, 78.38% of the MR children identified were full term infants whereas prematurity and post maturity accounted for only 18.9% and 2.70% respectively of the identified children.

Considering delivery type 48.65% of the identified MR children was delivered full term normal (FTND) and 2.70% of MR children underwent forceps delivery. An LSCS was performed in 35.14% and delivery was induced in the mothers of another 5.41% of children.

Birth Asphyxia was the significant birth complication identified and contributed to the 16.22% of the MR children identified. Others (factors not recorded or details not known) accounted for 83.78% of MR children identified. 27.73% of children identified had birth weight less than 2 Kg.

Postnatal infections (Meningitis, Pneumonia) contributed to the 8.11% of children. The occurrence of postnatal trauma/injury was seen in 2.70% of the MR children identified. Seizures occurred in 24.32% of the children identified. Others (factors not recorded or details not known) accounted for 50% of the children identified.

Observations & inferences

Maternal age less than 20 years, miscarriage, consanguinity, radiation, drug intake, trauma/injury allergies and high BP were observed to be the most frequently occurring prenatal factors in the children identified as having mental retardation.

Natal factors seen included prematurity, postmaturity, LSCS, forceps and induced delivery. Birth asphyxia and low birth weight were also seen.

Postnataly infections like meningitis, pneumonia, postnatal trauma/injury and comorbid seizures were found to be present in the identified children.

The rate of prenatal brain damage, post neonatal brain damage and unknown origin associated with MR were 20.5%, 22.7%, 4.5% and 34.1% respectively. The rate of perinatal disorders playing some role in the etiology of MR was 18.2% (as reported by Yamada K)

Durkin MS, Hasan ZM, Hasan KZ found in their study etiological factors associated with MR as lack of maternal education and other factors independently associated with MR included histories of perinatal difficulties, neonatal infections, postnatal brain infections, traumatic brain injury as well as mal nutrition.

***Cerebral Palsy & Mental Retardation*:** It was found that 7.14% of CP & MR children had their mothers having maternal age of conception up to 20 years and another 7.14% had their mothers having maternal age > 35 years. Miscarriage was found as the

etiological factor in 14.29% of CP & MR children. 21.43% of the disorder could be accounted for by consanguinity. Prenatal factors that could be accounted, as contributing etiological factors were trauma/injury (7.14%) and others (most commonly emotional problems, inadequate nutrition, & high blood pressure) during pregnancy contributed 92.86% of the CP & MR children identified. Considering gestational age, 78.57% of the MR children identified were full term infants whereas prematurity and post maturity accounted for 14.29% and 7.14% respectively of the identified children.

Considering delivery type 50% of the identified CP & MR children were delivered full term normal (FTND) and 7.14% of CP & MR children underwent forceps delivery. An LSCS was performed in 21.43%. A vacuum extraction was done in 7.14%. Others (factors not recorded or details not known).

Birth Asphyxia was the significant birth complication identified and contributed to 50% of the CP & MR children identified. Jaundice occurred in 14.29% of CP & MR children identified. Others (factors not recorded or details not known) accounted for 35.71% of the CP & MR children identified.

Postnatal infections (Meningitis) contributed to the 7.14% of the children identified. Seizures occurred in 50% of the CP & MR children identified. Others (factors not recorded or details not known) accounted for 42.86% of the children identified.

Observations & inferences

Maternal age less than 20 years and greater than 35 years, miscarriage, consanguinity, trauma/injury, emotional problems, inadequate nutrition and high BP during pregnancy was the most commonly found prenatal factors.

Natal factors observed were prematurity, postmaturity, cesarean, forceps and vacuum delivery and birth asphyxia.

Postnatally Jaundice, Meningitis and comorbid seizures could be identified.

Thus it can be concluded that in all three groups of CP, MR and CP & MR, overlapping prenatal, natal and postnatal etiological factors were seen. The most common prenatal factors were maternal age less than 20 years and greater than 35 years, consanguinity, positive history of miscarriage, high blood pressure during pregnancy etc. Natally, birth asphyxia, unnatural delivery type (LSCS, Vacuum delivery) was most commonly seen. Postnataly infections and seizures were the most commonly observed features.

Since the majority of children identified belong to the Hindu community and were predominantly from the low socio-economic group of rural areas, practices like consanguineous marriages and poor health care seem to be still existing in the community inspite of increased awareness and maternal health care program's.

Further research is needed to assess the contribution of factors like maternal age of conception, consanguineous marriage, improvements in child survival and other factors to the unusually high prevalence of mental retardation co-occurring with cerebral palsy.

CEREBRAL PALSY

Table 11 (a): Number and percentage of the various CP types

CP TYPE	SPASTIC	ATHETOID	ATAXIA	RIGIDITY	MIXED	FLACCID
No.	9	0	0	0	0	1
%	90	0	0	0	0	10

Of the children identified as having CP, 90% were spastic and 10% were flaccid

ETIOLOGICAL FACTORS IN CP TYPES

Table 11 (b): Etiological factors in CP types

MATERNAL AGE	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
UP TO 20	1	11.11	0	0	0	0	0	0	0	0	0	0
36-40	3	33.33	0	0	0	0	0	0	0	0	0	0
MISCARRIAGE												
YES	2	22.22	0	0	0	0	0	0	0	0	0	0
CONSANGUINITY												
YES	0	0.00	0	0	0	0	0	0	0	0	1	100
PRENATAL												
INFECTION	0	0.00	0	0	0	0	0	0	0	0	0	0
RADIATION	0	0.00	0	0	0	0	0	0	0	0	0	0
DRUGS	0	0.00	0	0	0	0	0	0	0	0	1	100
TRAUMA/INJURY	0	0.00	0	0	0	0	0	0	0	0	0	0
ALLERGIES	0	0.00	0	0	0	0	0	0	0	0	0	0
SEIZURES	0	0.00	0	0	0	0	0	0	0	0	0	0
EDOCRINAL	0	0.00	0	0	0	0	0	0	0	0	0	0
OTHERS	9	100.00	0	0	0	0	0	0	0	0	0	0
GESTATION												
FULL TERM	6	66.67	0	0	0	0	0	0	0	0	1	100
PREMATURE	2	22.22	0	0	0	0	0	0	0	0	0	0
POST MATURE	1	11.11	0	0	0	0	0	0	0	0	0	0
DELIVERY TYPE												
FTND	4	44.44	0	0	0	0	0	0	0	0	1	100
FORCEPS DELIVERY	0	0.00	0	0	0	0	0	0	0	0	0	0
LSCS	2	22.22	0	0	0	0	0	0	0	0	0	0
BREACH DELIVERY	0	0.00	0	0	0	0	0	0	0	0	0	0
PRO.INDUCED DELIVERY	2	22.22	0	0	0	0	0	0	0	0	0	0
VACCUM EXTRACTION	0	0.00	0	0	0	0	0	0	0	0	0	0
OTHERS	1	11.11	0	0	0	0	0	0	0	0	0	0
BIRTH COMPLICATION												
PROLAPSED CORD	0	0.00	0	0	0	0	0	0	0	0	0	0
BIRTH ASPHYXIA	4	44.44	0	0	0	0	0	0	0	0	1	100
JAUNDICE	1	11.11	0	0	0	0	0	0	0	0	0	0
BLOOD TRANS	0	0.00	0	0	0	0	0	0	0	0	0	0
NEONATAL INFECTIONS	0	0.00	0	0	0	0	0	0	0	0	0	0
OTHERS	0	0.00	0	0	0	0	0	0	0	0	0	0
BIRTH WEIGHT												
	2	22.22	0	0	0	0	0	0	0	0	0	0
POSTNATAL												
INFECTION	2	22.22	0	0	0	0	0	0	0	0	0	0
RADIATIONS	0	0.00	0	0	0	0	0	0	0	0	0	0
DRUGS	0	0.00	0	0	0	0	0	0	0	0	0	0
TRAUMA/INJURY	0	0.00	0	0	0	0	0	0	0	0	0	0
ALLERGIES	0	0.00	0	0	0	0	0	0	0	0	0	0
SEIZURES	1	11.11	0	0	0	0	0	0	0	0	0	0
ENDOCRINAL ABN	0	0.00	0	0	0	0	0	0	0	0	0	0
OTHERS	4	44.44	0	0	0	0	0	0	0	0	1	100

90% of the CP children identified could be classified under the Spastic type of Cerebral Palsy of whose mother, having a maternal age of conception upto 20 years accounted for 11.54% and maternal age over 35 years accounted for 33.33% respectively of the children identified. A history of miscarriage was posited in the mothers of 22.22% of the children identified. Considering prenatal factors others (inadequate nutrition, attempts to induce abortion, high B.P) contributed to 100% of the children identified as Spastic type of CP. Considering gestation 66.67% of these Spastic children identified were full term. 22.22% were premature and 11.11% were post mature. Considering delivery type 44.44% of the Spastic children identified were full term normally delivered. 22.22% were delivered by an LSCS and the mothers of another 22.22% had a prolonged induced delivery. Others (factors not recorded or details not known) were found in 11.11% of children.

Considering birth complications birth asphyxia contributed to 44.44% of the Spastic type of CP identified. Jaundice was found to have occurred in 11.11% of the disordered children. 22.22% of children had birth weight less than 2.00 Kg. 22.22% had postnatal infections and 11.11% had Seizures. Others (Congenital Heart Defects, Tuberculosis, History of Ear Ache and Ear Discharge) were found in 44.44% of children identified.

10% of the children identified as having CP had a Flaccid type (1 child) of CP. The etiological factors that were found contributing were a positive consanguinity, drug intake in the mother, birth asphyxia and postnataly, others (Congenital heart defect, defects in abdominal wall at birth etc.

Observations and Inferences

Spastic CP's were the most commonly identified type of CP. This again agrees with studies reported in the literature.

This could indicate that spastics CP's are the most common type of pure CP's i.e., CP's without associated mental retardation.

Correlating the etiological factors with CP type- the most frequently occurring prenatal factors were maternal age of conception less than 20 years and greater than 35 years, history of miscarriage, inadequate nutrition, attempts to induce abortion and high blood pressure. Natal factors included prematurity, postmaturity, LSCS and prolonged induced delivery. Birth asphyxia was found to be the most highly contributing factor. Low birth weight was also commonly seen. Postnataly jaundice, comorbid seizures, less frequently TB and ear infections could also be traced. Congenital heart defect was a very frequent observation in these children.

Not many studies have tried to correlate etiological factors with specific types of CP. However in a preliminary attempt the above factors were noticed. The exact correlation of CP types with above factors could only be confirmed with direct studies on a larger sample of an already identified group of specific types of CP.

Bottos M, Curanato T, Allibrio G, Gioachin C, Puato ML in their study done in North East Italy from 1965 to 1989 tried to correlate etiological factors with types of Cp. Prevalence of types of CP related to preterm birth such as diplegia was found to increase over the years while those associated with term babies such as dyskinesia decreased. This study suggested that prenatal factors are associated with some type of CP while in others such as diplegia, quadriplegia and diskinesia the perinatal factors were notable. Perinatal factors were associated with low birth weight children, while prentatal factors were greater for normal birth weight infants. Changes in neonatal care could influence the levels of CP, independent of the original presence of predisposing prenatal factors.

Table No.12 (a): Number and percentage of CP identified by severity

CP SEVERITY	V.Mild	Mild	Moderate	Severe	Profound
No	1	8	1	0	0
%	10	80	10	0	0

Of the 10 children identified as having CP 10% had very mild disability, 80% had mild level of disability and 10% had moderate disability.

ETIOLOGICAL FACTORS IN CP SEVERITY

Table No. 12 (b): Etiological factors in the various CP severities

MATERNAL AGE	V.Mild	%	MILD	%	Moderate	%	Severe	%	Profound	%
UP TO 20	0	0	1	12.5	0	0	0	0	0	0
36-40	1	100	2	25	0	0	0	0	0	0
MISCARRIAGE										
YES	0	0	1	12.5	1	100	0	0	0	0
CONSANGUINITY										
YES	0	0	1	12.5	0	0	0	0	0	0
PRENATAL										
INFECTION	0	0	0	0	0	0	0	0	0	0
RADIATION	0	0	0	0	0	0	0	0	0	0
DRUGS	0	0	1	12.5	0	0	0	0	0	0
TRAUMA/INJURY	0	0	0	0	0	0	0	0	0	0
ALLERGIES	0	0	0	0	0	0	0	0	0	0
SEIZURES	0	0	0	0	0	0	0	0	0	0
EDOCRINAL	0	0	0	0	0	0	0	0	0	0
OTHERS	1	100	7	87.5	1	100	0	0	0	0
GESTATION										
FULL TERM	0	0	6	75	1	100	0	0	0	0
PREMATURE	0	0	2	25	0	0	0	0	0	0
POST MATURE	1	100	0	0	0	0	0	0	0	0
DELIVERY TYPE										
FTND	0	0	5	62.5	0	0	0	0	0	0
FORCEPS DELIVERY	0	0	0	0	0	0	0	0	0	0
LSCS	1	100	1	12.5	0	0	0	0	0	0
BREACH DELIVERY	0	0	0	0	0	0	0	0	0	0
PRO.INDUCED DELIVERY	0	0	1	12.5	1	100	0	0	0	0
VACCUM EXTRACTION	0	0	0	0	0	0	0	0	0	0
OTHERS	0	0	1	12.5	0	0	0	0	0	0
BIRTH COMPLICATION										
PROLAPSED CORD	0	0	0	0	0	0	0	0	0	0
BIRTH ASPHYXIA	0	0	5	62.5	0	0	0	0	0	0
JAUNDICE	0	0	1	12.5	0	0	0	0	0	0
BLOOD TRANS	0	0	0	0	0	0	0	0	0	0
NEONATAL INFECTIONS	0	0	0	0	0	0	0	0	0	0
OTHERS	1	100	2	25	1	100	0	0	0	0
BIRTH WEIGHT										
	0	0	2	25	0	0	0	0	0	0
POSTNATAL										
INFECTION	0	0	2	25	0	0	0	0	0	0
RADIATIONS	0	0	0	0	0	0	0	0	0	0
DRUGS	0	0	0	0	0	0	0	0	0	0
TRAUMA/INJURY	0	0	0	0	0	0	0	0	0	0
ALLERGIES	0	0	0	0	0	0	0	0	0	0
SEIZURES	0	0	1	12.5	0	0	0	0	0	0
ENDOCRINAL ABN	0	0	0	0	0	0	0	0	0	0
OTHERS	1	100	5	62.5	1	100	0	0	0	0

10% of the CP children identified had a very mild degree of the disorder. 80% had a mild severity, 10% had a moderate severity and none had severe or profound severity of the disorder.

Very mild CP: 100% of the very mild CP identified (1 child) had the mothers maternal age of conception about 36 years. Considering prenatal etiology 100% contributed to others (High Blood Pressure, Emotional Problems, Treatment for Psychiatric Disorders). Considering gestation post maturity could be identified as the etiopathology. Delivery type was LSCS. Birth complication was contributed by others (eyes not opened at birth). Postnatal etiology was contributed by others (Meningitis, severe diarrhea and vomiting).

Mild CP: 12.5% of the mild CP identified had the mother's maternal age of conception upto 20 years. 25% had mother's maternal age of conception between 36 to 40 years. 12.5% had a history of miscarriage, another 12.5% had a positive consanguinity, 12.5% had drug intake in the mother during the prenatal period, and 87.5% had other prenatal causes as the contributing etiological factor. Considering gestation 78% of the mild CP were full term and 25% were premature. Considering delivery type 62.5% were full term normally delivered and 12.5% had an LSCS in the mother another 12.5% had prolonged induced delivery in the mother and yet another 12.5% had other complications in the mother during delivery. Considering birth complications, birth asphyxia contributed to 62.5%, Jaundice was found to occur in 12.5% and other birth complication occur in 25% of the mild CPs. Birth weight less that 2.00 Kg was found in 25% of children, postnatal infections in 25% of children, Seizures in 25% and other postnatal etiology in 62.5% of children identified as having a mild degree of CP.

Moderate CP: 100% of Moderate CP (1 child) had the mother with a history of miscarriage. Considering the prenatal etiology, others contributed to 100% of the children having moderate CP. Considering gestation and delivery type the child was full term with the mother having had a prolonged induced delivery. Birth complications were accounted by others (high fever of mother during delivery, mothers death following

delivery). Others (Tuberculosis, Meningitis, and Bronchitis) contributed to postnatal etiology.

Severe & Profound CP: None were identified to have severe and profound degree of CP.

Observations and Inferences

Among the CP's identified it was seen that the severity of the problem was very mild, mild or moderate with mild category being the highest group.

In the very mild category the prenatal etiological factors were emotional or psychiatric disorder and high blood pressure. Natal factors were relatively less frequent in this group.

In the mild category prenatal factors observed were maternal age less than or greater than 35 years, history of miscarriage, positive consanguinity, drug intake and other prenatal causes.

Prematurity, LSCS and prolonged induced delivery, very high rate of birth asphyxia and birth weight less than 2kg were the most commonly seen natal factors.

Postnatally jaundice, postnatal infections and comorbid seizures were seen.

No factors were seen to frequently occur in the moderate category.

The reason for the severity of CP being relatively milder and absence in the severe and profound categories could be the results of absent prenatal, natal and postnatal factors, which have a direct impact or cause, direct CNS/brain damage. This also implicates an improved maternal and neonatal health care.

Pharaoh P O, Platt M.J, Cooke T, in their study found that the proportion of cerebral palsy by clinical type has changed among the low birth weight babies with

relatively fewer cases with diplegia and a concomitant increase in the proportion with hemiplegia. This has implication for health, educational and social service provision.

Table No.13 (a): Number and percentage of MR identified by severity

MR SEVERITY	ABOVE	NORMAL	MILD MR	MODERATE MR	SEVERE MR	PROF MR
No	0	0	24	6	4	3
%	0	0	64.86	16.22	10.81	8.11

Of the 37 children identified as having MR 64.86% had mild retardation, 16.22% had moderate retardation, 10.81% had severe retardation and 8.11% had profound retardation.

Table No. 13 (b): Etiological factors associated with various MR severities

MATERNAL AGE	ABOVE	%	NORMAL	%	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
UP TO 20	0	0.00	0	0.00	4	16.67	1	16.67	0	0.00	0	0
36-40	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
MISCARRIAGE												
YES	0	0.00	0	0.00	3	12.50	3	50.00	2	50.00	3	100.00
CONSANGUINITY												
YES	0	0.00	0	0.00	4	16.67	2	33.33	1	25.00	2	66.67
PRENATAL												
INFECTION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RADIATION	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	3	12.50	1	16.67	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
ALLERGIES	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EDOCRINAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	18	75.00	5	83.33	4	100.00	3	100.00
GESTATION												
FULL TERM	0	0.00	0	0.00	18	75.00	6	100.00	4	100.00	1	33.33
PREMATURE	0	0.00	0	0.00	5	20.83	0	0.00	0	0.00	2	66.67
POST MATURE	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
DELIVERY TYPE												
FTND	0	0.00	0	0.00	12	50.00	2	33.33	3	75.00	1	33.33
FORCEPS DELIVERY	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	0	0.00
LSCS	0	0.00	0	0.00	8	33.33	3	50.00	1	25.00	1	33.33
BREACH DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PRO.INDUCED DELIVERY	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00	1	33.33
VACCUM EXTRACTION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	2	8.33	1	16.67	0	0.00	0	0.00
BIRTH COMPLICATION												
PROLAPSED CORD	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BIRTH ASPHYXIA	0	0.00	0	0.00	2	8.33	1	16.67	1	25.00	2	66.67
JAUNDICE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BLOOD TRANS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEONATAL INFECTIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	22	91.67	5	83.33	3	75.00	1	33.33
BIRTH WEIGHT												
	0	0.00	0	0.00	6	25.00	0	0.00	3	75.00	1	33.33
POSTNATAL												
INFECTION	0	0.00	0	0.00	2	8.33	0	0.00	1	25.00	0	0.00
RADIATIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	4	16.67	2	33.33	2	50.00	1	33.33
ENDOCRINAL ABN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	18	75.00	4	66.67	1	25.00	1	33.33

***Mild MR*:** In the Mild MR Group 16.67% was born to mothers whose maternal age was less than 20 years while 4.17% of children had mothers with maternal age greater than 35 years. 12.05% had mothers with a history of miscarriage and consanguinity was positive in 16.67%. 4.17% of the children had prenatal factors exposure to radiation, another 4.17% had a prenatal trauma/injury and yet another 4.17% had allergy in the mother prenataly. 12.57% of the mild MR had drug intake in the mother in the prenatal period and 75% had others (emotional disturbance and treatment for psychiatric disorders). Considering gestation 75% of children categorised as mild MR were born full term. 20.83% were premature and 4.17% postmature. Considering delivery type 50% of the mild MR were full term normally delivered, 4.17% through a forceps delivery, 33.33% who are delivered through a cesarean (LSCS Section), 4.17% of the mild MR had a prolonged induced delivery in the mother and 8.33% by others (factors not recorded or details not known). Considering birth complications 8.33% of the mild MR had birth Asphyxia and 91.67% had others (factors not recorded or details not known). 25% of the mild MR had a birth weight less than 2 Kg. Postnataly 8.33% had some infections, seizure occurred in 16.67% and 75% of the children identified as MR had other postnatal complications.

Moderate MR: 16.67% of the moderate MR group had their mothers with maternal age less than 20 years. 50% of the moderate MR had their mothers with a history of miscarriage. 33.33% was born of consanguineous marriage. The mothers of 16.67% of children identified as having moderate MR had drug intake during pregnancy and other prenatal factors (emotional disturbances, electric shock) contributed as an etiological factor to 83.33% of the children identified. Considering gestation 100% of the moderate MR were born full term. Considering delivery type 33.33% were full term normally delivered, 50% were delivered through LSCS, 16.67% through others (factors not recorded or details not known). Birth complications identified were birth Asphyxia in 16.67% and 83.33% of the children identified had others (factors not recorded or details not known). Seizures occurred in 33.33% and 66.67% had other postnatal history (Congenital Heart Defect, Bronchitis & Tuberculosis).

***Severe MR*:** 50% of the severe MR children had history of miscarriage in the mother. 25% were born of a positive consanguinity. Prenatal factors identified in the severe MR groups were others (emotional disturbance, attempts to induce labour). All the children in the Severe MR category were born full term 75% were full term normally delivered and 25% were born through Cesarean delivery (LSCS). Birth complications identified in the Severe MR category was birth asphyxia in 25% and others (factors not recorded or details not known) in 75%. 75% of the Severe MRs had birth weight less than 2 KG. Postnatal complications identified were infections in 25%, occurrence of seizures in 50% and others (Meningitis) in 25%.

***Profound MR*:** All the children in the profound MR category had mothers have a positive history of miscarriage and 66.67% were born of consanguineous marriage. Prenatal etiology was contributed by others (stomach pain with respiratory distress, attempts to induce abortion & high B.P) in 100%. Considering gestation 33.33 % were born full term and 63.67% were premature. 33.33% were full term normally delivered, another 33.33% cesarean delivered and yet another 33.33% through prolonged induced delivery. The birth complications identified were birth asphyxia in 66.66%. Other birth complications were found in 33.33%. 33.33% had low birth weight. Postnatal etiology identified were trauma/injury in 33.33%, seizures in 33.33% and other postnatal complications accounted for 33.33% of the profound MR.

Observations and Inferences

It was found that among the MR children identified, the greatest number had a mild level of retardation followed by moderate, severe and profound respectively.

In the various MR severity's the prenatal factors most commonly seen were maternal age less than 20 years and greater than 35 years, history of miscarriage, consanguinity, prenatal trauma/injury, radiation, drug intake, emotional disturbances, attempted abortion without medical supervision, electric shock to the mother and high blood pressure were seen.

Natal factors most commonly seen were prematurity, postmaturity, LSCS, prolonged induced delivery and forceps delivery, birth asphyxia and birth weight less than 2kg. Postnatal infections, comorbid seizures and trauma/injury were also seen.

The prenatal and natal factors identified in MR were similar to those identified in CP. Though directly influencing factors like birth asphyxia and unnatural delivery types have lesser etiological correlation to MR when compared to CP.

Table No.14 (a) : Number and percentage of type of CP in CP&MR.

CP&MR						
CP TYPE	**SPASTIC**	**ATHETOXIC**	**ATAXIA**	**RIGIDITY**	**MIXED**	**FLACCID**
No	10	0	0	0	1	3
%	71.43	0.00	0.00	0.00	7.14	21.43

Among the various CP types in CP&MR 71.43% had Spastic CP, 7.14% had Mixed CP and 21.43% had Flaccid CP

Table No.14 (b): Etiological factors in type of CP in CP&MR

MATERNAL AGE	SPASTIC	%	ATHETOXIC	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
UP TO 20	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0
36-40	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
MISCARRIAGE												
YES	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
CONSANGUINITY												
YES	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
PRENATAL												
INFECTION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RADIATION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EDOCRINAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	10	100.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00
GESTATION												
FULL TERM	7	70.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
PREMATURE	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
POST MATURE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DELIVERY TYPE												
FTND	6	60.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
FORCEPS DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
LSCS	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
BREACH DELIVERY	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PRO.INDUCED DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VACCUM EXTRACTION	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BIRTH COMPLICATION												
PROLAPSED CORD	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BIRTH ASPHYXIA	5	50.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
JAUNDICE	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BLOOD TRANS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEONATAL INFECTIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
BIRTH WEIGHT												
	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
POSTNATAL												
INFECTION	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RADIATIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	6	60.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
ENDOCRINAL ABN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00

In the group diagnosed as having CP & MR 71.43% were of the Spastic type. 7.14% of the mixed and 21.43% of the Flaccid type.

***Spastic CP*:** In mothers of 10% of the children identified as Spastic CP there was a positive history of miscarriage. 100% had other prenatal complications. 70% of children were born full term. 20% premature and 10% postmature. 60% were full term normally delivered, 10% were born of LSCS, 10% born of breach and another 10% were vacuum extracted. 10% were born through others (factors not recorded or details not known). Birth complications identified were birth asphyxia in 50%, Jaundice in 20% and others in 30%. 10% of children identified had birth weight less than 2 Kg. Postnatal infections were seen in 10%, seizures occurred in 60% and other postnatal infections occurred in 30%.

***Mixed CP*:** 100% (1 child) had the mother's maternal age less than 20 years. There was a positive type of miscarriage and positive consanguinity. The prenatal etiology of trauma/injury was also identified. The Mixed CP child identified was born of a full term normal delivery type and birth complications identified were others (factors not recorded or details not known). Co-occurrence of seizure was also seen as postnatal complication.

***Flaccid CP*:** 33.33% of children identified as having Flaccid CP had mothers have maternal age about 35 years and 66.67% were born of consanguineous union. Prenatal etiology was identified as 100%. All the children were of a full term gestation. Delivery using forceps were identified in 33.33% and 66.67% were born through cesarean delivery (LSCS). Birth complications identified were birth asphyxia in 66.67% and other birth complications accounted for as the etiological factors in 33.33% of this group. All children in this group had other postnatal complications.

Observations and Inferences

When attempts were made to classify children having both CP and MR, they could be grouped into specific types like spastic (highest number), flaccid followed by mixed. This could indicate that flaccid and mixed types were always associated with

MR, however spastic types could also be identified. Spastic types were the only type of CP to exist independently as previously discussed.

In the various CP types the most commonly seen prenatal factors were history of miscarriages, a very high incidence of consanguinity and maternal age greater than 35 years.

Prematurity and postmaturity, instrumental delivery, breach delivery and other birth complications were the most frequently seen natal factors. In the spastic CP's birth weight less than 2 kg could also be identified. High occurrences of birth asphyxia were seen.

Postnatally jaundice, infections, other postnatal complications and comorbid seizures could be identified.

Birth asphyxia and instrumental delivery were found to be the most highly occurring etiological factors. Postnatal seizures and other complications were frequently seen.

Table 15(a): Number and Percentage of CP Severity in CP&MR

CP&MR					
CP SEVERITY	**V.Mild**	**Mild**	**Moderate**	**Severe**	**Profound**
No	0	6	1	4	3
%	0	42.86	7.14	28.57	21.43

Of the 14 children identified as having both CP and MR 42.86% had mild level of CP severity, 7.14% had moderate CP, 28.57% had severe CP and 21.43% had profound CP.

Table 15(b): Etiological Factors in CP Severity in CP&MR

MATERNAL AGE	V.Mild	%	MILD	%	Moderate	%	Severe	%	Profound	%
UP TO 20	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
36-40	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
MISCARRIAGE										
YES	0	0.00	1	16.67	0	0.00	0	0.00	1	33.33
CONSANGUINITY										
YES	0	0.00	0	0.00	1	100.00	1	25.00	1	33.33
PRENATAL										
INFECTION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RADIATION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EDOCRINAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	6	100.00	1	100.00	4	100.00	2	66.67
GESTATION										
FULL TERM	0	0.00	5	83.33	1	100.00	3	75.00	2	66.67
PREMATURE	0	0.00	1	16.67	0	0.00	1	25.00	0	0.00
POST MATURE	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
DELIVERY TYPE										
FTND	0	0.00	4	66.67	0	0.00	0	0.00	3	100.00
FORCEPS DELIVERY	0	0.00	0	0.00	0	0.00	1	25.00	0	0.00
LSCS	0	0.00	2	33.33	1	100.00	0	0.00	0	0.00
BREACH DELIVERY	0	0.00	0	0.00	0	0.00	1	25.00	0	0.00
PRO.INDUCED DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VACCUM EXTRACTION	0	0.00	0	0.00	0	0.00	1	25.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	1	25.00	0	0.00
BIRTH COMPLICATION										
PROLAPSED CORD	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BIRTH ASPHYXIA	0	0.00	1	16.67	1	100.00	4	100.00	1	33.33
JAUNDICE	0	0.00	2	33.33	0	0.00	0	0.00	0	0.00
BLOOD TRANS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEONATAL INFECTIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	3	50.00	0	0.00	0	0.00	3	100.00
BIRTH WEIGHT										
	0	0.00	0	0.00	0	0.00	1	25.00	0	0.00
POSTNATAL										
INFECTION	0	0.00	1	16.67	0	0.00	0	0.00	0	0.00
RADIATIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	1	16.67	0	0.00	3	75.00	3	100.00
ENDOCRINAL ABN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	4	66.67	1	100.00	1	25.00	0	0.00

Mild CP: In the Mild CP group 16.67% had a history of miscarriage, and all the children (i.e. 100%) had positive prenatal history. 83.33% were born full term, while 16.67% were premature. 66.67% had a full term normal delivery and 33.33% were born through caesarean sections. Birth asphyxia was seen in 16.67% and 33.33% had jaundice as birth complications. While 50% had other birth complications like high fever for mother during delivery. Postnatal complications like infections were seen in 16.67%, seizures in 16.67% and other postnatal complications like severe diarrhea and vomiting, meningitis etc in 66.67%.

Moderate CP: 100% (one child) of moderate CP had maternal age above 35 yrs and 100% had positive consanguinity. All the children i.e. 100% had other prenatal history of high BP, emotional problems etc. Gestational age was full term in 100%, 100% had caesarian delivery. Birth asphyxia was seen in 100% and also other postnatal complications like congenital heart defects.

Severe CP: 25% had positive consanguinity, 100% had other prenatal factors like treatment for psychiatric illness, inadequate nutrition etc. Full term gestation in 75% and 25% were born preterm. Forceps delivery was seen in 25%, breach delivery in 25%, vacuum extraction in 25% and 25% through other modes (unrecorded). 100% had birth asphyxia, 25% had birth weight less than 2kg. Seizures were seen in 75% and other postnatal complications in 25%.

Profound CP: Maternal age was less than 20 yrs in 33.33% of the cases, 33.33% had history of miscarriage and consanguinity was positive in 33.33%. Trauma/injury to the mother was present in 33.33% and 66.67% had other prenatal complications. 66.67% had full term gestational period and 33.33% were born premature. All the children i.e. 100% were born FTND, 33.33% had birth asphyxia and other postnatal complications like meningitis, pneumonia etc in 100%. 100% had seizure postnatally.

Observations and Inferences

Of the children identified as having CP and MR, the highest occurring was mild level of CP followed by severe profound and moderate CP's respectively.

A positive prenatal history of miscarriage, high blood pressure, inadequate nutrition and emotional/psychiatric problems could be identified. Instrumental delivery, birth asphyxia and birth weight less than 2kg (more in the severe group) were frequently seen natal factors. Postnatal infections and seizures could be identified.

The prenatal, natal and postnatal factors identified in profound retardation were maternal age less than 20 years, history of miscarriage, consanguinity, trauma/injury to the mother and high occurrence of other prenatal complications. Natal factors identified were high occurrence of prematurity, birth asphyxia and postnatal complications of meningitis, pneumonia and seizures.

Thus it can be concluded that the profound level of CP identified in children with CP and MR had higher frequency of positive prenatal, natal and postnatal factors.

Table No.16 (a) : Number and percentage of severity of MR in CP & MR

CP&MR						
MR SEVERITY	ABOVE	NORMAL	MILD MR	MODERATE MR	SEVERE MR	PROF MR
No	0	0	6	1	3	4
%	0	0.00	42.86	7.14	21.43	28.57

Of the 14 children identified as CP&MR, 42.86% were mild MR, 7.14% were moderate MR, 21.43% severe MR and 28.57% profound MR.

Table No.16 (b): Etiological factors in MR Severity in CP & MR

MATERNAL AGE	ABOVE	%	NORMAL	%	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
UP TO 20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
36-40	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
MISCARRIAGE												
YES	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	1	25.00
CONSANGUINITY												
YES	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33	2	50.00
PRENATAL												
INFECTION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RADIATION	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EDOCRINAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	6	100.00	1	100.00	3	100.00	3	75.00
GESTATION												
FULL TERM	0	0.00	0	0.00	5	83.33	1	100.00	2	66.67	3	75.00
PREMATURE	0	0.00	0	0.00	1	16.67	0	0.00	1	33.33	0	0.00
POST MATURE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
DELIVERY TYPE												
FTND	0	0.00	0	0.00	4	66.67	0	0.00	0	0.00	3	75.00
FORCEPS DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33	0	0.00
LSCS	0	0.00	0	0.00	1	16.67	1	100.00	0	0.00	1	25.00
BREACH DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33	0	0.00
PRO.INDUCED DELIVERY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VACCUM EXTRACTION	0	0.00	0	0.00	1	16.67	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33	0	0.00
BIRTH COMPLICATION												
PROLAPSED CORD	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BIRTH ASPHYXIA	0	0.00	0	0.00	2	33.33	0	0.00	3	100.00	2	50.00
JAUNDICE	0	0.00	0	0.00	2	33.33	0	0.00	0	0.00	0	0.00
BLOOD TRANS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEONATAL INFECTIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	2	33.33	1	100.00	0	0.00	2	50.00
BIRTH WEIGHT												
	0	0.00	0	0.00	1	16.67	0	0.00	0	0.00	0	0.00
POSTNATAL												
INFECTION	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
RADIATIONS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRUGS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRAUMA/INJURY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ALLERGIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SEIZURES	0	0.00	0	0.00	2	33.33	0	0.00	2	66.67	3	75.00
ENDOCRINAL ABN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	4	66.67	0	0.00	1	33.33	1	25.00

Mild MR with CP: 100% of this group had other prenatal complications (inadequate nutrition, emotional disturbance). 83.33% had a full term gestation, 16.67% were premature. Considering type of delivery 66.67% were full term normally delivered and 16.67% were born through cesarean delivery (LSCS). Another 16.67% were vacuum extracted. Birth complications identified were birth asphyxia in 33.33%, Jaundice in another 33.33%. Other (factors not recorded or details not known) birth complications were seen in 33.33%. 16.67% of this group had birth weight less than 2 Kg. Postnataly seizures were seen in 33.33% and others (Diarrhea, vomiting, history of ear ache and ear discharge) were seen in 66.67%.

Moderate MR with CP: 100% (1 child) had the mother who have positive history of miscarriage, other prenatal complications like (High B.P, treatment for psychiatric disorders etc.). All children in this group were born full term through a cesarean section. 100% had other (factors not recorded or details not known) birth complications and postnatal infections.

Severe MR with CP: 33.33% of the severe MR with CP category was born of consanguineous union. 100% of children had prenatal infections. 66.67% were full term and 33.33% premature. 33.33% were born through forceps type of delivery, another 33.33% through a breach type and yet another 33.33% through others (factors not recorded or details not known). Birth complications identified were birth asphyxia in 100%. Postnataly 66.66% had seizures and 33.33% had other (congenital heart defects) postnatal complications.

Profound MR with CP: 25% of children in this category had mothers with maternal age less than 20 years and 25% had maternal age above 35 years. The mothers of 25% of children had positive history of miscarriage positive and 50% of children were born of a consanguineous union. Prenatal complications were identified in 25% of children as trauma/injury and others (attempted abortion, pregnancy at very short intervals, emotional problems) in 75%. 25% of children were born of cesarean type of delivery. Birth complications identified were as birth asphyxia in 50% of children and 50% had

other (Congenital heart defects, defects in abdominal wall) postnatal complications. Seizures occurred in 75% of children and others (factors not recorded or details not known) occurred in 25% of children in this category.

Observations and Inferences

Of the children identified as having CP and MR, the highest number had a mild level of retardation, followed by profound, severe and moderate levels of retardation.

The prenatal causative factors that could be identified in the mild and moderate category were emotional/psychiatric disturbances, inadequate nutritions and high blood pressure. Natal factors were LSCS delivery, birth asphyxia and other birth complications. Postnatally infections and seizures had a high occurrence.

In the severe and profoundly retarded children a high occurrence of consanguinity, maternal age less than 20 years or greater than 35 years, prenatal infections in the mother, complications like trauma/injury, attempted abortion and pregnancy at very short intervals were the observed factors. Postnatally very high occurrence of seizures and other postnatal complications and congenital heart defects were common. So it can be concluded that with increasing severity the occurrence of direct factors, which could cause brain damage, were more frequent.

In their study,Murphy C, Yeargin-Allsopp M, Deconfle P, Drews CD found 65% of children identified had MR associated with CP,46% had epilepsy and 15% had a sensory impairment.

In their study,Suzuki J,Ito M,Tomiwa K, Okuno T, found that about 485 of the children identified in their study suffered from epilepsy.25% had spastic diplegia,86% had tetraplegia,45% had hemiplegia,39%of the dyskinetic type and 13% were the ataxic type.

ASSOCIATED PROBLEMS IN CP, MR, CP&MR

Section 1: Development

Table No.17 (a): Associated problems section 1 in CP, MR, CP & MR

GROSS MOTOR	CP	%	MR	%	CP&MR	%
DELAYED	8	80.00	25	67.57	11	78.57
DEVIANT	0	0.00	0	0.00	1	7.14
FINE MOTOR						
DELAYED	8	80.00	27	72.97	11	78.57
DEVIANT	0	0.00	1	2.70	1	7.14
ORAL MOTOR						
DELAYED	4	40.00	12	32.43	7	50.00
DEVIANT	0	0.00	3	8.11	2	14.29
SELF HELP SKILLS			0	0.00		
DELAYED	7	70.00	17	45.95	9	64.29
DEVIANT	0	0.00	3	8.11	1	7.14
SPEECH&LANGUAGE						
DELAYED	5	50.00	29	78.38	13	92.86
DEVIANT	0	0.00	0	0.00	0	0.00
AUDITORY						
DELAYED	0	0.00	4	10.81	2	14.29
DEVIANT	0	0.00	0	0.00	0	0.00
VISUAL						
DELAYED	0	0.00	1	2.70	1	7.14
DEVIANT	0	0.00	2	5.41	0	0.00
OTHER SENSES						
DELAYED	0	0.00	2	5.41	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00
SOCIAL						
DELAYED	2	20.00	8	21.62	5	35.71
DEVIANT	0	0.00	1	2.70	1	7.14

Cerebral Palsy: 80% of the CP children identified showed a delayed gross motor development. Fine motor development was delayed in 80%. 40% had delayed development (abnormal) of oromotor skills.

Self-help skills are found to be delayed in 70% of cases. Speech and Language Development was found to be delayed in 50%. Other senses (like tactual and gustatory) were normal. Social development was delayed in 20%.

Pharoah PO,Cooke t,Johnson M A, King R and Mutch L in their epidemiological study of CP in England and Scotland found that 33.33% had severe ambulatory disability(no independent walking),23.7% had severe manual disability(incapable of

feeding or dressing unaided).23.1% had severe visual disability. The recording of such trend provides vital information for those responsible for providing services for children with disabilities.

In a study done by Reily S,Skuse D,Poblete X in London, more than 90% of CP children had clinically significant oro motor dysfunction. In 60% of the children, severe feeding problems preceded the diagnosis of CP.This has important implications for nutritional intake/diet of the child, and the importance of observing feeding of the child at home if commendable.

Mental Retardation: 67.57% of the MR children identified showed a delayed gross motor development. Fine motor development was delayed in 72.97%. 32.43% had delayed development (abnormal) of oromotor skills. 8.11% showed a deviant oromotor development.

Self-help skills were found to be delayed in 45.95% of cases and deviant in 8.11%. Speech and Language Development was found to be delayed in 78.38%. 10.81% of MR cases showed a delayed auditory development and 2.70% showed a delayed visual development and 5.41% a deviant development. 10% of the children identified did not attend any school, 94.59% of MR children identified had other senses like tactile and gustatory normal. 5.41% showed developmental lags in sensory development. 21.62% showed delayed social development and 2.70% showed deviant social development.

Cerebral Palsy & Mental Retardation: 78.57% of the CP & MR children identified showed a delayed gross motor development and 7.14% a deviant gross motor development (arrests and delays). Fine motor development was delayed in 78.57% and deviant in 7.14%. 50% had delayed development (abnormal) of oromotor skills. 14.29% showed a deviant oromotor development.

Self-help skills were found to be delayed in 64.29% of cases and deviant in 7.14%. Speech and Language Development was found to be delayed in 92.86%. 14.29%

had a delayed auditory development and 7.14 had a delayed visual development. Social development was found to be delayed in 35.71% and deviant in 7.14% respectively. 28.57% of the children identified did not attend any school.

Observations and Inferences

Cerebral Palsy – Gross, fine, oral motor development were delayed in majority of the CP children. Self help skill development, speech and language and social skill development were also delayed.

Mental Retardation- The MR children showed a relatively less, but still existing delays in gross, fine and oral motor development. Self help skills development was delayed in about half the children identified. Delayed speech and language and social development was found in the majority of children. Few showed abnormal auditory skills development and developmental lags in other sensory areas were also noted.

Cerebral Palsy and Mental Retardation - Delayed and deviant, gross and fine motor and oral motor development was observed in majority of children in this category. Some deviancies in visual and auditory development were also observed. Speech and language and social skills were delayed.

The delay in development were stable across all the three groups with more effect in the CP and CP & MR groups which could possibly be because of the physical problems that they seem to have.

Section 2: Schooling

Table No.17 (b): Associated problems section 2 in CP, MR, CP & MR

ATTENDS	CP	%	MR	%	CP&MR	%
NO SCHOOL	1	10.00	7	18.92	4	28.57
NORMAL SCHOOL	2	20.00	30	81.08	7	50.00
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	7	70.00	0	0.00	3	21.43

Cerebral Palsy -10% of the children identified did not attend any school, 20% attended normal schools. Schooling was not applicable in 70% of cases.

Mental Retardation -18.92% of the MR cases identified did not attend school whereas 81.08% attended normal school.

Cerebral Palsy and Mental Retardation- 50% attended normal school and schooling was not applicable in 21.43%.

Observations and Inferences

Relatively less number of children in the CP and CP and MR attended normal school or schooling was not applicable. However in the MR group a high percentage of children were observed to attend normal school.

The reason for low school attendance in CP and CP & MR groups may be due to the restricted motor function were activity in them. Majority of the children in the MR group are mildly retarded with few moderately retarded which puts them in the category of educable MR and hence their attendance in normal school.

Section 3 : General, Physical and Behavioural Characteristics

Table No. 17(c) Associated problems section 3 in CP, MR, CP & MR

PHY. DEFOR	CP	%	MR	%	CP&MR	%
YES	5	50.00	3	8.11	6	42.86
HEAD&NECK						
CONG DEFECTS	0	0.00	2	5.41	1	7.14
ACQ. DEFECTS	0	0.00	1	2.70	3	21.43
LIMBS						
MONOPLEGIA	2	20.00	0	0.00	0	0.00
HEMIPLEGIA	2	20.00	1	2.70	1	7.14
TRIPLEGIA	0	0.00	0	0.00	1	7.14
QUADRIPLEGIA	0	0.00	0	0.00	4	28.57
OTHERS	4	40.00	2	5.41	7	50.00
GAIT						
SCISSORED	3	30.00	0	0.00	0	0.00
LIMPING	1	10.00	1	2.70	1	7.14
SHUFFLING	0	0.00	0	0.00	2	14.29
OTHERS	0	0.00	3	8.11	0	0.00
MOTOR						
STEREOTYPIES	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	0	0.00	1	2.70	2	14.29
TONE, POSTURE	9	90.00	3	8.11	10	71.43
SENSORY ORGANS						
PHY DEFECTS	0	0.00	1	2.70	0	0.00
UNUSUAL BEH						
HYPERACTIVE	0	0.00	6	16.22	1	7.14
WITHDRAWN	0	0.00	2	5.41	1	7.14
TANTRUMS	4	40.00	5	13.51	3	21.43
INCONTENANCE	0	0.00	1	2.70	1	7.14
THUM SUCKING	0	0.00	1	2.70	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00

Cerebral Palsy : 50% of the CP children identified had general physical deformity. None had head and neck abnormalities, congenital or acquired defects.20% had monoplegia, another 20% hemiplegia and 40% had others problems (factors not recorded or details not known). 30% of children had a scissoring gait. A limping gait was observed in 10%. 40% of the children showed tantrum behaviour.

Mental Retardation: 8.11% had general physical deformities. 5.41% and 2.70% of the MR children identified had congenital and acquired defects respectively. 2.70% of the children in this category had hemiplegia and 5.4% others (details not known). 2.70% of

children had a limping gait. In 8.11% details could not be obtained. 2.70% had involuntary movements (uncontrolled movements, but could not be identified as tremors).

2.70% of children had physical deficits. 16.22% showed hyperactive behaviour and 5.41% of children were withdrawn in nature. 13.51% showed severe temper trantrums, 2.70% showed incontinence and another 2.70% of children showed thumb sucking.

Cerebral Palsy & Mental Retardation: 42.86% of the entire CP & MR children identified had general physical deformities. 7.41% and 21.43% of the children identified in this category showed congenital defects and acquired defects respectively.14% had hemiplegia and another 7.14% had triplegia. 28.57% had quadriplegia and 14.29% had a normal motor system. 14.29% showed involuntary movements. 71.43% showed a normal tone and posture. All the CP & MR children showed development of sensory organs. 35% had no unusual behaviour. 7.14% showed hyperactive behaviour and another 7.14% showed withdrawal behaviour. 21.43% showed trantrum behaviour and 7.14% showed incontinence.

Observations and Inferences

Cerebral Palsy – Almost half of the children had general physical deformities and restricted ambulation due to monoplegia, hemiplegia and other limb defects. Scissoring gait and limping gait common to CP were observed. However, tone and posture were accounted as normal possibly due to the subjectivity involved in the evaluation. Unusual behaviours and tantrum behaviours were very common in these children.

Mental Retardation – Among the MR group a lesser occurrence of physical deformities were seen, however they showed more of congenital and acquired defects. Most of them had normal ambulation and gait and lesser defects of the motor system. Hyperactivity, withdrawal and severe temper tantrums, incontinence, thumb sucking were seen in this group.

Cerebral Palsy & Mental Retardation – General physical deformities, congenital defects and acquired defects were common. Few children were restricted by monoplegia, hemiplegia, triplegia and quadriplegia (since other types like mixed, flaccid were also identifed). A few showed hyperactivity, withdrawal and tantrums common to mental retardation. It can be concluded that CP children had more physical problems with unusual behaviours like tantrums, which could be due to their inability to carry out motor activities. Motor abilities were relatively less affected in MR's while they showed more of behavioural problems whereas the CP and MR showed both physical problems as well as behavioural problems.

Section 4: Speech, Language, Hearing Development, Structure and Functions

Table No. 17(d) Associated problems section 4 in CP, MR, CP & MR

SPEECH MECHANISM	CP	%	MR	%	CP&MR	%
DEFECTIVE	1	10.00	4	10.81	2	14.29
STRUCTURE						
DEFECTIVE	1	10.00	5	13.51	2	14.29
VEGIT FN						
DEFECTIVE	1	10.00	7	18.92	7	50.00
SPEECH FN						
DEFECTIVE	2	20.00	10	27.03	5	35.71
ARTICULATION						
DEFECTIVE	0	0.00	9	24.32	3	21.43
LANGUAGE						
DELAYED	4	40.00	33	89.19	13	92.86
DEVIANT	0	0.00	0	0.00	1	7.14
COMPREHENSION						
DELAYED	1	10.00	31	83.78	12	85.71
DEVIANT	0	0.00	0	0.00	0	0.00
EXPRESSION						
DELAYED	1	10.00	31	83.78	10	71.43
DEVIANT	0	0.00	0	0.00	0	0.00
HEARING						
DEFECTIVE	0	0.00	3	8.11	1	7.14

Cerebral Palsy: Considering the speech mechanism, language and hearing systems, 10% of CP identified ie one child had defective speech mechanism, structure & function and defective vegetative functions. 40% of children had delayed language development, 10% had a delayed comprehension, and another 10% had delayed expression.

Mental Retardation: 10.81% of the children identified with Mental Retardation had defective speech mechanism. 13.51% had a defective speech mechanism structure and 18.92% had defective vegetative function. Speech functions were defective in 27.03% and misarticulations were found in 27.42%. 89.19% had a delayed language development, 83.78% had a delayed comprehension and 83.78% delayed expression. 8.11% had a defective hearing system.

***Cerebral Palsy and Mental Retardation*:** 14.29% of the children identified had a defective speech mechanism, structure and function. 14.29% had defective vegetative functions. Speech functions were defective in 50%, misarticulations were found in 21.43%. Language development was delayed in 92.86%, deviant in 7.14%. Language comprehension delayed in 85.71% and language expression delayed in 71.43%. 7.14% had a defective hearing system.

Observations and Inferences

Cerebral Palsy – Defective speech mechanism structure and function and defective vegetative functions and delayed language development in the areas of comprehension and expressions were seen in this group. Hearing was normal in the children identified as pure CP's.

Mental Retardation- Abnormalities in the speech mechanism structure and function, some vegetative functions and misarticulations were the common findings in this group. Delayed language skills in both expression and comprehension were predominant. Defective hearing was present in a few.

Cerebral Palsy &Mental Retardation – All speech, language and hearing functions were seen to be affected in this group.

Speech structure and function defects were more in the CP& MR group than in the other two groups. Deficient skills in language function were a common finding for all

the 3 groups. Speech problems in MR could be compounded by the presence of hearing loss.

Section 5 : General, Physical Examinations

Table No. 17(e) Associated problems section 5 in CP, MR, CP & MR

HEAD SHAPE	CP	%	MR	%	CP&MR	%
UNREMARKABLE	8	80.00	26	70.27	10	71.43
BRACHYCEPHALY	0	0.00	1	2.70	0	0.00
DOLICOCEPHALY	0	0.00	1	2.70	0	0.00
OXYCEPHALY	0	0.00	1	2.70	0	0.00
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00
MICROCEPHALY	0	0.00	7	18.92	4	28.57
MACROCEPHALY	2	20.00	1	2.70	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00
FACIES						
MONGOLOID	0	0.00	4	10.81	0	0.00
LMASK LIKE	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	1	2.70	0	0.00
SPINE						
UNREMARKABLE	10	100.00	35	94.59	12	85.71
LORDOSIS	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	0	0.00	2	5.41	2	14.29
GIBBUS	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00
FEET						
PESCAVUS	0	0.00	0	0.00	0	0.00
FLAT FOOT	2	20.00	5	13.51	7	50.00
CLUB FOOT	1	10.00	0	0.00	0	0.00

***Cerebral Palsy*:** 20% had macrocephaly. 20% had flat foot and 10% club foot.

Mental Retardation: 2.70% had brachycephaly, 2.70% dolicocephaly, 2.70% oxycephaly, 18.92% microcephaly, 2.70% macrocephaly, and10.81% had mangoloid features. Kyphoscoliosis was found in 5.41%. 13.51% had flat foot.

Cerebral Palsy & Mental Retardation: Microcephaly was found in 28.57%. Kyphosicoliosis was found in 14.29%. Flat foot was found in another 50%.

Observation and inferences

Cerebral Palsy – Microcephaly, flatfoot and clubfoot were the general physical findings in this group.

Mental retardation – Most abnormalities in head shape, Mongoloid features, spinal defects and flat foot were the common findings in this group.

Cerebral Palsy & Mental Retardation – Microcephaly, spinal defects and flat foot were the common findings here.

The relatively high finding of abnormalities in head shape, face, spine etc in the MR group indicates the presence of syndromes along with MR like Down's Syndrome (resulting in Mongoloid Facies) .The children with CP, and CP& MR had no syndromes associated with them.

Severe visual impairment and Hydrocephalous were present in 18% and 23% of preterm CP children identif ied by Hagberg et al.

Section 6: Neurological Examinations

Table No. 17(f) Associated problems section 6 in CP, MR, CP & MR

TONE						
HYPOTONIA	1	10.00	0	0.00	3	21.43
SPASTIC	2	20.00	2	5.41	4	28.57
RIGID	0	0.00	0	0.00	1	7.14
VARIABLE	0	0.00	0	0.00	0	0.00
CORDINATION						
IMPAIRED	0	0.00	0	0.00	1	7.14
NOT ASSESSABLE	0	0.00	0	0.00	4	28.57
DTR						
REDUCED	1	10.00	1	2.70	3	21.43
ABSENT	0	0.00	0	0.00	0	0.00
INCREASED	3	30.00	4	10.81	7	50.00
PLANTARS						
FLEXOR	9	90.00	30	81.08	4	28.57
EXTENSOR	1	10.00	5	13.51	6	42.86
MUTE	0	0.00	1	2.70	0	0.00
EQUIVOCAL	0	0.00	1	2.70	4	28.57
GAIT						
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	0	0.00	0	0.00	1	7.14
SCISSOR GAIT	2	20.00	1	2.70	5	35.71
SPASTIC GAIT	0	0.00	1	2.70	1	7.14
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00
Not Assessable	1	10.00	2	5.41	2	14.29
SLR						
NEGATIVE	2	20.00	4	10.81	4	28.57
POSITIVE	1	10.00	4	10.81	7	50.00
PRIM.REFLEX						
PRESENT	2	20.00	4	10.81	4	28.57
ABSENT	0	0.00	0	0.00	1	7.14

***Cerebral Palsy*:** Hypotonia was found in 10%, spasticity in 20%. DTR was reduced in 10% and increased in 30%. Plantars were flexor and extensor in 10%. 20% had a scissoring gait. 10% were too young to walk. SLR's were normal in 20% and positive in 10%. 20% had primitive reflexes.

Mental Retardation: 5.41% had spastic tone, DTRs were reduced in 2.70% and increased in 10.81%. Plantars of the flexor type were seen in 81.08%, extensor type in 13.51% and mute in 2.70% and equivocal in 2.70%. 2.70% had a scissoring gait and

2.70% had spastic gait. 5.41% were too young and gait was not applicable. 10.81% had a negative SLR and 10.81% a positive SLR. Primitive reflex was present in 10.81%.

***Cerebral Palsy & Mental Retardation*:** 21.43% of the children identified as having CP & MR had hypotonia, 28.57% had spastic tone and 7.14% rigid tone. 7.14% of children had an impaired coordination. 28.57% were too young. DTR was reduced in another 21.43%, increased in 50%. Plantars were of the flexor kind in 28.57% and extensor type in 42.86%. Plantars were equivocal in 28.57%. 7.14% had a hemiplegic gait, 35.71% had a spastic gait. 14.26% were too young. 28.57% had negative SLR whereas SLR's were positive in 50%. Primitive reflexes were present in 28.57% and absent in 7.14% of the children identified as having CP & MR

Observations and inferences

***Cerebral Palsy* –** Hypotonia**,** spasticity, increased and decreased DTR, flexor and extensor plantars, scissoring gait and primitive reflexes were the frequently occurring neurological findings in the CP group.

Mental Retardation – Few children were identified with a spastic tone, increased and reduced DTR, plantars predominantly of the flexor type, scissoring and spastic gait and primitive reflexes.

Non ambulatory mentally retarded were present in 39% of identified CP children in their study by Hagberg B,Hagberg G,Olow I, van Wendt L.

***Cerebral Palsy & Mental Retardation* –** Hypotonia, spastic tone rigid tone impaired coordination, predominant DTR's, extensors and plantars, hemiplegic and spastic gait, positive SLR's and presence of primitive reflexes were the findings of this group.

The neurological findings in MR was lesser in frequency than the CP and MR groups which agrees with findings reported in the literature.

In their study Hagberg B, Hagberg G,Olow I,van Wendt L, reported that hemiplegic,diplegic snd tetraplegic syndromes accounted for 22%, 66% & 7% of pre terms and 44%, 29% & 10% of term babies.

Section 7 : Functional Activities and Abilities

Table No. 17(g) Associated problems section 7 in CP, MR, CP & MR

STAIR CLIMBING	CP	%	MR	%	CP&MR	%
MIN DIFFICULTY	0	0.00	4	10.81	0	0.00
NEEDS ASSISTANCE	3	30.00	6	16.22	1	7.14
NOT POSSIBLE	0	0.00	2	5.41	5	35.71
AMBULATION						
MIN DIFFICULTY	1	10.00	3	8.11	0	0.00
NEEDS ASSISTANCE	2	20.00	5	13.51	2	14.29
NOT POSSIBLE	0	0.00	2	5.41	4	28.57
BATHING						
MIN DIFFICULTY	0	0.00	4	10.81	1	7.14
NEEDS ASSISTANCE	3	30.00	8	21.62	2	14.29
NOT POSSIBLE	0	0.00	2	5.41	4	28.57
DRESSING						
MIN DIFFICULTY	0	0.00	3	8.11	0	0.00
NEEDS ASSISTANCE	3	30.00	8	21.62	0	0.00
NOT POSSIBLE	0	0.00	2	5.41	6	42.86
GROOMING						
MIN DIFFICULTY	0	0.00	3	8.11	0	0.00
NEEDS ASSISTANCE	3	30.00	8	21.62	0	0.00
NOT POSSIBLE	0	0.00	2	5.41	6	42.86
FEEDING						
MIN DIFFICULTY	1	10.00	4	10.81	1	7.14
NEEDS ASSISTANCE	2	20.00	7	18.92	1	7.14
NOT POSSIBLE	0	0.00	2	5.41	4	28.57
FUNCT.GADE						
NORMAL	8	80.00	21	56.76	6	42.86
MIN.DISABILITY	1	10.00	6	16.22	2	14.29
NEEDS ASSISTANCE	1	10.00	8	21.62	1	7.14
WHEEL CHAIR	0	0.00	1	2.70	2	14.29
BED RIDDEN	0	0.00	1	2.70	3	21.43
COG FUNCTIONS						
NOT AFFECTED	1	10.00	3	8.11	2	14.29
AFFECTED	4	40.00	17	45.95	10	71.43
PYRAMIDAL						
NOT AFFECTED	1	10.00	4	10.81	3	21.43
AFFECTED	3	30.00	0	0.00	6	42.86

Cerebral Palsy: Considering the functional activity 30% need assistance in stair climbing, 10% had minimal difficulty and 20% needed assistance in Ambulation. 70% had independent bathing skill and 30% need assistance. 30% needed assistance in

dressing. 70% could independently groom while 30% needed assistance. 70% could feed themselves, 10% had minimal difficulty and 20% need assistance.

In functional grading 10% of the children identified were graded, as having minimal disability and 10% needed assistance.

40% had cognitive functions affected. 10% of the children had pyramidal systems unaffected while the 30% had an affected pyramidal system.

Mental retardation: 10.81% of children identified as MR had minimal difficulty in stair climbing and 16.22% needed assistance. In 5.41% of children identified as MR stair climbing was not possible. 8.11% had minimal difficulty in ambulation while 13.51% needed assistance while in 5.41% ambulation was not possible.

10.81% could bath with minimal difficulty, 2.61% needed assistance and 5.41% could not bath independently. 8.11% had minimal difficulty, 21.62% needed assistance and for 5.41% dressing was not possible. 8.11% had minimal difficulty and 21.62% needed assistance. Grooming was not possible in 5.41% of children. 64.86% could feed independently, 10.81% had minimal difficulty and 18.92% need assistance. 5.41% could not feed independently. 16.22% were graded as having minimal disability and 21.62% needed assistance in functional activity. 2.70% of the MR identified were wheel chair bound and another 2.70% were bid ridden. Cognitive functions were affected in 45.95%.

Cerebral Palsy & Mental Retardation: 7.14% needed assistance in stair climbing, and 35.71% could not climb stairs. 14.29% needed assistance and 28.57% of children were not ambulatory. 7.14% had minimal difficulty and 14.29% needed assistance. 28.57% could not bath independently. 57.14% could dress independently, 42.86% could not dress independently. 42.86% could not groom independently. 7.14% had minimal difficulty, 7.14% required assistance and feeding was not possible for 28.57% of children identified as CP & MR.

14.29% were graded as having minimal disability, 17.14% as needing assistance, 14.29% were wheel chair bound and 21.43% bed ridden. Cognitive function was affected in 79.43%. Pyramidal system was affected in 42.86%.

Observations and Inferences

Cerebral Palsy – Most of the children identified in this group were not completely dependent for functional activities like stair climbing, ambulation and activities of daily living. But in some activities they have minimal difficulty and needed some assistance. Affected cognitive and pyramidal functions were also a finding.

Mental Retardation – These children were observed to have relatively lesser difficulty in functional activities like stair climbing and ambulation and other activities of daily living like feeding, dressing, grooming etc. However some were identified as wheel chair bound and bed ridden.

Cerebral Palsy & Mental Retardation – Functional activity was affected by restricted ambulation and activities of daily living like dressing, grooming etc. Presence of wheel chair bound and bed ridden cases were seen.

The CP and MR category were found to be more impaired in their functional skills possibly because the degree of affection was lesser in the pure CP and pure MR groups.

ASSOCIATED PROBLEMS IN CP TYPE

Section 1 : Development

Table No 18(a) : Associated problems section 1 in CP Type

GROSS MOTOR	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
DELAYED	7	77.78	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FINE MOTOR												
DELAYED	7	77.78	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ORAL MOTOR												
DELAYED	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SELF HELP SKILLS												
DELAYED	6	66.67	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPEECH&LANGUAGE												
DELAYED	4	44.44	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUDITORY												
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VISUAL												
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHER SENSES												
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SOCIAL												
DELAYED	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP - 77.78% had delayed gross motor development and fine motor development.. Oral motor functions were delayed in 33.33%. Self help skills were delayed in 66.67%. 44.44% showed delayed speech and language development 11.11% had delayed social development.

Flaccid CP - 100% (one case) had delayed gross motor, fine motor, oral motor and self help skills development. Speech and language skills were seen to be delayed in this case (100%). Social development was also delayed.

Section 2 : Schooling

Table No 18(b) : Associated problems section 2 in CP Type

ATTENDS	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
NO SCHOOL	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NORMAL SCHOOL	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	6	66.67	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00

Spastic CP - 11.11% did not attend school, 22.22% attends normal school while 66.67% were not eligible to attend school age wise

Flaccid CP - the only case in this group (100%) was not old enough to attend school.

Section 3 : General, Physical and Behavioural Characteristics

Table No 18(c) : Associated problems section 3 in CP Type

PHY. DEFOR	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
YES	5	55.56	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEAD&NECK												
CONG DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ACQ. DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LIMBS												
MONOPLEGIA	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIA	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
QUADRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
GAIT												
SCISSORED	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LIMPING	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SHUFFLING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOTOR												
STEREOTYPIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TONE, POSTURE	8	88.89	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
SENSORY ORGANS												
PHY DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
UNUSUAL BEH												
NIL	5	55.56	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
HYPERACTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
WITHDRAWN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TANTRUMS	4	44.44	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INCONTENANCE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
THUM SUCKING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP - 55.56% of the spastic CP's had physical deformities.22.22% had monoplegia and triplegia each, 33.33% had some other abnormality of the limbs. 33.33% had scissoring gait and 11.11% had limping gait and 88.89% had some abnormality of tone and posture.Tantrums were seen in 44.44%.

Flaccid CP – The only case had some abnormality of the limbs, some deficit in tone and posture.

Visual disability disturbances have been found to be associated with CP(Schenk-Root lieb AJ,van Nieuwenhuizen O,van der Graaf Y,Wittebol-Post D,Willemse J1992).Awareness of visual disability when compiling a program for visual and neuro developemental stimulation for children with Cereral Palsy is essential.

Section 4 : Speech, Language and Hearing Development, Structure and Functions

Table No 18(d) : Associated problems section 4 in CP Type

SPEECH MECHANISM	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
DEFECTIVE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
STRUCTURE												
DEFECTIVE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VEGIT FN												
DEFECTIVE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPEECH FN												
DEFECTIVE	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ARTICULATION												
DEFECTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LANGUAGE												
DELAYED	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
COMPREHENSION												
DELAYED	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EXPRESSION												
DELAYED	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEARING												
DEFECTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP - 11.11% of the spastic CP had defective speech mechanism of which 11.11% had defective structure and 11.11% had defective vegetative function. Speech function was defective in 22.2% and 33.33% had delayed language, 11.11% had delayed comprehension and another 11.11% had delayed language expression.

Flaccid CP - Language was delayed in the only case.

Section 5 : General, Physical Examinations

Table No 18(e) : Associated problems section 5 in CP Type

HEAD SHAPE	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
UNREMARKABLE	8	88.89	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BRACHYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DOLICOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OXYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MICROCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MACROCEPHALY	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FACIES												
MONGOLOID	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LMASK LIKE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPINE												
UNREMARKABLE	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
LORDOSIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GIBBUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FEET												
PESCAVUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FLAT FOOT	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
CLUB FOOT	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP - 11.11% had macrocephaly, 11.11% had flat foot and 11.11% had club foot.

Flaccid CP - The only case identified as having flaccid CP had macrocephaly and flat foot .

Suzuki,J Ito M, Tomiwa K,Okuno T, found microcephaly in 35% of the CP children identified in their study.(66% in tetraplegia and about 20% in other types).

Section 6 : Neurological Examinations

Table No 18(f) : Associated problems section 6 in CP Type

TONE	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
HYPOTONIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
SPASTIC	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RIGID	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VARIABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
CORDINATION												
IMPAIRED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DTR												
REDUCED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INCREASED	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PLANTARS												
FLEXOR	8	88.89	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
EXTENSOR	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MUTE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EQUIVOCAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GAIT												
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCISSOR GAIT	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPASTIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SLR												
NEGATIVE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
POSITIVE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PRIM.REFLEX												
PRESENT	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP - 22.22% had spastic tone of the limbs and DTR's increased in 33.33%. The plantars were flexor in 88.89% and extensive in 11.11%. Scissoring gait was seen in 22.22%. SLR's were negative in 11.11% and positive in 11.11%. Primary reflexes were present in 11.11%.

Flaccid CP - The flaccid CP case identified had hypotonia ,normal coordination, reduced DTR, plantar flexor, negative SLR and presence of primary reflex.

Section 7 : Functional Activities and Abilities

Table No 18(g) : Associated problems section 7 in CP Type

STAIR CLIMBING	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AMBULATION												
MIN DIFFICULTY	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BATHING												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRESSING												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GROOMING												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FEEDING												
MIN DIFFICULTY	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FUNCT.GADE												
MIN.DISABILITY	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
WHEEL CHAIR	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BED RIDDEN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
COG FUNCTIONS												
NOT AFFECTED	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AFFECTED	3	33.33	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
PYRAMIDAL												
NOT AFFECTED	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AFFECTED	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00

Spastic CP - 22.22% needed assistance in stair climbing. 11.11% had minimal difficulty and 11.11% needed assistance in ambulation. 22.22% needed assistance in bathing. 22.22% needed help with dressing. 22.22% needed assistance in grooming.For feeding minimal difficulty was seen in 11.11% and 11.11% needed assistance. Functional grading was normal in 88.89% while 11.11% had minimal disability. Cognitive functions were affected in 33.33%. Pyramidal functions were affected in 22.22%.

Flaccid CP - The only case identified as having flaccid CP needed assistance in stair climbing (100%), ambulation (100%), bathing (100%), dressing (100%), grooming (100%) and feeding (100%). Functional grading in this case also fell in the needs assistance category (100%). Cognitive functions(100%) and pyramidal functions (100%) were affected in this case

Observation and inferences

The most commonly identified was the spastic type of CP. These cases had delayed development in all areas, abnormal limbs, physical deformities, abnormal tone and posture, unusual behaviour and trantrums, defective speech language functions and abnormal feet. Increased DTRs , extensor plantars, scissoring gait, positive SLRs and primitive reflexes were also seen in these cases. Functional activities were affected and they need assistance to function independently. Pyramidal functions were also seen to be affected.

All the associated problems seen in the CP type – spastic CP are typical of this disorder as reported in literature. Since there was only one case diagnosed as Flaccid CP the findings in this case cannot be generalised.

In their study, Parkes J,Dolk H,Hill N,Pattenden S found the most common CP subtype was bilateral spastic CP (55%).29% had no useful hand/ arm function.Almost half of the cases had intellectual,sensory impairment or active seizures.

ASSOCIATED PROBLEMS IN CP SEVERITY

Section 1 : Development

Table No 19(a) : Associated problems section 1 in CP Severity

GROSS MOTOR	V. MILD	%	MILD	%	MODE RATE	%	SEVER E	%	PROFO UND	%
DELAYED	1	100.00	6	75.00	1	100.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FINE MOTOR										
DELAYED	1	100.00	6	75.00	1	100.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ORAL MOTOR										
DELAYED	1	100.00	3	37.50	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SELF HELP SKILLS										
DELAYED	1	100.00	5	62.50	1	100.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPEECH&LANGUAGE										
DELAYED	1	100.00	4	50.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUDITORY										
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VISUAL										
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHER SENSES										
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SOCIAL										
DELAYED	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Very Mild CP - The only case falling in the very mild category had delayed gross motor skills (100%), delayed fine motor skills (100%), delayed oral motor skills (100%), delayed self help skills, and delayed speech and language skills (100%).

Mild CP - 75% had delayed gross motor skills. Fine motor skills were delayed in 75%. Oral motor skills were delayed in 37.50%. Self help skills were delayed in 62.50%. Speech and language was delayed in 50%. Social skills were delayed in 25%.

Moderate CP - The only case identified as having moderate CP had delayed gross motor (100%) and fine motor skills. Self help skills was delayed in 100%.

Section 2 : Schooling

Table No 19(b) : Associated problems section 2 in CP Severity

ATTENDS	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
NO SCHOOL	1	100.00	6	75.00	1	100.00	0	0.00	0	0.00
NORMAL SCHOOL	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Very Mild CP - The only case in this group does not attend school (100%).

Mild CP - 75% does not attend school while 25% attends normal school.

Moderate CP - The only case (100%) does not attend school.

Section 3 : General, Physical and Behavioural Characteristics

Table No 19(c) : Associated problems section 3 in CP Severity

PHY. DEFOR	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
YES	1	100.00	3	37.50	1	100.00	0	0.00	0	0.00
HEAD&NECK										
CONG DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ACQ. DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LIMBS										
MONOPLEGIA	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIA	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
TRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
QUADRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	1	100.00	2	25.00	1	100.00	0	0.00	0	0.00
GAIT										
SCISSORED	1	100.00	1	12.50	1	100.00	0	0.00	0	0.00
LIMPING	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
SHUFFLING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOTOR										
STEREOTYPIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TONE, POSTURE	1	100.00	7	87.50	1	100.00	0	0.00	0	0.00
SENSORY ORGANS										
PHY DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
UNUSUAL BEH										
NIL	1	100.00	5	62.50	0	0.00	0	0.00	0	0.00
HYPERACTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
WITHDRAWN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TANTRUMS	0	0.00	3	37.50	1	100.00	0	0.00	0	0.00
INCONTENANCE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
THUM SUCKING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Very Mild CP - The only case in this group had physical deformity (100%), other unspecified problems in limbs (100%), scissored gait (100%), abnormal tone and posture (100%).

Mild CP - 37.50% had physical defects, monoplegia was seen in 25% and hemiplegia in 25%. Other unspecified problems of the limbs were seen in 25%. 12.50% showed scissoring gait and 12.50% had limbing gait. Motor skills were abnormal in 87.50%. 37.50% showed temper trantrums.

Moderate CP - The only case in this group had physical deformity (100%), other unspecified problems of the limbs (100%), scissored gait (100%), abnormal tone and posture (100%), and temper tantrums (100%).

Section 4 : Speech, Language, Hearing Development, Structure and Functions

Table No 19(d) : Associated problems section 4 in CP Severity

SPEECH MECHANISM	V. MILD	%	MILD	%	MODE RATE	%	SEVER E	%	PROFO UND	%
DEFECTIVE	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
STRUCTURE										
DEFECTIVE	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
VEGIT FN										
DEFECTIVE	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
SPEECH FN										
DEFECTIVE	1	100.00	1	12.50	0	0.00	0	0.00	0	0.00
ARTICULATION										
DEFECTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LANGUAGE										
DELAYED	1	100.00	3	37.50	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
COMPREHENSION										
DELAYED	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EXPRESSION										
DELAYED	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEARING										
DEFECTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Very Mild CP - Speech function (100%) was defective in the only case in this group. This case had delayed language (100%) and delayed language expression (100%) and comprehension.

Mild CP - 12.50% had defective speech mechanism, defective structure (12.50%), defective vegetative functions (12.50%) and defective speech function was seen in 12.50%. Language was delayed in 37.50%.

Section 5 : General Physical Examinations

Table No 19(e) : Associated problems section 5 in CP Severity

HEAD SHAPE	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
UNREMARKABLE	0	0.00	7	87.50	1	100.00	0	0.00	0	0.00
BRACHYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DOLICOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OXYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MICROCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MACROCEPHALY	1	100.00	1	12.50	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FACIES										
MONGOLOID	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LMASK LIKE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPINE										
UNREMARKABLE	1	100.00	8	100.00	1	100.00	0	0.00	0	0.00
LORDOSIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GIBBUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FEET										
PESCAVUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FLAT FOOT	1	100.00	1	12.50	0	0.00	0	0.00	0	0.00
CLUB FOOT	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00

Very Mild CP - The only case had macrocephaly (100%) and flat foot (100%).

Mild CP - 12.50% had Macrocephaly. Club foot was seen in 12.5% and flat foot in 12.5%.

Section 6 : Neurological Examinations

Table No 19(f) : Associated problems section 6 in CP Severity

TONE	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
HYPOTONIA	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
SPASTIC	1	100.00	1	12.50	0	0.00	0	0.00	0	0.00
RIGID	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VARIABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
CORDINATION										
IMPAIRED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DTR										
REDUCED	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INCREASED	1	100.00	2	25.00	0	0.00	0	0.00	0	0.00
PLANTARS										
FLEXOR	1	100.00	7	87.50	1	100.00	0	0.00	0	0.00
EXTENSOR	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
MUTE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EQUIVOCAL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GAIT										
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCISSOR GAIT	1	100.00	1	12.50	0	0.00	0	0.00	0	0.00
SPASTIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
SLR										
NEGATIVE	1	100.00	1	12.50	1	100.00	0	0.00	0	0.00
POSITIVE	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
PRIM.REFLEX										
PRESENT	1	100.00	1	12.50	1	100.00	0	0.00	0	0.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Very Mild CP - 100% had spastic tone (one case), increased DTR (100%), flexors (100%), scissor gait (100%), negative SLRs (100%) and presence of primary reflex (100%).

Mild CP - Hypotonia was seen in 12.50% and spastic tone in 12.50%. DTR was increased in 25%. Plantars were flexor in 87.50% and extensor in 12.50%. Scissoring gait was seen in 12.50%. SLR's were negative in 12.50% and positive in 12.50% while primitive reflexes were present in 12.50%.

Moderate CP - presence of primitive reflexes were seen (100%).

Section 7 : Functional Activities and Abilities

Table No 19(g) : Associated problems section 7 in CP Severity

STAIR CLIMBING	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	3	37.50	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AMBULATION										
MIN DIFFICULTY	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BATHING										
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	3	37.50	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRESSING										
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	3	37.50	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GROOMING										
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	3	37.50	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FEEDING										
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	3	37.50	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FUNCT.GADE										
MIN.DISABILITY	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	2	25.00	0	0.00	0	0.00	0	0.00
WHEEL CHAIR	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
BED RIDDEN	0	0.00		0.00	0	0.00	0	0.00	0	0.00
COG FUNCTIONS										
NOT AFFECTED	1	100.00	6	75.00	1	100.00	0	0.00	0	0.00
AFFECTED	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00
PYRAMIDAL										
NOT AFFECTED	1	100.00	1	12.50	1	100.00	0	0.00	0	0.00
AFFECTED	0	0.00	4	50.00	0	0.00	0	0.00	0	0.00

Mild CP - 37.50% needed assistance in stair climbing. 12.5% had minimal difficulty and 25% needed assistance in ambulation. 37.50% needed assistance in bathing. 37.5% needed assistance in Dressing. 37.5% needed assistance in grooming. 37.5% needed assistance in feeding. Functional grading showed minimal disability in 12.5% and 25%

needed assistance. Cognitive functions were affected in 12.5%. Pyramidal function were affected in 50%.

Observations and inferences

Mild CP – Most of the children identified as CP fell in the Mild category. These children showed delayed development in both motor skills and speech and language skills. Findings in speech and language, general examination and neurology showed findings typical of CP. These children were able to function independently with some assistance. Pyramidal functions were seen to be affected in most cases.

On subjective grading the mild level of disability will not have a global effect on the functioning of these children indicating that with adequate rehabilitation measures, these children could be brought back to the main stream.

ASSOCIATED PROBLEMS IN MR TYPE

Section 1 : Development

Table No 20(a) : Associated problems section 1 in MR Severity

GROSS MOTOR	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
DELAYED	15	62.50	5	83.33	4	100.00	1	33.33
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
FINE MOTOR								
DELAYED	17	70.83	5	83.33	4	100.00	1	33.33
DEVIANT	0	0.00	0	0.00	0	0.00	1	33.33
ORAL MOTOR								
DELAYED	7	29.17	3	50.00	1	25.00	1	33.33
DEVIANT	2	8.33	0	0.00	0	0.00	1	33.33
SELF HELP SKILLS								
DELAYED	10	41.67	3	50.00	3	75.00	1	33.33
DEVIANT	0	0.00	2	33.33	0	0.00	1	33.33
SPEECH&LANGUAGE								
DELAYED	19	79.17	4	66.67	4	100.00	2	66.67
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
AUDITORY								
DELAYED	4	16.67	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
VISUAL								
DELAYED	1	4.17	0	0.00	0	0.00	0	0.00
DEVIANT	1	4.17	0	0.00	1	25.00	0	0.00
OTHER SENSES								
DELAYED	1	4.17	1	16.67	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
SOCIAL								
DELAYED	5	20.83	1	16.67	2	50.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	1	33.33

Mild MR - Gross motor skills were delayed in 62.50%. 70.83% had delayed fine motor skills. Oral motor skills were delayed in 29.17% and deviant in 8.33%. 41.67% had delayed self-help skills. Speech language skills were delayed in 79.17%. Auditory skills were delayed in 16.67%. Visual skills were delayed in 4.17% and deviant in 4.17%. Other senses were delayed in 4.17%. Social skills were delayed in 20.83%.

Moderate MR - 83.33% had delayed gross motor skills. Fine motor skills were delayed in 83.33%. 50% had delayed oral motor skills. Self help skills were delayed in 50% and deviant in 33.33%. Speech and language skills were delayed in 66.67%. Other senses were delayed in 16.66%. Social skills were delayed in 16.67%.

Severe MR - 100% had delayed gross motor skills and fine motor skills. 25% had delayed oral motor skills. Self help skills were delayed in 75%. Speech and language skills were delayed in 100%. Visual skills were deviant in 25% and 50% had delayed social skills.

Profound MR - 33.33% had delayed motor skills. Fine motor skills were delayed and deviant in 33.33% each. While oral motor skills were delayed and deviant in 33.33% each. Self help skills were also delayed and deviant in 33.33% each. Speech and language skills were delayed in 66.67 %.

Section 2 : Schooling

Table No 20(b) : Associated problems section 2 in MR Severity

ATTENDS	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
NO SCHOOL	3	12.50	1	16.67	1	25.00	2	66.67
NORMAL SCHOOL	21	87.50	5	83.33	3	75.00	1	33.33
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00

Mild MR - 12.50% did not attend school and 87.5% attended normal school

Moderate MR - 16.67% did not attend school and 83.33% attended normal school.

Severe MR - 25% did not attend school and 75% attended normal school.

Profound MR - 66.67% did not attend school and 33.33% attended normal school.

Section 3 : General, Physical and Behavioural Characteristics

Table No 20(c) : Associated problems section 3 in MR Severity

PHY. DEFOR	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
YES	3	12.50	0	0.00	0	0.00	0	0.00
HEAD&NECK								
NORMAL	21	87.50	6	100.00	4	100.00	3	100.00
CONG DEFECTS	2	8.33	0	0.00	0	0.00	0	0.00
ACQ. DEFECTS	1	4.17	0	0.00	0	0.00	0	0.00
LIMBS								
MONOPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIA	0	0.00	1	16.67	0	0.00	0	0.00
TRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00
QUADRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	2	8.33	0	0.00	0	0.00	0	0.00
GAIT								
SCISSORED	0	0.00	0	0.00	0	0.00	0	0.00
LIMPING	0	0.00	1	16.67	0	0.00	0	0.00
SHUFFLING	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	1	4.17	0	0.00	1	25.00	1	33.33
MOTOR								
STEREOTYPIES	0	0.00	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	0	0.00	0	0.00	0	0.00	1	33.33
TONE, POSTURE	0	0.00	2	33.33	0	0.00	1	33.33
SENSORY ORGANS								
PHY DEFECTS	0	0.00	0	0.00	1	25.00	0	0.00
UNUSUAL BEH								
NIL	9	37.50	2	33.33	0	0.00	2	66.67
HYPERACTIVE	3	12.50	2	33.33	1	25.00	0	0.00
WITHDRAWN	1	4.17	0	0.00	0	0.00	1	33.33
TANTRUMS	3	12.50	1	16.67	1	25.00	0	0.00
INCONTENANCE	0	0.00	0	0.00	1	25.00	0	0.00
THUM SUCKING	1	4.17	0	0.00	0	0.00	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00

Mild MR - 12.5% had physical deformity. 8.33% had congenital defects of the head and neck and 4.17% had acquired defects of the head and neck.. Unusual behaviours were seen in 37.5%, hyperactivity in 12.5%, withdrawal in 4.17%, tantrums in 12.5% and thumb sucking in 4.17%.

Moderate MR - 16.67% had hemiplegia. Limping gait was seen in 16.67%. 33.33% had some problems of tone and posture. 33.33% had hyperactivity and 16.67% had tantrums.

Severe MR - 25% had physical defects. Hyperactivity was seen in 25%, tantrums in 25% and incontinence in another 25%.

Profound MR - Involuntary motor movements were seen in 33.33% and 33.33% had abnormal tone and posture. Withdrawn behaviour was seen in 33.33%.

Section 4 : Speech. Language, Hearing Development, Structure and Functions

Table No 20(d) : Associated problems section 4 in MR Severity

SPEECH MECHANISM	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
DEFECTIVE	1	4.17	1	16.67	1	25.00	1	33.33
STRUCTURE								
DEFECTIVE	2	8.33	2	33.33	1	25.00	0	0.00
VEGIT FN								
DEFECTIVE	3	12.50	3	50.00	0	0.00	1	33.33
SPEECH FN								
DEFECTIVE	4	16.67	4	66.67	1	25.00	1	33.33
ARTICULATION								
DEFECTIVE	6	25.00	1	16.67	2	50.00	0	0.00
LANGUAGE								
DELAYED	20	83.33	6	100.00	4	100.00	3	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
COMPREHENSION								
DELAYED	20	83.33	6	100.00	4	100.00	1	33.33
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
EXPRESSION								
DELAYED	20	83.33	6	100.00	4	100.00	1	33.33
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
HEARING								
DEFECTIVE	3	12.50	0	0.00	0	0.00	0	0.00

Mild MR - 4.17% had defective speech mechanism, 8.33% had defective structure, 12.50% had defective vegetative function, 16.67% had defective speech function. Articulation was defective in 25%. 83.33% showed delayed language. Delayed language comprehension was seen in 83.33% and delayed expression in 83.33%. Hearing was defective in 12.5%.

Moderate MR - 16.67% had defective speech mechanism, 33.33% had defective structure, 50% had defective vegetative function, 66.67% had defective speech function and 16.67% had defective articulation. Language was delayed in all the cases (100%).

Delayed language comprehension (100%) and delayed language expression (100%) was seen in all the cases.

Severe MR - 25% had defective speech mechanism, 25% had defective speech structure, 25% had defective speech function and 50% had defective articulation. Language was delayed in all the cases (100%), 100% had delayed language comprehension and expression.

Profound MR - 33.33% had defective speech mechanism, 33.33% had defective vegetative function and 33.33% had defective speech function. Language was delayed in 100%. Comprehension and expression were delayed in 33%.

Section 5 : General Physical Examinations

Table No 20(e) : Associated problems section 5 in MR Severity

HEAD SHAPE	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
UNREMARKABLE	19	79.17	4	66.67	2	50.00	1	33.33
BRACHYCEPHALY	0	0.00	0	0.00	1	25.00	0	0.00
DOLICOCEPHALY	1	4.17	0	0.00	0	0.00	0	0.00
OXYCEPHALY	0	0.00	0	0.00	0	0.00	1	33.33
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
MICROCEPHALY	3	12.50	2	33.33	1	25.00	1	33.33
MACROCEPHALY	1	4.17	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00
FACIES								
MONGOLOID	2	8.33	0	0.00	1	25.00	1	33.33
LMASK LIKE	0	0.00	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	1	4.17	0	0.00	0	0.00	0	0.00
SPINE								
UNREMARKABLE	23	95.83	6	100.00	3	75.00	3	100.00
LORDOSIS	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	1	4.17	0	0.00	1	25.00	0	0.00
GIBBUS	0	0.00	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00	0	0.00
FEET								
PESCAVUS	0	0.00	0	0.00	0	0.00	0	0.00
FLAT FOOT	2	8.33	0	0.00	1	25.00	2	66.67
CLUB FOOT	0	0.00	0	0.00	0	0.00	0	0.00

Mild MR - 4.17% had dolicocephaly, 12.50% had microcephaly and 4.17% had macrocephaly. Some other defects of the face was seen in 4.17%. 4.17% showed kyphoscoliosis of the spine and 8.33% had flat foot.

Moderate MR - 33.33% had microcephaly.

Severe MR - 25% had brachycephaly and 25% had microcephaly. Mongoloid face was seen in 25%, kyphoscoliosis in 25% and flat foot in 25%.

Profound MR - 33.33% had oxycephaly, 33.33% had microcephaly, 33.33% had mongoloid face and 66.67% had flat foot.

Section 6 : Neurological Examinations

Table No 20(f) : Associated problems section 6 in MR Severity

TONE	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
HYPOTONIA	0	0.00	0	0.00	0	0.00	0	0.00
SPASTIC	1	4.17	1	16.67	0	0.00	0	0.00
RIGID	0	0.00	0	0.00	0	0.00	0	0.00
VARIABLE	0	0.00	0	0.00	0	0.00	0	0.00
CORDINATION								
IMPAIRED	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00
DTR								
REDUCED	0	0.00	0	0.00	1	25.00	0	0.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00
INCREASED	1	4.17	1	16.67	0	0.00	2	66.67
PLANTARS								
FLEXOR	22	91.67	3	50.00	4	100.00	1	33.33
EXTENSOR	1	4.17	2	33.33	0	0.00	2	66.67
MUTE	1	4.17	0	0.00	0	0.00	0	0.00
EQUIVOCAL	0	0.00	1	16.67	0	0.00	0	0.00
GAIT								
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00
SCISSOR GAIT	0	0.00	0	0.00	0	0.00	1	33.33
SPASTIC GAIT	0	0.00	0	0.00	0	0.00	1	33.33
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	2	33.33	0	0.00	0	0.00
SLR								
NEGATIVE	1	4.17	1	16.67	1	25.00	1	33.33
POSITIVE	2	8.33	2	33.33	0	0.00	0	0.00
PRIM.REFLEX								
PRESENT	1	4.17	1	16.67	1	25.00	1	33.33
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00

Mild MR - 4.17% had spastic tone. DTR was increased in 4.17%. Plantars were flexor in 91.67%, extensor in 4.17% and mute in 4.17%. SLR's were positive in 8.33% and primitive reflexes were present in 4.17%.

Moderate MR - 16.67% had spastic tone. DTR was increased in 6.67%, plantars were flexor in 50%, extensor in 33.33% and equivocal in16.67%. Gait was not accessible in 33.33%. SLR's were positive in 33.33% and primitive reflexes were present in 16.67%.

Severe MR - DTR was reduced in 25%, plantars were flexor in 100%. Primitive reflexes were present in 25%.

Profound MR - DTR was increased in 66.67%, plantar were flexor in 33.33% and extensor in 66.67%. Scissoring gait was seen in 33.33% and spastic gait in 33.33%. Primitive reflexes were present in 33.33%.

Section 7 : Functional Activities and Abilities

Table No 20(g) : Associated problems section 7 in MR Severity

STAIR CLIMBING	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
MIN DIFFICULTY	2	8.33	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	0	0.00	1	16.67	3	75.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
AMBULATION								
MIN DIFFICULTY	1	4.17	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	0	0.00	1	16.67	2	50.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
BATHING								
MIN DIFFICULTY	2	8.33	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	2	8.33	1	16.67	3	75.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
DRESSING								
MIN DIFFICULTY	1	4.17	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	2	8.33	1	16.67	3	75.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
GROOMING								
MIN DIFFICULTY	1	4.17	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	2	8.33	1	16.67	3	75.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
FEEDING								
MIN DIFFICULTY	2	8.33	1	16.67	1	25.00	0	0.00
NEEDS ASSISTANCE	1	4.17	1	16.67	3	75.00	2	66.67
NOT POSSIBLE	0	0.00	2	33.33	0	0.00	0	0.00
FUNCT.GADE								
MIN.DISABILITY	4	16.67	2	33.33	0	0.00	0	0.00
NEEDS ASSISTANCE	2	8.33	1	16.67	3	75.00	2	66.67
WHEEL CHAIR	0	0.00	0	0.00	1	25.00	0	0.00
BED RIDDEN	0	0.00	1	16.67	0	0.00	0	0.00
COG FUNCTIONS								
NOT AFFECTED	1	4.17	1	16.67	0	0.00	1	33.33
AFFECTED	7	29.17	4	66.67	4	100.00	2	66.67
PYRAMIDAL								
NOT AFFECTED	1	4.17	1	16.67	1	25.00	1	33.33
AFFECTED	0	0.00	0	0.00	0	0.00	0	0.00

Mild MR - Minimal difficulty in stair climbing was seen in 8.33%. 4.17% had minimal difficulty in ambulation. 8.33% had minimal difficulty in bathing while 8.33% needed assistance. In dressing 4.17% showed minimal difficulty and 8.33% needed assistance. Minimal difficulty in grooming was seen in 4.17% while 8.33% needed assistance. 8.33% had minimal difficulty in feeding and 4.17% needed assistance. Functional grading showed minimal disability in 16.67% and 8.33% needed assistance. Cognitive functions were affected in 29.17%.

Moderate MR - 16.67% showed minimal difficulty in stair climbing and needed assistance in stair climbing. For 33.33% stair climbing was not possible. 16.67% showed minimal difficulty in ambulation and needed assistance in ambulation. For 33.33% ambulation was not possible. Bathing had minimal difficulty in 16.67%, needed assistance in 16.67% and not possible in 33.33%. Dressing was minimally difficult in 16.67% and needed assistance in 16.67% not possible in 33.33%. 16.67% had minimal difficulty in grooming and needed assistance in grooming. Grooming was not possible in 33.33%. Feeding showed minimal difficulty and needed assistance in 16.67% and not possible in 33.33%. Functional grading, minimal disability in 33.33% needs assistance in 16.67% and bed riden in 16.67%. Cognitive functions were affected in 66.67%.

Severe MR - Stair climbing- minimal difficulty in 25% needs assistance in 75%. Ambulation - 25% had minimal difficulty and 50% needs assistance. 25% had minimal difficulty in bathing and 75% needed assistance. 25% had minimal difficulty in dressing and 75% needed assistance. 25% had minimal difficulty in grooming and 75% needed assistance in grooming, 25% had minimal difficulty in feeding and 75% needed assistance in functional grading and 25% were wheel chair bound. 100% had their cognitive functions affected.

Profound MR - 66.67% needed assistance in stair climbing while 66.67% needed assistance in ambulation. 66.67% needed assistance in bathing, dressing, grooming and feeding. Functional grading needed assistance in 66.67%, cognitive functions were affected in 66.67%.

Observations and inferences

Mild MR: Delayed gross and fine motor development, oral motor, self help, social speech and language development and occasional delays in hearing skill development were seen in this group. Most children in this category attended normal school. Some physical deformities, congenital head and neck defects, unspecified problems of the limbs and lot of behavioural problems were seen. Delayed speech and language skills and some deficits in speech functions were observed. Features of various syndromes like abnormal head shape, few abnormalities in feet and spine and flexor plantars were frequently seen. Abnormalities of tone, posture, motor system and reflexes were relatively less frequent. Minimal difficulty and some assistance were required to function independently.

Moderate MR: A relatively higher occurrence of delayed gross motor, fine motor and speech and language development were seen in this group. Most children attended normal school. Behavioural abnormalities were more in this group with less physical abnormalities. Speech and language skills were severely delayed in all cases. Abnormalities of face and abnormal reflexes were present. Degree of disability in activities of daily living were relatively higher in this group.

***Severe MR*:** All cases had delayed gross motor, fine motor, oromotor, self help, speech and language and social skill development. Some visual skill development abnormality was also noticed. When compared to mild and moderate category relatively less school attendance was seen in this group. Unspecified problems of gait, physical defects and behavioural problems like hyperactivity, tantrums and incontinence were seen. Defective speech mechanism and structure, functions and misarticulations were noted. Language was delayed in both expression and comprehension. Abnormalities in head shape, microcephaly, mongoloid features, spinal defects and flat foot were also noted. Some abnormal reflexes were seen in DTRs and there were primitive reflexes. A good percentage needed assistance in functional activities and activities of daily living. Most

fell in the needed assistance category in functional grading. All had cognitive functions affected.

***Profound MR*:** Abnormalities in motor development, delays and deviance in self help skills development and delayed speech and language development and some abnormalities in social skills development were observed. School attendance was very low in this category. Unspecified problems of gait and abnormal tone and posture were seen. Defective speech mechanism in terms of vegetative functions and misarticulations were observed. Language was delayed in all. Abnormalities in head shape, microcephaly, mongoloid features and flat foot were seen. Increased DTRs and abnormal plantar and primitive reflexes were noticed. A good percentage needed assistance in functional activities and activities of daily living. Most children needed assistance in functional grading and had their cognitive system affected.

The problem seen were more in speech language and other developmental areas and speech and language expression and comprehension skills. Neurological problems and other physical findings were relatively less in the MR group. As the severity increased the children were more dependent in functional activities and activities of daily living. Features suggestive of syndromes were more in the MR group than CP group.

Table No 20(h) : Syndromes Associated with Mental retardation

	Hearing Loss	**Down's Syndrome**	**Other Syndromes**
No	2	2	4
%	5.41	5.41	10.81

It was observed that 5.41% of the children identified as having MR had hearing loss and Down's Syndrome, while 8.11% had other syndromes like Seckel Cell Syndrome, Marfanoid Features and Brittle Bone Disease.

Inferences : It could be inferred that the presence of these disorders were the reason why the cases diagnosed as MR had prominent physical abnormalities.

ASSOCIATED PROBLEMS IN CP&MR MR Severity.

Section 1 : Development

Table No. 21(a) Associated problems section 1 in CP & MR - MR Severity.

GROSS MOTOR	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
DELAYED	4	66.67	1	100.00	2	66.67	4	100.00
DEVIANT	1	16.67	0	0.00	0	0.00	0	0.00
FINE MOTOR								
DELAYED	4	66.67	1	100.00	2	66.67	4	100.00
DEVIANT	1	16.67	0	0.00	0	0.00	0	0.00
ORAL MOTOR								
DELAYED	1	16.67	0	0.00	2	66.67	4	100.00
DEVIANT	2	33.33	0	0.00	0	0.00	0	0.00
SELF HELP SKILLS								
DELAYED	2	33.33	1	100.00	3	100.00	3	75.00
DEVIANT	1	16.67	0	0.00	0	0.00	0	0.00
SPEECH&LANGUAGE								
DELAYED	6	100.00	1	100.00	2	66.67	4	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
AUDITORY								
DELAYED	0	0.00	0	0.00	0	0.00	2	50.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
VISUAL								
DELAYED	0	0.00	0	0.00	0	0.00	1	25.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
OTHER SENSES								
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
SOCIAL								
DELAYED	2	33.33	0	0.00	0	0.00	3	75.00
DEVIANT	1	16.67	0	0.00	0	0.00	0	0.00

Mild Mental Retardation: 16.67% of the mildly retarded had delayed development and another 16.67% had a deviant gross and fine motor development. 16.67% had a delayed and 33.33% had a deviant oromotor development. 33.33% had delayed and 16.67% had deviant ability for self help skills. All the children in the Mild MR category had a delayed speech and language development. 33.33% had a delayed social development and 16.67% had a deviant social development.

Moderate Mental Retardation: In the Moderate MR category the identified had delayed gross motor and fine motor developments, delayed self help skills, delayed development of speech and language.

Severe Mental Retardation: 66.67% had delayed gross motor, fine motor and oral motor development. All children identified had delayed self help skills. 66.67% had a delayed speech and language development.

Profound Mental Retardation: All children identified had delayed, gross and fine motor development, delayed oral motor development. 75% had delayed self help skills. All the children in this category had delayed speech and language development. 50% showed delayed auditory development. 25% showed delayed visual development and 75% showed delayed social development.

Section 2 : Schooling

Table No. 21(b) Associated problems section 2 in CP & MR - MR Severity.

ATTENDS	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
NO SCHOOL	1	16.67	0	0.00	0	0.00	3	75.00
NORMAL SCHOOL	5	83.33	0	0.00	2	66.67	0	0.00
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00	0	0.00
NOT APPLICABLE	0	0.00	1	100.00	1	33.33	1	25.00

***Mild Mental Retardation*:** 16.67% of children had no schooling whereas 83.33% attended normal school.

***Moderate Mental Retardation*:** Schooling not applicable for children in this category.

Severe Mental Retardation: 66.67% of children identified in this category attended normal school. Schooling was not applicable in 33.33%.

Profound Mental Retardation: 75% of children identified in this category did not attend school. Schooling was not applicable in 25%.

Section 3 : General, Physical and Behavioural Characteristics

Table No. 21(c) Associated problems section 3 in CP & MR - MR Severity

PHY. DEFOR	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
YES	2	33.33	1	100.00	2	66.67	1	25.00
HEAD&NECK								
CONG DEFECTS	0	0.00	0	0.00	0	0.00	1	25.00
ACQ. DEFECTS	0	0.00	0	0.00	2	66.67	1	25.00
LIMBS								
MONOPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIA	0	0.00	0	0.00	1	33.33	0	0.00
TRIPLEGIA	0	0.00	0	0.00	0	0.00	1	25.00
QUADRIPLEGIA	1	16.67	0	0.00	2	66.67	1	25.00
OTHERS	4	66.67	1	100.00	0	0.00	2	50.00
GAIT								
SCISSORED	0	0.00	0	0.00	0	0.00	0	0.00
LIMPING	0	0.00	0	0.00	1	33.33	0	0.00
SHUFFLING	1	16.67	0	0.00	1	33.33	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00
MOTOR								
STEREOTYPIES	0	0.00	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	0	0.00	0	0.00	1	33.33	1	25.00
TONE, POSTURE	5	83.33	1	100.00	2	66.67	2	50.00
SENSORY ORGANS								
PHY DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00
UNUSUAL BEH								
NIL	4	66.67	0	0.00	0	0.00	1	25.00
HYPERACTIVE	1	16.67	0	0.00	0	0.00	0	0.00
WITHDRAWN	0	0.00	0	0.00	0	0.00	1	25.00
TANTRUMS	1	16.67	0	0.00	2	66.67	0	0.00
INCONTENANCE	0	0.00	0	0.00	0	0.00	1	25.00
THUM SUCKING	0	0.00	0	0.00	0	0.00	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00

Mild Mental Retardation: 33.33% in the Mild MR category had some general physical deformity. 16.67% had quadriplegia. 66.67% could not be categorised. 16.67% had a shuffling gait. Hyperactive behaviour was seen in 16.67% and tantrum behaviours in another 16.67%.

Moderate Mental Retardation: One child had general physical deformity.

Severe Mental Retardation: 66.67% had general physical deformity. 66.67% had acquired defects of the head and neck. 33.33% had hemiplegia while 66.67% had quadriplegia. 33.33% had a limbic gait and another 33.33% had a shuffling gait. 33.33% had involuntary movements .Tantrum behaviours were seen in 66.67% of the children identified.

Profound Mental Retardation: 25% had general physical deformities. Congenital defects were seen in 25% and acquired defects in another 25%. 25% had a triplegia, yet another 25% had a quadriplegia and 50% could not be classified. All the children had adequate gait. Involuntary movements were seen in 25% .Unusual behaviour seen was withdrawal in 25% and incontinence in another 25%.

Section 4 : Speech, Language, Hearing Development, Structure and Functions

Table No. 21(d) : Associated problems section 4 in CP & MR - MR Severity

SPEECH MECHANISM	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
DEFECTIVE	1	16.67	0	0.00	1	33.33	0	0.00
STRUCTURE								
DEFECTIVE	1	16.67	0	0.00	1	33.33	0	0.00
VEGIT FN								
DEFECTIVE	1	16.67	1	100.00	2	66.67	3	75.00
SPEECH FN								
DEFECTIVE	2	33.33	0	0.00	2	66.67	1	25.00
ARTICULATION								
DEFECTIVE	2	33.33	0	0.00	1	33.33	0	0.00
LANGUAGE								
DELAYED	5	83.33	1	100.00	3	100.00	4	100.00
DEVIANT	1	16.67	0	0.00	0	0.00	0	0.00
COMPREHENSION								
DELAYED	4	66.67	1	100.00	3	100.00	4	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
EXPRESSION								
DELAYED	3	50.00	1	100.00	2	66.67	4	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00
HEARING								
DEFECTIVE	0	0.00	0	0.00	0	0.00	1	25.00

Mild Mental Retardation: 16.67% of the Mild MR category had some speech mechanism defects in terms of structure, function, 33% had some defective speech functions and misarticulations. 83.33% had a delayed language development and 16.67% had deviant language development. 66.67% had a delayed language comprehension and 50% had a delayed language expression.

Moderate Mental Retardation: None had defective speech mechanism, structure or function however some vegetative functions were affected in the one child identified under this category. Language was delayed in terms of both comprehension and expression.

Severe Mental Retardation: 33.33% had defective structure and function of speech mechanism. Vegetative functions were affected in 66.67% and some speech functions were also defective. Misarticulations were present in 33.33%. Language was delayed in all the three children identified in this category. Comprehension delay was evident in three children and 66.67% (2 children) had delayed language expression.

***Profound Mental Retardation*:** Vegetative function was defective in 75% of children identified. 25% had a defective speech function. All the children had a delayed development (both comprehension and expressive delays). 25% of the children identified in this category had defective hearing.

Section 5 : General Physical Examinations

Table No. 21(e) Associated problems section 5 in CP & MR – MR Severity

HEAD SHAPE	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
UNREMARKABLE	5	83.33	1	100.00	3	100.00	1	25.00
BRACHYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
DOLICOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
OXYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
MICROCEPHALY	1	16.67	0	0.00	0	0.00	3	75.00
MACROCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00
FACIES								
MONGOLOID	0	0.00	0	0.00	0	0.00	0	0.00
LMASK LIKE	0	0.00	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00
SPINE								
UNREMARKABLE	6	100.00	1	100.00	3	100.00	2	50.00
LORDOSIS	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	0	0.00	0	0.00	0	0.00	2	50.00
GIBBUS	0	0.00	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00	0	0.00
FEET								
PESCAVUS	0	0.00	0	0.00	0	0.00	0	0.00
FLAT FOOT	2	33.33	0	0.00	2	66.67	3	75.00
CLUB FOOT	0	0.00	0	0.00	0	0.00	0	0.00

***Mild Mental Retardation*:** 16.67% had microcephaly. 33.33% had flat foot.

Severe Mental Retardation: Two of the children (66.67%) had flat foot.

Profound Mental Retardation: 75% of the children identified had microcephaly. 50% were identified to have kyphoscoliosis. 75% had flat foot.

Section 6 : Neurological Examination

Table No. 21(f) Associated problems section 6 in CP & MR - MR Severity

TONE	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
HYPOTONIA	0	0.00	0	0.00	1	33.33	2	50.00
SPASTIC	2	33.33	0	0.00	1	33.33	1	25.00
RIGID	1	16.67	0	0.00	0	0.00	0	0.00
VARIABLE	0	0.00	0	0.00	0	0.00	0	0.00
CORDINATION								
IMPAIRED	1	16.67	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	2	66.67	2	50.00
DTR								
REDUCED	1	16.67	0	0.00	1	33.33	1	25.00
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00
INCREASED	3	50.00	1	100.00	1	33.33	2	50.00
PLANTARS								
FLEXOR	2	33.33	1	100.00	1	33.33	0	0.00
EXTENSOR	4	66.67	0	0.00	1	33.33	1	25.00
MUTE	0	0.00	0	0.00	0	0.00	0	0.00
EQUIVOCAL	0	0.00	0	0.00	1	33.33	3	75.00
GAIT								
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	0	0.00	0	0.00	1	33.33	0	0.00
SCISSOR GAIT	3	50.00	0	0.00	0	0.00	2	50.00
SPASTIC GAIT	1	16.67	0	0.00	0	0.00	0	0.00
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	1	33.33	1	25.00
SLR								
NEGATIVE	1	16.67	1	100.00	1	33.33	1	25.00
POSITIVE	2	33.33	0	0.00	2	66.67	3	75.00
PRIM.REFLEX								
PRESENT	1	16.67	1	100.00	1	33.33	1	25.00
ABSENT	0	0.00	0	0.00	0	0.00	1	25.00

***Mild Mental Retardation*:** 33.33% had a spastic tone and 16.67% had rigid tone. Co-ordination was impaired in 16.67%. 16.67% had reduced DTR and 50% had an increased DTR. Plantars were flexor type in 33.33% and of the extensor type in 66.67%. 16.67% of the children in this category had spastic gait. 50% had a scissoring gait. SLR's were negative in 16.67% and positive in 33.33%. Primitive reflexes were present in 16.67%.

Moderate Mental Retardation: The single child identified in this category had an increased DTR, plantars was of the flexor type, SLR negative and primitive reflexes were present.

Severe Mental Retardation: 33.33% had hypertonia, 33.33% had spastic tone and co-ordination could not be assessed in 66.67%. 33.33% had DTR reduced and 33.33% had DTR increased. Plantars of the flexor type of the 33.33% and extensor in another 33.33% and equivocal in another 33.33%. Gait was of the hemiplegic type in 33.33% and could not be assessed in the remaining 33.33%. SLR negative in 33.33% and positive in 66.67%. Primitive reflexes were present in 33.33% of children identified.

Profound Mental Retardation: 50% had a hypertonia, 25% spastic tone and coordination not assessable in 50%. 25% had DTR reduced and 50% had DTR increased. Plantars were of the extensor type in 25% and equivocal in 75%. Gait was of the scissoring type and not assessable in 25%. SLR was negative in 25% and positive in 75%. Primitive reflexes were present in 25% and absent in another 25%.

Section 7 : Functional Activities and abilities

Table No. 21(g) Associated problems section 7 in CP & MR - MR Severity

STAIR CLIMBING	MILD MR	%	MODERATE MR	%	SEVERE MR	%	PROFOUND MR	%
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	1	25.00
NOT POSSIBLE	1	16.67	0	0.00	1	33.33	3	75.00
AMBULATION								
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	16.67	0	0.00	0	0.00	1	25.00
NOT POSSIBLE	0	0.00	0	0.00	1	33.33	3	75.00
BATHING								
MIN DIFFICULTY	0	0.00	0	0.00	1	33.33	0	0.00
NEEDS ASSISTANCE	1	16.67	0	0.00	0	0.00	1	25.00
NOT POSSIBLE	0	0.00	0	0.00	1	33.33	3	75.00
DRESSING								
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	1	16.67	0	0.00	1	33.33	4	100.00
GROOMING								
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	1	16.67	0	0.00	1	33.33	4	100.00
FEEDING								
MIN DIFFICULTY	1	16.67	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	1	25.00
NOT POSSIBLE	0	0.00	0	0.00	1	33.33	3	75.00
FUNCT.GADE								
MIN.DISABILITY	0	0.00	1	100.00	1	33.33	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	1	25.00
WHEEL CHAIR	1	16.67	0	0.00	0	0.00	1	25.00
BED RIDDEN	0	0.00	0	0.00	1	33.33	2	50.00
COG FUNCTIONS								
NOT AFFECTED	1	16.67	0	0.00	1	33.33	0	0.00
AFFECTED	4	66.67	1	100.00	2	66.67	3	75.00
PYRAMIDAL								
NOT AFFECTED	1	16.67	0	0.00	1	33.33	1	25.00
AFFECTED	3	50.00	1	100.00	1	33.33	1	25.00

Mild Mental Retardation: Stair climbing was not possible in 16.67% of the children identified in this category. 16.67% needed assistance in ambulation. 16.67% needed assistance in bathing. Dressing was not possible in 16.67% and grooming was not possible in 16.67%. Feeding showed minimally difficult in 16.67% and 16.67% was

wheel chair bound. Cognitive functions were affected in 66.67% whereas pyramidal functions were affected in 50%.

Moderate Mental Retardation: Functional grading showed minimal disability in one child. Cognitive functions and pyramidal functions were also affected.

Severe Mental Retardation: 33.33% could not climb stairs, ambulation was not possible in 33.33%, 33.33% had minimal difficulty in bathing, dressing was not possible for 33.33%, grooming was not possible for 33.33% and feeding was not possible for 33.33%. Functional grading showed minimal difficulty in 33.33% and 33.33% bedridden. Cognitive functions were affected in 66.67% and Pyramidal system affected in 33.33% of the children identified.

Profound Mental Retardation: 25% needed assistance in stair climbing whereas stair climbing was not possible in 75%. 25% needed assistance in ambulation and ambulation was not possible in 75%. 25% needed assistance in bathing and bathing was not possible in 75%. Dressing and grooming was not possible in 100%. 25% needed assistance in feeding and feeding was not possible for 75%. 25% was functionally graded as needing assistance and 25% were wheel chair bound and another 50% were bed ridden. Cognitive functions were affected in 75% and pyramidal functions were affected in 25%.

Observations and inferences

Mild MR: Some abnormalities in gross and fine motor development and a higher abnormality in oromotor development, delayed and deviant self help skill development, speech and language development and social skill development were seen. A higher percentage attended normal school. Few physical deformities, abnormalities of the limbs, gait and few behavioural problems were noticed. Speech mechanism deficits in terms of structure, function and misarticulation were observed. A majority of children had delayed language comprehension and expression. Microcephaly and flat foot was also seen. Spastic and rigid tone, impaired coordination, abnormal plantars, spastic and

scissoring gait, positive SLRs and some primitive reflexes were seen. Some assistance was needed in functional activity and activities of daily living. Cognitive and pyramidal functions were affected.

***Moderate MR*:** Delayed gross motor, fine motor, self help and speech language development was noticed. Schooling was not applicable in majority of cases. General physical deformities, defective vegetative functions were observed. Minimal disability in functional grading and affected cognitive and pyramidal functions were seen.

Severe MR: Relatively high percentage had delayed gross motor development, fine and oromotor development. Mostly a delayed speech and language development and self help skill development was noticed. Fair attendance in school. General physical deformity, acquired defective head and neck and limb abnormalities had a relatively higher occurrence. Tantrum behaviours were seen in majority. Language was delayed in terms of comprehension and expression along with defective structure, function of speech mechanism and abnormal vegetative function. Misarticulations were seen. Flat foot tone abnormalities incoordination and abnormal reflexes occurred in high frequency. Functional activities were not possible or showed a higher level of disability in this group. Functional grading ranged from minimal difficulty to bed ridden. Cognitive and pyramidal functions were affected.

***Profound MR*:** All identified had delayed development of gross motor skills, fine motor skills, speech and language skills, social skills, visual skills and auditory skills. Low attendance in school was seen. General physical deformities, congenital and acquired defects, limb abnormalities like triplegia and quadriplegia were seen. Unusual behaviours like withdrawal and incontinence occurred in high frequency. Vegetative functions were defective. All had delayed language skills and some hearing defects. High occurrence of microcephaly, some spinal abnormality and high occurrence of flat foot were seen. Hypertonia, spastic tone, abnormal DTRs and plantars, scissoring gait, positive SLRs and some occurrence of primitive reflexes were noted. A more severely

impaired functional activity and activities of daily living were seen. Functional grading was also more impaired. Cognitive functions and pyramidal functions were affected.

It can be concluded that with increasing severity developmental delays, level of disability in terms of functional activity and grading and abnormal reflexes were higher.

ASSOCIATED PROBLEMS IN CP&MR CP TYPE

Section 1 : Development

Table No. 22(a) Associated problems section 1 in CP & MR – CP Type

GROSS MOTOR	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
DELAYED	7	70.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FINE MOTOR												
DELAYED	7	70.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ORAL MOTOR												
DELAYED	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SELF HELP SKILLS												
DELAYED	6	60.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
DEVIANT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPEECH&LANGUAGE												
DELAYED	9	90.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUDITORY												
DELAYED	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VISUAL												
DELAYED	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHER SENSES												
DELAYED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SOCIAL												
DELAYED	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
DEVIANT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

***Spastic CP* –** Delayed gross motor development was seen in 70% of this spastic CP's while 10% had deviant development. Delayed fine motor development were seen in 70% and deviant development in 10%. Oral motor skills were delayed in 30% and deviant in 20%. Delayed self-help skills development was seen in 60% and deviant development in

10%. 90% had delayed speech and language development and 10% had delayed auditory and visual development. Social skills were delayed in 30% and deviant in 10%.

Mixed CP – The only case identified as having mixed CP had delayed gross motor (100%), fine motor (100%), oral motor (100%), self help skills (100%), speech and language (100%) and auditory skill development (100%). Social development (100%) was also delayed in this case.

Flaccid CP - All the cases (100%) had delayed gross motor, fine motor and delayed oral motor development. 66.67% had delayed self-help skills development. All the cases had delayed speech and language development (100%). 33.33% had delayed social development.

Suzuki J,Ito M,Tomiwa K,Okuno T in their study found that the degree of gross motor disability differed among the clinical types being mild in 40%,moderate in 17% and severe in 39%.Gross motor disability was generally correlated with mental retardation. Some non-ambulatory cases exhibited a normalor subnormal mentality.

Section 2 : Schooling

Table No. 22(b) Associated problems section 2 in CP & MR – CP Type

ATTENDS	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
NO SCHOOL	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
NORMAL SCHOOL	5	50.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPECIAL SCHOOL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PARTIALLY INTEGRATED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT APPLICABLE	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00

Spastic CP – 50% of the spastic CP attended normal school while schooling was not applicable in 20%.

Mixed CP - The only case (100%) in this category did not attend school.

Flaccid CP - Schooling was not applicable in all the cases (100%).

In their study,Suzuki J, Ito M, Tomiwa K, Okuna T, found that 53% of their case entered a elementary school (ordinary classes in 30% and special classes in 23%),41% a special school,and 5% entered a protective institution.

Section 3 : General, Physical and Behavioural Characteristics

Table No. 22(c) Associated problems section 3 in CP & MR – CP Type

PHY. DEFOR	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
YES	4	40.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
HEAD&NECK												
CONG DEFECTS	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ACQ. DEFECTS	2	20.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
LIMBS												
MONOPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIA	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TRIPLEGIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
QUADRIPLEGIA	2	20.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
OTHERS	6	60.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
GAIT												
SCISSORED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LIMPING	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SHUFFLING	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
OTHERS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOTOR												
STEREOTYPIES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INVOLUNTARY MOVEMENTS	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
TONE, POSTURE	8	80.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
SENSORY ORGANS												
PHY DEFECTS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
UNUSUAL BEH												
NIL	5	50.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
HYPERACTIVE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
WITHDRAWN	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TANTRUMS	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INCONTENANCE	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
THUM SUCKING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AUTISTIC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DROOLING	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHERS	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

***Spastic CP* –** 40% had physical deformities. 10% had congenital defect of the head and neck and 20% had acquired defect. Hemiplegia was seen in 10%, quadriplegia in 20% and other unspecified defects of the limbs seen in 60%. 10% had limping gait and another 10% had shuffling gait. Involuntary motor movements were seen in 10% while abnormalities of tone and posture was seen in 80%. Tantrums were observed in 30% and other unusual behaviors in 10%.

Mixed CP – The only case in this group had physical deformities (100%), acquired defects of head and neck (100%), quadriplegia (100%), involuntary movement (100%), and incontinence (100%).

Flaccid CP - 33.33% had physical deformities, triplegia (33.33%), quadriplegia (33.33%), and other unspecified abnormalities of the limb (33.33%) and showed a shuffling gait (33.33%). Abnormalities of tone and posture were seen in 66.67% while hyperactivity was seen in 33.33%.

Section 4: Speech, Language, Hearing Development, Structure and Functions

Table No. 22(d) Associated problems section 4 in CP & MR – CP Type

SPEECH MECHANISM	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
DEFECTIVE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
STRUCTURE												
DEFECTIVE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VEGIT FN												
DEFECTIVE	4	40.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
SPEECH FN												
DEFECTIVE	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
ARTICULATION												
DEFECTIVE	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LANGUAGE												
DELAYED	9	90.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
COMPREHENSION												
DELAYED	8	80.00	0	0.00	0	0.00	0	0.00	1	100.00	3	100.00
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EXPRESSION												
DELAYED	7	70.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
DEVIANT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEARING												
DEFECTIVE	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00

Spastic CP – 10% had defective speech mechanism and defective structure. Vegetative function was defective in 40%, speech function in 30%, defective articulation in 30%, delayed language in 90% and deviant language in 10%. 80% had delayed language comprehension skills and 70% had delayed expression.

Mixed CP - The only case in this category 100% had defective vegetative function, defective speech function (100%), delayed language skills (100%), delayed language comprehension (100%) and expression and defective hearing (100%).

Flaccid CP - Speech mechanism was defective in 33.33%, vegetative function defective in 66.67%, defective speech function in 33.33%. Language was delayed in 100%, with delayed comprehension skills in 100% and expression skills in 66.67%.

Section 5 : General Physical Examinations

Table No. 22(e) Associated problems section 5 in CP & MR – CP Type

HEAD SHAPE	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
UNREMARKABLE	7	70.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00
BRACHYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DOLICOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OXYCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PLAGIOCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MICROCEPHALY	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
MACROCEPHALY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FACIES												
MONGOLOID	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
LMASK LIKE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MOON SHAPED	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ANY OTHER	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPINE												
UNREMARKABLE	9	90.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00
LORDOSIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(R)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCOLIOSIS(L)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
KYPHOSCOLIOSIS	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
GIBBUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TENDERNESS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FEET												
PESCAVUS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
FLAT FOOT	5	50.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
CLUB FOOT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP – 30% had microcephaly while 10% had kyphoscoliosis and 50% had flat foot

Mixed CP – The only case had microcephaly i.e., (100%), kyphoscoliosis (100%) and flat foot (100%)

Flaccid CP – 33.33% had flat foot.

Section 6 : Neurological Examinations

Table No. 22(f) Associated problems section 6 in CP & MR – CP Type

TONE	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
HYPOTONIA	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
SPASTIC	4	40.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RIGID	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VARIABLE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
CORDINATION												
IMPAIRED	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
DTR												
REDUCED	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INCREASED	7	70.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PLANTARS												
FLEXOR	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
EXTENSOR	6	60.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
MUTE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
EQUIVOCAL	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
GAIT												
SENSORY ATAXIE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HEMIPLEGIC GAIT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SCISSOR GAIT	5	50.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SPASTIC GAIT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
SHUFFLING GAIT'	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ATAXIC GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
HIGH STEP GAIT	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GAIT APRAXIA	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT ASSESSABLE	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
SLR												
NEGATIVE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
POSITIVE	4	40.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
PRIM.REFLEX												
PRESENT	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
ABSENT	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00

Spastic CP – 40% had spastic tone while 10% had rigid tone. Coordination was impaired in 10% while it was not assessable in 30%. DTR's were reduced in 10% and increased in 70%. Plantars were extensor in 60% and equivocal in 10%. Scissoring gait was seen in 50% and 10% had a spastic gait. SLR's were positive in 40%. 10% had primitive reflexes.

Mixed CP – Hypotonia was seen in 100% (one case), plantars were equivocal in this case (100%), gait was not assessable in 100%, SLR's were positive (100%) and primitive reflexes were absent (100%) in this case.

Flaccid CP – 66.67% had hypotonia while coordination was not assessable in 33.33%. DTR's were reduced in 66.67%, plantars were flexor in 33.33% and equivocal in 66.67%. Gait was not assessable in 33.33% while SLR's were positive in 66.67%. Primitive reflexes were present in 33.33%.

Section 7 : Functional activities and Abilities

Table No. 22(g) Associated problems section 7 in CP & MR – CP Type

STAIR CLIMBING	SPASTIC	%	ATHETOID	%	ATAXIA	%	RIGIDITY	%	MIXED	%	FLACCID	%
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	2	20.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
AMBULATION												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
BATHING												
MIN DIFFICULTY	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
DRESSING												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
GROOMING												
MIN DIFFICULTY	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	3	30.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
FEEDING												
MIN DIFFICULTY	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NOT POSSIBLE	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
FUNCT.GADE												
MIN.DISABILITY	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
NEEDS ASSISTANCE	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
WHEEL CHAIR	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
BED RIDDEN	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
COG FUNCTIONS												
NOT AFFECTED	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33
AFFECTED	7	70.00	0	0.00	0	0.00	0	0.00	1	100.00	2	66.67
PYRAMIDAL												
NOT AFFECTED	1	10.00	0	0.00	0	0.00	0	0.00	1	100.00	1	33.33
AFFECTED	6	60.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Spastic CP – 10% needed assistance in stair climbing while for 20% stair climbing was not possible. Ambulation needed assistance in 20% while it was not possible in 10%. 10% could bath with minimal difficulty while 20% needed assistance and for 10% it was not possible. For 30% dressing was not possible while grooming was not possible in 30%. 10% had minimal difficulty in feeding, 10% needed assistance in feeding and feeding was not possible in 10%. Functional grading showed minimal disability in 20% while 10% needed assistance were wheel chair bound or bed ridden. Cognitive functions were affected in 70% while pyramidal functions were affected in 60%.

Mixed CP – Stair climbing was not possible in the only case in this group (100%). Ambulation, bathing, dressing, grooming and feeding were also not possible (100%). This case was wheel chair bound (100%) and cognitive functions were affected in this case (100%).

Flaccid CP – For 66.67% stair climbing, ambulation, bathing, dressing, grooming and feeding were not possible. Functional grading showed that all these cases were bed ridden (66.67%) and cognitive functions were also affected in them.

Observations and Inferences

Spastic CP – Delay in gross motor development, fine motor development, oral motor development, self help development, speech and language development and social skills development was seen. A few deviancies in auditory development was also noticed. These children had a fair attendance in normal school. General physical deformities, limb abnormalities like hemiplegia, quadriplegia and other unspecified defects were noticed. Few had abnormal gait and abnormalities of tone and posture. Behavioural problems like temper tantrums were observed in a majority. Defective speech mechanism, structure and function (vegetative) misarticulations and a very high frequency of delayed speech and language was noticed. Microcephaly, spinal abnormalities and flat foot were also a finding. Tone and reflex patterns were consistent

with findings specific to spastic CP. Functional activities needed assistance though disability was not so severe. Cognitive and pyramidal functions were affected.

Mixed CP – The only case identified had most areas of development, functions and functional activities affected. The level of disability was severe with no school attendance.

Flaccid CP - Major findings were delayed gross motor, fine motor, oral motor, self help skills, speech and language and social development. Schooling was not applicable in this category. Physical abnormalities, limb abnormalities like triplegia, quadriplegia and other unspecified abnormalities of the limb, some gait abnormality, abnormalities of tone and posture and frequent reports of hyperactivity were the major findings. Speech mechanism structure and function and severely affected vegetative functions were noticed. All children had language abnormalities. Flat foot was not uncommon. Tone and reflex patterns were consistent with the hypotonic type of CP. Functional activity and grading was implicated as having severe disability. All cases were bed ridden.

To conclude all developmental milestones were delayed in the various type of CP's. Physical and neurological examination showed typical profiles respective to the categories. Functional abilities were much severe than the pure CP types.

ASSOCIATED PROBLEMS IN CP&MR CP SEVERITY

Section 1 : Development

Table No. 23(a) Associated problems section 1 in CP & MR – CP Severity

GROSS MOTOR	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
DELAYED	0	0.00	5	83.33	1	100	2	50	3	100
DEVIANT	0	0.00	0	0	0	0	1	25	0	0
FINE MOTOR										
DELAYED	0	0.00	5	83.33	1	100	2	50	3	100
DEVIANT	0	0.00	0	0	0	0	1	25	0	0
ORAL MOTOR										
DELAYED	0	0.00	1	16.67	1	100	2	50	3	100
DEVIANT	0	0.00	1	16.67	0	0	1	25	0	0
SELF HELP SKILLS										
DELAYED	0	0.00	3	50	0	0	3	75	3	100
DEVIANT	0	0.00	0	0	0	0	1	25	0	0
SPEECH&LANGUAGE										
DELAYED	0	0.00	6	100	1	100	3	75	3	100
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
AUDITORY										
DELAYED	0	0.00	0	0	0	0	0	0	2	66.67
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
VISUAL										
DELAYED	0	0.00	0	0	0	0	0	0	1	33.33
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
OTHER SENSES										
DELAYED	0	0.00	0	0	0	0	0	0	0	0
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
SOCIAL										
DELAYED	0	0.00	2	33.33	0	0	0	0	3	100
DEVIANT	0	0.00	1	16.67	0	0	0	0	0	0

Mild CP - 83.33% had delayed gross motor development, fine motor development were delayed in 83.33%. Oral motor speech were delayed and deviant in 16.67%, self help skills were delayed in 50%. All the children (100%) had delayed speech and language skills. Social skills were delayed in 33.33% and deviant in 16.67%

Moderate CP - All the children i.e. 100% had delayed gross motor development, fine motor development, oral motor skills and delayed speech and language skills.

Severe CP - 50% had delayed gross motor development and 25% had deviant gross motor development. Fine motor development was delayed in 50% and deviant in 25%.

Oral motor skills were delayed in 50% and deviant in 25%. Self help skills were delayed in 75% and deviant in 25%. 75% showed delay in speech and language development.

Profound CP - 100% had delayed gross motor, fine motor, oral motor, self help and speech and language development. Auditory skills was delayed in 66.67% and visual skills in 33.33%. Social skills was delayed in all the children (100%).

Section 2 : Schooling

Table No. 23(b) Associated problems section 2 in CP & MR – CP Severity

ATTENDS	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
NO SCHOOL	0	0.00	0	0	0	0	1	25	3	100
NORMAL SCHOOL	0	0.00	3	50	0	0	2	50	0	0
SPECIAL SCHOOL	0	0.00	0	0	0	0	0	0	0	0
PARTIALLY INTEGRATED	0	0.00	0	0	0	0	0	0	0	0
NOT APPLICABLE	0	0.00	3	50	1	100	1	25	0	0

Mild CP - 50% attends normal school were schooling was not applicable in 50%.

Moderate CP - Schooling was not applicable in all the children (100%).

Severe CP - 50% attended normal school. Schooling was not applicable in 25%.

Profound CP - All the children does not attend school.

Section 3 : General, Physical and Behavioural Characteristics

Table No. 23(c) Associated problems section 3 in CP & MR – CP Severity

PHY. DEFOR	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
YES	0	0.00	2	33.33	0	0	3	75	1	33.33
HEAD&NECK										
CONG DEFECTS	0	0.00	0	0	0	0	0	0	1	33.33
ACQ. DEFECTS	0	0.00	0	0	0	0	2	50	1	33.33
LIMBS										
MONOPLEGIA	0	0.00	0	0	0	0	0	0	0	0
HEMIPLEGIA	0	0.00	0	0	0	0	1	25	0	0
TRIPLEGIA	0	0.00	0	0	1	100	0	0	0	0
QUADRIPLEGIA	0	0.00	0	0	0	0	3	75	1	33.33
OTHERS	0	0.00	5	83.33	0	0	0	0	2	66.67
GAIT										
SCISSORED	0	0.00	0	0	0	0	0	0	0	0
LIMPING	0	0.00	0	0	0	0	1	25	0	0
SHUFFLING	0	0.00	1	16.67	0	0	1	25	0	0
OTHERS	0	0.00	0	0	0	0	2	50	0	0
MOTOR										
STEREOTYPIES	0	0.00	0	0	0	0	0	0	0	0
INVOLUNTARY MOVEMENTS	0	0.00	0	0	0	0	1	25	1	33.33
TONE, POSTURE	0	0.00	5	83.33	0	0	3	75	2	66.67
SENSORY ORGANS										
PHY DEFECTS	0	0.00	0	0	0	0	0	0	0	0
UNUSUAL BEH										
NIL	0	0.00	4	66.67	1	100	1	25	1	33.33
HYPERACTIVE	0	0.00	1	16.67	0	0	0	0	0	0
WITHDRAWN	0	0.00	0	0	0	0	0	0	1	33.33
TANTRUMS	0	0.00	1	16.67	0	0	2	50	0	0
INCONTENANCE	0	0.00	0	0	0	0	0	0	1	33.33
THUM SUCKING	0	0.00	0	0	0	0	0	0	0	0
AUTISTIC	0	0.00	0	0	0	0	0	0	0	0
DROOLING	0	0.00	0	0	0	0	0	0	0	0
OTHERS	0	0.00	0	0	0	0	1	25	0	0

Mild CP - 33.33% had physical deformities. Some abnormality of the limb was seen in 83.33%. 16.67% had a shuffling gait. Abnormalities in tone and posture was seen in 83.33%. 16.67% had hyperactivity and 16.67% had tantrums.

Moderate CP - All the children i.e. 100% had triplegia.

Severe CP - 75% had physical deformities. Acquired defects of the head and neck was seen in 50%. 25% had hemiplegia and 75% had quadriplegia. Limping gait was seen in 25%, shuffling in 25% and other abnormalities in 50%. 25% had involuntary motor

movements and 75% had abnormalities in tone and posture. Tantrums were seen in 50% and other unusual behaviors in 25%.

Profound CP - 83.33% had physical deformities. Congenital defects were seen in 33.33% and acquired defects in 33.33%. Quadriplegia in 33.33% and other abnormalities of limbs 66.67%. 33.33% had involuntary motor movements and 66.67% had abnormalities of tone and posture. 33.33% had withdrawn behavior and incontinence.

Section 4 : Speech, Language, Hearing Development, Structure and Functions

Table No. 23(d) Associated problems section 4 in CP & MR – CP Severity

SPEECH MECHANISM	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
DEFECTIVE	0	0.00	1	16.67	0	0	1	25	0	0
STRUCTURE										
DEFECTIVE	0	0.00	1	16.67	0	0	0	0	0	0
VEGIT FN										
DEFECTIVE	0	0.00	2	33.33	0	0	2	50	3	100
SPEECH FN										
DEFECTIVE	0	0.00	1	16.67	0	0	3	75	1	33.33
ARTICULATION										
DEFECTIVE	0	0.00	2	33.33	0	0	1	25	0	0
LANGUAGE										
DELAYED	0	0.00	6	100	1	100	3	75	3	100
DEVIANT	0	0.00	0	0	0	0	1	25	0	0
COMPREHENSION										
DELAYED	0	0.00	5	83.33	1	100	3	75	3	100
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
EXPRESSION										
DELAYED	0	0.00	4	66.67	1	100	2	50	3	100
DEVIANT	0	0.00	0	0	0	0	0	0	0	0
HEARING										
DEFECTIVE	0	0.00	0	0	0	0	0	0	1	33.33

Mild CP - Speech mechanism defective in 16.67%, structure defective in 16.67% and vegetative functions defective in 33.33%. 16.67% had defective speech function, 33.33% had defective articulation. Language was delayed in all children (100%). 83.33% had delayed language comprehension and 66.67% delayed language expression.

Moderate CP - All children (100%) had delayed language and language comprehension (100%) and expression (100%).

Severe CP - Speech mechanism was defective in 25%, vegetative function in 50%. 75% had defective speech function and 25% had defective articles. Language was delayed in 75% and deviant in 25%. Language comprehension was delayed in 75% and expression was delayed in 50%.

Profound CP - All children i.e. 100% had defective vegetative function, 33.33% had defective speech function. All children had delayed language (100%), language expression (100%) and comprehension (100%). 33.33% had defective hearing.

Section 5 : General Physical examinations

Table No. 23(e) Associated problems section 5 in CP & MR – CP Severity

HEAD SHAPE	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
UNREMARKABLE	0	0.00	5	83.33	1	100	4	100	0	0
BRACHYCEPHALY	0	0.00	0	0	0	0	0	0	0	0
DOLICOCEPHALY	0	0.00	0	0	0	0	0	0	0	0
OXYCEPHALY	0	0.00	0	0	0	0	0	0	0	0
PLAGIOCEPHALY	0	0.00	0	0	0	0	0	0	0	0
MICROCEPHALY	0	0.00	1	16.67	0	0	0	0	3	100
MACROCEPHALY	0	0.00	0	0	0	0	0	0	0	0
ANY OTHER	0	0.00	0	0	0	0	0	0	0	0
FACIES										
MONGOLOID	0	0.00	0	0	0	0	0	0	0	0
LMASK LIKE	0	0.00	0	0	0	0	0	0	0	0
MOON SHAPED	0	0.00	0	0	0	0	0	0	0	0
ANY OTHER	0	0.00	0	0	0	0	0	0	0	0
SPINE										
UNREMARKABLE	0	0.00	6	100	1	100	4	100	1	33.33
LORDOSIS	0	0.00	0	0	0	0	0	0	0	0
SCOLIOSIS(R)	0	0.00	0	0	0	0	0	0	0	0
SCOLIOSIS(L)	0	0.00	0	0	0	0	0	0	0	0
KYPHOSCOLIOSIS	0	0.00	0	0	0	0	0	0	2	66.67
GIBBUS	0	0.00	0	0	0	0	0	0	0	0
TENDERNESS	0	0.00	0	0	0	0	0	0	0	0
FEET										
PESCAVUS	0	0.00	0	0	0	0	0	0	0	0
FLAT FOOT	0	0.00	2	33.33	0	0	2	50	3	100
CLUB FOOT	0	0.00	0	0	0	0	0	0	0	0

Mild CP - 16.67% had microcephaly and 33.33% had flat foot.

Severe CP - 50% of the children had flat foot.

Profound CP - 100% had microcephaly, 66.67% had kyphoscoliosis and 100% had flat foot.

Section 6 : Neurological Examinations

Table No. 23(f) Associated problems section 6 in CP & MR – CP Severity

TONE	V. MILD	%	MILD	%	MODERATE	%	SEVERE	%	PROFOUND	%
HYPOTONIA	0	0.00	0	0	1	100	1	25	1	33.33
SPASTIC	0	0.00	2	33.33	0	0	1	25	1	33.33
RIGID	0	0.00	0	0	0	0	1	25	0	0
VARIABLE	0	0.00	0	0	0	0	0	0	0	0
CORDINATION										
IMPAIRED	0	0.00	0	0	0	0	1	25	0	0
NOT ASSESSABLE	0	0.00	0	0	0	0	2	50	2	66.67
DTR										
REDUCED	0	0.00	0	0	1	100	2	50	0	0
ABSENT	0	0.00	0	0	0	0	0	0	0	0
INCREASED	0	0.00	4	66.67	0	0	1	25	2	66.67
PLANTARS										
FLEXOR	0	0.00	3	50	0	0	1	25	0	0
EXTENSOR	0	0.00	3	50	0	0	2	50	1	33.33
MUTE	0	0.00	0	0	0	0	0	0	0	0
EQUIVOCAL	0	0.00	0	0	1	100	1	25	2	66.67
GAIT										
SENSORY ATAXIE	0	0.00	0	0	0	0	0	0	0	0
HEMIPLEGIC GAIT	0	0.00	0	0	0	0	1	25	0	0
SCISSOR GAIT	0	0.00	3	50	0	0	0	0	2	66.67
SPASTIC GAIT	0	0.00	0	0	0	0	1	25	0	0
SHUFFLING GAIT'	0	0.00	0	0	0	0	0	0	0	0
ATAXIC GAIT	0	0.00	0	0	0	0	0	0	0	0
HIGH STEP GAIT	0	0.00	0	0	0	0	0	0	0	0
GAIT APRAXIA	0	0.00	0	0	0	0	1	25	0	0
NOT ASSESSABLE	0	0.00								
SLR										
NEGATIVE	0	0.00	1	16.67	1	100	1	25	0	0
POSITIVE	0	0.00	2	33.33	0	0	2	50	3	100
PRIM.REFLEX										
PRESENT	0	0.00	1	16.67	1	100	1	25	1	33.33
ABSENT	0	0.00	0	0	0	0	0	0	1	33.33

Mild CP - 33.33% had spastic tone. DTR was increased in 66.67%. Plantars were extensor in 50%. 50% has scissor gait. SLR's were positive in 33.33%, negative in 16.67%. 16.67% had primitive reflexes

Moderate CP - 100% had hypotonia. DTR was reduced in 100% and plantars were equivocal in 100%. Primitive reflexes were present in 100%.

Severe CP - Hypotonia was seen in 25%, spasticity in 25% and rigidity in 25%. Coordination was impaired in 25% and not assessable in 25%. 50% had reduced DTR's and 25% had increased DTR's. Plantars were extensor in 50% and equivocal in 25%. 25% showed hemiplegic gait, 25% showed spastic gait and another 25% had gait apraxia. SLR's were negative in 25% and positive in 50%. Primitive reflexes were seen in 25%.

Profound CP - 33.33% had hypotonia and 33.33% had spastic CP. Coordination was not assessable in 66.67%. DTR's were increased in 66.67%. Plantars were extensor in 33.33% and equivocal in 66.67%. Scissoring gait was seen in 66.67%. SLR's were positive in 100% and primitive reflexes were present in 33.33%.

Section 7 : Functional Activities and Abilities

Table No. 23(g) Associated problems section 7 in CP & MR – CP Severity

STAIR CLIMBING	V. MILD	%	MILD	%	MODE RATE	%	SEVER E	%	PROFO UND	%
MIN DIFFICULTY	0	0.00	0	0	0	0	0	0	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	0	0	1	33.33
NOT POSSIBLE	0	0.00	0	0	1	100	2	50	2	66.67
AMBULATION										
MIN DIFFICULTY	0	0.00	0	0	0	0	0	0	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	1	25	1	33.33
NOT POSSIBLE	0	0.00	0	0	1	100	1	25	2	66.67
BATHING										
MIN DIFFICULTY	0	0.00	0	0	0	0	1	25	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	1	25	1	33.33
NOT POSSIBLE	0	0.00	0	0	1	100	1	25	2	66.67
DRESSING										
MIN DIFFICULTY	0	0.00	0	0	0	0	0	0	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	0	0	0	0
NOT POSSIBLE	0	0.00	0	0	1	100	2	50	3	100
GROOMING										
MIN DIFFICULTY	0	0.00	0	0	0	0	0	0	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	0	0	0	0
NOT POSSIBLE	0	0.00	0	0	1	100	2	50	3	100
FEEDING										
MIN DIFFICULTY	0	0.00	0	0	0	0	1	25	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	0	0	1	33.33
NOT POSSIBLE	0	0.00	0	0	1	100	1	25	2	66.67
FUNCT.GADE										
MIN.DISABILITY	0	0.00	1	16.67	0	0	1	25	0	0
NEEDS ASSISTANCE	0	0.00	0	0	0	0	0	0	1	33.33
WHEEL CHAIR	0	0.00	0	0	0	0	1	25	1	33.33
BED RIDDEN	0	0.00	0	0	1	100	1	25	1	33.33
COG FUNCTIONS										
NOT AFFECTED	0	0.00	1	16.67	0	0	1	25	0	0
AFFECTED	0	0.00	4	66.67	1	100	3	75	2	66.67
PYRAMIDAL										
NOT AFFECTED	0	0.00	1	16.67	1	100	1	25	1	33.33
AFFECTED	0	0.00	4	66.67	0	0	1	25	1	33.33

Mild CP – 16.67% had minimal disability in their functional grading and 66.67% had their cognitive and pyramidal functions affected.

Moderate CP – Stair climbing, ambulation, dressing, grooming and feeding were not possible in this group. Functional grading – bed ridden (100%) and cognitive functions affected 100%.

Severe CP – Stair climbing was not possible in 50%, ambulation was not possible in 25%, bathing – minimal difficulty in 25%, needed assistance in 25% and not possible in 25%. Dressing was not possible in 50%, grooming was not possible in 50% and in 25% feeding was not possible. Functional grading showed minimal disability in 25%, 25% were wheel chair bound and 25% was bed ridden. Cognitive functions were affected in 75% and pyramidal functions were affected in 25%.

Profound CP – 33.33% needed assistance in stair climbing, 66.67% - stair climbing not possible. Ambulation needed assistance in 33.33% and not possible in 66.67%. 33.33% needs assistance in bathing and bathing was not possible in 66.67%. Dressing and grooming were not possible in 100%. Feeding needs assistance in 33.33% and not possible in 66.67%. Functional grading showed needed assistance in 33.33%, wheel chair bound in 33.33% and bed ridden in 33.33%. Cognitive functions were affected in 66.67% and pyramidal functions were affected in 33.33%.

Observations and Inferences

Mild CP – Major delays in gross motor, fine motor, speech and language (in all cases) and social development was seen. Fair attendance in normal school was observed. Physical deformities and some abnormalities of limbs, abnormalities of tone and posture were the major finding in this group. Defective speech mechanism, vegetative functions, articulation and language skills were observed. Microcephaly and flat foot were the major physical findings. Tone, gait and reflexes were consistent with findings in spastic type of CP. Minimal disability was the grading for functional activities. Cognitive and pyramidal functions were affected.

Moderate CP – The only child identified in this category had the most areas of development affected. The case also had triplegia. Schooling was not applicable in this case and language comprehension and expression were delayed. Normal physical findings were seen in this case. Neurological evaluation showed hypotonia, reduced DTR, equivocal plantars and primitive reflexes. Functional activity and grading showed severe impairment with most of the cases being bed ridden. Cognitive and pyramidal functions were affected.

Severe CP – Showed a delayed development in all areas and fair school attendance. Severe physical deformities, acquired defects of head and neck, hemi and quadriplegia, gait abnormalities, abnormalities in tone and posture and behavioural problems were seen. Speech mechanism mostly vegetative functions were affected. Delayed language skills were observed. General physical examination was normal except for flat foot. Muscle tone varied from hypotonia to spasticity to rigidity. Variable reflex patterns were seen. Functional activities were severely affected. So were cognitive and pyramidal functions.

Profound CP - All cases had delayed gross motor, fine motor, speech and language, social skills, oral motor, auditory and visual skills. Major findings of physical deformity, congenital and acquired defects, quadriplegia and other limb abnormalities, involuntary motor movements and tone and posture abnormalities were seen. Some behavioural abnormalities were also observed. All children had defective vegetative functions and speech functions. All had delayed language and few had defective hearing. Microcephaly and flat feet were seen in all along with some spinal abnormalities. Abnormal reflex patterns were the most common finding in the spastic type of CP. Functional activity and grading was severe. Cognitive and pyramidal functions are affected.

To summarize functional disability was more severe for higher levels of severity. Reflex patterns, physical defects etc were typical of various CP types as reported in literature.

High Risk factors In the Pregnant Mother

92 women were found to be pregnant at the time of the study. On screening with the high-risk register 27 mothers were identified to be at risk for having children who could be affected with CP, MR or CP & MR. Most mothers have positive scores in more than one question, though a positive score on even one question put the mother in the high-risk category. The questions obtaining maximum positive score were that relating to drug intake and exposure to radiation's.

Table No. 24 : Data regarding highrisk screening with the number of +ve persons

Screened	Iden. Mother	Q1 +ve	Q2 +ve	Q3 +ve	Q4 +ve	Q5 +ve	Q6 +ve	Q7 +ve	Q8 +ve	Q9 +ve
92	27	2	4	16	16	0	0	6	0	2

On further follow up of these mothers at delivery all the neonates were reported as normal by the concerned medical professional.

Observations and inferences:

This finding again indicates the positive effects of improved maternal health care in this society. Factors like any intake and exposure of radiations (commonly on X-ray or Scans) does not seem to have contributed to increased occurrence of these disorders.

The high-risk register was introduced to check the current status of incidence of CP, MR and CP & MR in the same survey area. But a negative result in the high risk register implicate better maternal health care and a possible reduction in the incidence of these disorders in further generations.

SUMMARY AND CONCLUSIONS

To summarize, the major findings of the present study are as follows:

- The incidence per 1000 of CP, MR and CP & MR in the Sreekaryam panchayat agree with reports in the literature.
- Males have a higher incidence in all the three disorders identified.
- The highest incidence was seen for MR.
- Rural areas had the highest incidence for all the three disorders.
- The disorders were seen more in the lower and middle SES groups.
- Most of the children identified belong to nuclear type of family.
- Incidence was more in the Hindu community for CP, MR and CP & MR.
- A majority of the children identified were the results of consanguineous unions.
- Overlapping prenatal, natal and postnatal factors were found to contribute to the disorders identified.
- In the milder degree of CP prenatal factors were more frequently observed.
- The prenatal and natal factors were common for both CP & MR.
- Directly influencing factors like birth asphyxia and unnatural delivery types had a higher etiological correlation with CP than with MR.
- The degree of impairment in development was more in the CP and CP & MR group when compared to the pure MR category.
- The milder severity of CP, MR and CP & MR generally showed a better trend of school attendance.
- The major problem in the CP and CP & MR group were the result of their physical limitations while the MR children seem to have more of behavioural problems.
- Abnormalities in general physical appearance and associated syndromes were more in MR than CP.
- Functional activities/abilities were more impaired with increase in severity of the problem irrespective of the disorder.

- A screening using a highrisk register indicated a negative result in the occurrence of Cp, Mr or Cp&Mr on mothers identified as highrisk indicating improved maternal healthcare and awareness.

Improved health care especially maternal and neonatal care seem to be the major reason for the relatively low incidence of CP, MR and CP & MR which is on par with numbers from developed countries. But even in this improved health scenario practices like consanguineous marriages is a major positive factor unique to the Indian context which should be abolished.

Delivery by unnatural methods like LSCS, Vacuum was observed frequently in the mothers of the identified population. This might have aided in the increased survival rate of low birth weight and premature infants leading to higher occurrence of these disorders in the population.

Awareness on rehabilitation facilities and aids available to these children are generally poor which is proved by the lesser attendance rates in schools by the higher severity groups in these disorders. This could also mean a lack of adequate rehabilitation facilities in the country.

Limitations of the study:

There were no dramatic results which were obtained from this present study which is different from existing studies. This could be because of the study designed wherein the disordered group were identified from a general population and then their etiological and associated problems studied. Etiology and associated problem could be correlated with the type and severity of the disorder only if the study is conducted in a larger group of already identified disordered population.

Recommendations:

Based on the existing findings/trends some etiological correlations could be made with the various disorders their type and degrees; however a more significant and

relevant factors could be identified only by studying these factors in already identified population of a disordered group.

The existing incidence/prevalence rate identified by this study is significant to call for the need for a multidisciplinary team or a multidisciplinary set up for their management. This indicates the urgent need for the development of such centres in this locality and in other areas.

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NOTE : File names of raw data and Project Report

File EPID1.DBF contains epidemiologic and socioeconomic details and answers to the screening questionnaire on CP&MR. – in CD

File EPID.DBF contains identification and socioeconomic details of each family. . – in CD

File EPID2.DBF contains the data collected using the diagnostic pro-forma. . – in CD

File EPID4.DBF contains results of the screening questionnaire used to identify the highrisk factors in the pregnant mother. . – in CD

SREEKARYAM2.JPG contains the map of the surveyed area. . – in CD

STRUCTURE.DOC contains structure of the data files with description of each field and Coding sheet for the datas used in the data file. . – in CD

CPMR.DOC contains the final report of the project – in CD

Fields used for creating graphs

Figure 1 : Various disorders identified in the survey

CP	:	Cerebral Palsy
MR	:	Mental Retardation
CP&MR	:	Cerebral Palsy and Mental Retardation
Del.Sp&Lg.	:	Delayed Speech and Language
Dec. sch. Per	:	Decreased Scholastic Performance
Epilepsy	:	Epilepsy
Poor sch. Per	:	Poor Scholastic Performance
Misarticulation	:	Misarticulation
Seizure Dis	:	Seizure Disorder
Others	:	Other disorders included Below average Performers, Congenital Meningo Myclocoele, Chronic Suppurative Otitis Media(CSOM), Developmental Expressive Aphasia, Hearing Loss, Learning Disability, Prematurity, Rt. Hemidystonia

APPENDIX – V

Explanation and description of the various terms used in the diagnostic proforma and their relevance to CP, MR and CP & MR.

Terms	*Description*	*Indication & relevance to CP, MR and CP & MR*
Handedness	The hand which a person uses predominantly for all daily life activities.	Establishment of usage of one hand indicates normal brain development.
3. Ambidextrous	Uses both hands to carryout activities.	Could be an indication of abnormal brain representation.
4. Not established	Confusion regarding usage of hands for activities.	Could be an indication of abnormal brain representation.
Birth and related history 1. Mothers age at pregnancy	The age at which the child was conceived.	Maternal age less than 20 years and greater than 35 years are positive indicators of develop-mental delays in children particularly CP, MR, etc.
2. Miscarriages if any.		Frequent miscarriages could be a high risk.
Consanguinity	Marriage between relatives.	Usually a high risk for abnormal children. Risk increases as relation between parents are close.

Prenatal	The factors during pregnancy which could result in the birth of an abnormal child.	
Natal and postnatal factors.	The factors at birth and immediately after birth.	
1. Period of Gestation	The period which the child remains in the mothers womb before delivery. Normally 36 weeks or nine months.	Delivery before period (premature) or after prescribed period (postmature) could result in abnormal children.
4. Type of delivery		
(i) FTND	Full term normal delivery.	
(ii) Forceps delivery	Extracting the baby with the help of a forceps when normal delivery become difficult.	Often a high risk factor.
(iii) LSCS	Lower section cesarean session or normally called cesarean delivery	
(iv) Breech delivery	Type of delivery where the child's buttocks come out first.	
(v) Prolonged induced labour	When delivery is prolonged medications are given to speedup delivery.	
(vi) Vacuum extraction	Type of delivery where an instrument using vacuum is used to extract the baby.	

5. Other birth complications (i) Prolapsed cord	Condition where the umbilical cord comes out first during delivery.	
(ii) Birth asphyxia	Lack of oxygen to the brain due to a delayed cry immediately after birth.	Major high risk factor for brain damage.
(iii) Jaundice	Neonatal jaundice occurs in the first week of life characterised by yellow skin colour	
(iv) Neonatal infections	Any major infections after the baby is born. Eg:- Meningitis, Encephalitis etc.	High risk for the occurrence of these disorders.
7. Apgar score	A score reflecting the child's condition immediately after birth, includes respiratory abilities and general health status. Normal score is usually 7-10 in 1 minute.	A low score baby is at risk.
8. Post natal complications (ii) Radiations	Harmful rays which can cause complications when the child is exposed to. (rare)	
(iii) Drugs	Medicines which causes harm to the brain.	If head injury present, high risk for brain damage which could result in these disorders.
(iv) Trauma	Any fall, injury to the baby after birth resulting in brain damage	
(v) Seizures	Fits:- Alternating movements of the muscles of the body.	
(vi) Endocrinal abnormalities	Diseases due to excess or lack of hormone levels adequate to the body.	
9. Immunization	Preventive medicines/vaccines used to prevent certain childhood diseases.	

II Educational History:		
(iii) Special school	School which caters to the special needs of disabled children including areas of development, reading, writing, language and vocational training.	Most of these children require special help for their special needs.
(iv) Partially integrated	The disabled child attends a normal school with adequate special help separately within the curriculum and joins the normal children.	Applicable to mild levels of disability.
III General Evaluation		
(a) Head & neck		
(ii) Congenital defects	Physical defects in the head & neck already present at birth.	Seen in some of these disorders especially in syndromes (a group of abnormalities).
(iii) Acquired defects	Physical defects of the head & neck acquired after birth.	Seen in some retarded children.
(b) Limbs		
(ii) Monoplegia	Paralysis and weakness restricted to one limb of the body	Seen to various degrees in C.P children and disorders having a C.P component.
(iii) Hemiplegia	Paralysis and weakness restricted to one side of the body	"
(iv) Triplegia	Paralysis and weakness affecting three limbs of the body	"
(v) Quadriplegia	Paralysis and weakness affecting all four limbs of the body.	"
(c) Gait	Manner of walk	
(ii) Scissored	Right and left legs are crossed like in a	Typically seen in the spastic child.

	scissors during walk.	
(iii) Shuffling	Total unbalanced manner of walk with inadequate placement of the feet.	Seen in some types of C.P.
(d) Motor		
(ii) Stereotypies	Repetitive hand or any motor activities without any purpose.	Part of the behavioural problem seen in C.P & M.R children
(iii) Involuntary movements	Movements on which the individual has no control over.	Frequently seen in particular types of C.P.
(iv) Tone, posture & balance	Terms used to indicate the mobility and strength of ones muscles.	Abnormal tone, posture & balance in CP & more severe levels of retardation.
(e) Sensory organs		
(ii) Physical defects	Any abnormalities in the five sensory organs.	Hearing defects and abnormal touch sensations are frequent in these disorders.
(f) Unusual behaviour		
(ii) Hyperactive	Abnormal and over physical activity, restlessness, inability to sit or attend to a particular task.	Behavioural problem seen in these children mainly in the MR child.
(iii) Withdrawn	Refuses to interact or socialise.	Seen in any of the disorders.
(iv) Tantrums	Excessive crying, throwing things around, injuring others and self may form tantrums.	Mainly seen in the MR category or the disorders with associated mental retardation.
(v) Incontinence	Behaviours specific to the disorder of autism: repetitive purposeless motor and verbal behaviour, etc.	Seen in some spastic and profoundly mentally retarded.
(vi) Autistic	Excessive collection of saliva in the mouth and dribbling down the sides of the mouth.	Seen in most spastic children and severe levels of mental retardation.
(vii) Drooling		
IV Speech, language evaluation		
1. Speech mechanism	The structures responsible for the production of speech like the lips, tongue, palate, jaw etc and adequate functioning of the same for the	Affected in all the disorders.
(a) Structure		
(b) Function		

	production of speech constitutes the speech mechanism, evaluation of structure (a) and function (b).	
(i) Vegetative	Vegetative functions include abilities like blowing, sucking, chewing, swallowing etc.	Mainly affected in the CP children and more of the severe to profound mentally retarded.
2. Articulation	Production of speech sounds of a particular language using the articulators (organs like lips, tongue, palate, jaw etc.)	Misarticulations ie incorrect production of speech sounds seen in most of the these disorders.
3. Voice	Production of sound by the vocal cords situated in the voice box (larynx).	Voice problems seen in CP children
4. Prosody	Variations in the pitch, loudness and loudness differences in the speech of an individual.	Abnormal prosody occurs in some types of CP.
5. Language		
(ii) Delayed	Language is called delayed when the development of language in terms of understanding and speaking falls behind that of a normal child.	Seen in almost all children affected with CP, MR and CP & MR.
(iii) Deviant	Language is said to be deviant when it is inappropriate, bizarre in terms of understanding and speaking compared to a normal child.	Some deviancies may occur when accompanied by autistic/hyperactive behaviours.
(a) Comprehension	Understanding of language.	Both these areas of comprehension and expression may be differentially or globally affected.
(b) Expression	Verbal output of language	
Provisional diagnosis		
(i) Spastic	Spastic type of CP is mainly characterised by increased muscle tone, tendency to keep elbow in a flexed position, knees flexed, hyperactive reflexes (exaggerated).	
(ii) Athetoid	Athetoid CP is characterised by slow writhing,	

(i) Ataxia	involuntary movements particularly in the distal extremities (limbs). Ataxic type of CP is mainly characterised by incoordinated movements, variable muscle tone and ataxic gait.	
(ii) Rigidity	Rigidity is characterised by rigid tone in the muscles and abnormal posture.	
(iii) Mixed	Mixed type may be a combination of any of the above type of CP.	
Psychological Evaluation 1. Tests (i) DS		
(ii) VSMS	Vineland Social Maturity Scale	Used to assess IQ levels in these disordered population.
(iii) SFB	Seguine Form Board	
(iv) BKT	Binet Kamat Test	
2. Developmental Quotient (DQ) 3. Social Age (SA) 4. Mental Age (MA) 5. Intelligence Quotient (IQ)		
General Examination 1.4 Neuro cutaneous patches	Light coloured patches seen on the skin indicative of a central nervous system problem.	Seen in some of these disordered population which is indicative of a brain damage.
1.5 Head Shape (i) Unremarkable	Normal	
(ii) Brachycephaly	Abnormal head shapes termed by the	Reflects abnormalities in the head and neck

(iii) Dolicocephaly (iv) Oxycephaly (v) Plagiocephaly	differences and variations in the abnormalities.	associated and commonly seen with syndromes having mental retardation as an associated problem.
(vi) Microcephaly (vii) macrocephaly	Small head size Larger than normal head size.	Seen in children with developmental brain damage as in the disorders of CP, MR and CP & MR
1.6 Facies: (i) Mongloid	Features characterised by low set ears, slanting eyes, flat nose, thick tongue etc.	Seen in mental retardation associated with Downs syndrome.
(ii) Mask like (iii) Moon shaped	Abnormal shape of the face.	
1.7 Spine (i) Lordosis (ii) Scoliosis (iii) Kyphoscoliosis (iv) Gibbus	Abnormalities of the spine resulting in abnormal curvatures and difficult posturing.	Found as defects at birth indicative of syndromes which have associated mental retardation.
1.8 Feet (i) Pes cavus (ii) Flat foot (iii) Club foot	Structural abnormalities of the foot.	
1.9.1 Toes/fingers (i) Syndactaly (ii) Polydactaly (iii) Arachnodactaly	Deformities of organs like the nose, ear,	

1.9.6 Congenital deformities	tongue, eye etc.	
2. Systemic Examinations	Examination of systems like cardiovascular, respiratory, gastro intestinal, endocrine etc.	
3. Neurological Examination 3.4 Motor System 3.4.1 Bulk 3.4.2 Tone 3.6.1 DTR 3.6.2 Plantars 3.8.7 SLR's	The functions of various cranial nerves like vision, hearing, odor etc. The general tone (muscle strength) bulk (muscle size) and movements. Muscle reaction to nerve stimulation Muscle reaction to stimulation of sole of the foot Response of the leg to the application of a stimulus.	
4. Functional Activity	Activities like bathing, dressing, grooming, feeding (activities of the daily living) stair climbing and ambulation (movement).	
5. Functional Grading	Grading of the amount of disability.	
6. Functional systems 6.1 Cognitive functions 6.2 Pyramidal functions	 Functions on a global level using the general intellectual abilities. Areas in the nervous system responsible for motor activities.	