KNOWLEDGE, ATTITUDE AND PRACTICE OF MOTHERS OF CHILDREN WITH CEREBRAL PALSY

By

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بسم الله الرحمن الرحيم

قال تعالى:

(وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمْ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا)

صدق الله العظيم

سورة النساء (الإية) (113)
Dedication

To

The best mother in

The whole universe

To

My mother
I deeply thank my supervisor Dr. Elham Mohammed Omer to whom I would like to show my appreciation and gratefulness for her meticulous and sustained advice, guidance and support during the construction of this work.

I deeply thank Dr. Ali Bilal consultant psychiatrist for his great help and advice.

I would like to thank all the team working in Khartoum Cheshire Home for their help during data collection.

Children with cerebral palsy and their mothers, to whom I am indebted to I wish them a prospective future & happiness.

Especial thanks to Mr Hassan for entering data and Miss Fadia.

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ABSTRACT

Cerebral palsy is a common worldwide neurological condition.

This is a descriptive cross-sectional, hospital and institutional based study it was conducted between April to August 2005. It was conducted in Khartoum pediatric hospitals and Khartoum Cheshire Home for rehabilitation of disabled children.

The objectives of the study were to assess knowledge, attitude and practices of mothers of children with CP and to study the psychological impact on them.

Two hundred and four children were enrolled in the study. The mean age of the children was 46.06±(SD) 33.23 months. 73.5% of the children were less than 5 years of age, most of them 77.5% were diagnosed by one year of age. Male to female ration was 1.37:1.

Half of mothers 50.5% had good knowledge about CP. Mothers educational level (P<0.0001), age of the mother (P<0.015) had significant correlation with the knowledge score.

Some aspects of attitudes are influenced by educational level of the mothers eg. the link between CP and mental
retardation (P<0.03), believe in traditional medicine (P<0.001) and expectation of special treatment (P<0.05).

Anxiety was moderate in less than half 40.7% of the mothers when assessed by (STAI). There was a significant correlation between the severity of anxiety and the degree of disability in the child (P<0.035), the type of CP (P<0.005) and the age of the mother (P<0.012).

Depression was diagnosed in more than two thirds of the mothers when assessed by (BDI). The level of depression correlates directly with the good knowledge (P<0.006), education (P<0.0001) and age of the mother (P<0.0001), the type of CP (P<0.023) and to the degree of disability in the child (P<0.0033).

The study recommended, further prospective studies, good communication between medical personnel and CP parents and starting multidisciplinary centers for managing CP children.
ملخص الأطروحة

تظهر صورةً في العالم الشيوعي العصبي، أكثر من الدماغ، ويعتبر.

العدد في اجتماع التقييمات، مع دراسة مشفى هذه من وابطمة، في المشترين، لأطفال في دار من ألغية وأبري بين الفترة من Northwestern عام 2005.

الاجتماع في الدماغ الشلل حول وبيانات حقوق الاكتشاف، الته دعا أمهاء الأطفال، وناشئ الدماغي المصابين، نابو وأربعة تأهيل. كانت 77.5% من الأطفال من العمر 77 estava قبل، بينما الثالث أكثر تخفيف تم 39.7% في الشلل الكهـالات في الجانبي الشلل حالات، تنظيم 26.6% في المشتركون، و 50.5% على مستوى أمهات أثناء تائه أيضًا.

الإغاثة، و 35.4% من الأطفال، و 7.3% من الأطفال، و 15.3% من الأطفال، و 12.5% من الأطفال، و 6.6% من الأطفال، و 3.5% من الأطفال، و 3.5% من الأطفال، و 3.5% من الأطفال.
ABBREVIATIONS

ADL  Activities of daily living
AFO  Ankle foot orthosis
BDI  Beck depression inventory
CCDs Contracture corrective devices
CNS  Central nervous system
CP   Cerebral palsy

$EEG$  Electroencephalogram

GABA  Gamma-aminobutyric acid
NICU  Neonatal intensive care unit
PSI  Parenting stress index
RH  Rhesus factor
SD  Sudanese dinar
SDR  Selective dorsal rhizotomy

$STAI$  State – Trait Anxiety Inventory

TORCHS  Toxoplasmosis, rubella, cytomegalovirus, herpes
        simplex

القيمة الأعتبارية ق.أ.
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Chapter One
1. INTRODUCTION AND LITERATURE REVIEW

1.1. General consideration and historical notes:

Cerebral palsy is the commonest cause of childhood physical disability\(^{(1)}\). Although cerebral palsy was known since ancient and biblical times; it was not differentiated from other crippling disorders\(^{(2)}\) till 1843, when William Little, an English surgeon wrote the first medical descriptions of a puzzling disorder that affected children in the first years of life, causing stiff, spastic muscles in their legs and to a lesser degree in their arms. These children had difficulty grasping objects, crawling, and walking. They did not get better as they grew up nor did they become worse.

W. Little did efforts to classify subtypes of cerebral palsy, which was once called Little’s disease\(^{(3)}\). Little suggested their condition resulted from a lack of oxygen during birth. He proposed that this oxygen shortage damaged sensitive brain tissues controlling movement\(^{(4)}\).

Sigmund Freud disagreed; noting that children with cerebral palsy often had other problems such as mental retardation, visual disturbances, and seizures, Freud suggested that the disorder might sometimes have roots earlier in life, during the brain's
development in the womb. "Difficult birth, in certain cases," he wrote, "is merely a symptom of deeper effects that influence the development of the fetus. so he expanded narrow assumptions that cerebral palsy resulted from birth trauma and anoxia by suggesting the possibility of predisposing factors and counseled against classification by causes until evidence for causation was clearly established; this is a challenge that continues today\(^{(5,6)}\)

1.2. Definition:

Cerebral palsy describes group of disorders of movement and or posture which are persistent but not necessary unchanging as a result of a defect or lesion that is not progressive in nature affecting the immature or growing brain ,so it is pathologically and etiologically heterogeneous condition\(^{(4,7,8,9,10)}\).

1.3 Epidemiology:

The worldwide prevalence and incidence of the disorder are not clearly known\(^{(11)}\). The overall reported prevalence in children aged 3–10 years is 2·4 per 1000 children, with variability in the reported rates in girls and boys\(^{(12,13)}\). During the past 20 years, there have been increases in the incidence and prevalence of cerebral palsy that may be related to improved documentation of
cases by national registries, advances in neonatal care, or other factors\(^{(10,14)}\). The prevalence in USA is 2-2.5/1000 live birth\(^{(10)}\), in Europe 2.08/1000\(^{(15)}\), in China 1.6/1000\(^{(16)}\). In Nigeria and Ethiopia 10/100,000 \(^{(17)}\) and 20/100,000 population\(^{(18)}\).

### 1.4. Etiology and Pathogenesis:

Cerebral palsy may result from a wide range of causes including congenital, genetic, inflammatory, anoxic, traumatic, toxic, and metabolic factors\(^{(19)}\). Causes may be divided into those which operate prenatally, perinatally and post-natally. A variety of risk factors has been associated with cerebral palsy.

Although significant postnatal intraventricular hemorrhage is likely to have neurologic sequelae, most hypoxic-ischemic injuries associated with cerebral palsy are prenatal \(^{(17,18,19)}\).

#### 1.4.1. Prenatal Factors:

are those operating from time of conception to the time of labour. These are responsible for 28\% of all cases of term babies with cerebral palsy\(^{(20)}\) and in some studies they are responsible for 70-80\% of cases\(^{(21)}\). Recent studies have suggested that prenatal maternal chorioamnionitis
may play a significant role, accounting for as many as 12% of cases of spastic cerebral palsy in term infants and more than twice that among preterm infants\(^{(22)}\). Prenatal risk factors are more nonspecific and harder to identify but include intrauterine infections, teratogenic exposures, placental complications, multiple births, and maternal conditions such as mental retardation, seizures, or hyperthyroidism. Socioeconomic factors may increase risk but also may be linked to other pathophysiologic factors such as low birth weight or preterm birth\(^{(23)}\).

1.4.2. **Perinatal events:** Those factors operate from the time of onset of labour to the time of viability of the delivered child. In such as preterm birth in which it is the most important cause in about 67% of them \(^{(20)}\), low birth weight, asphyxia, intracranial hemorrhage, infection, seizures, hypoglycemia, and hyperbilirubinemia would warrant careful developmental and neurologic screening during subsequent primary care office visits. Nevertheless, a specific cause for cerebral palsy often can’t be determined, and an interplay of multiple factors is likely in many instances\(^{(17)}\).
1.4.3. **Post natal factors:** These factors operate after the time of birth of the infant. They are less important numerically than the other factors\(^{(24)}\). They include trauma, infection of CNS and vascular accidents.

1.5. **Pathophysiology:**

Cerebral palsy results from a permanent static lesion of the cerebral motor cortex that occurs before, at, or within 2 years of birth\(^{(25,26)}\). Even though the lesion itself does not change, the clinical manifestations of the lesion change as the child grows and develops. The motor skills of most children with cerebral palsy improve as they grow, but in a slower rate in comparison with unaffected children\(^{(27)}\).

Injury to the upper motor neurons decreases cortical input to the reticulospinal and corticospinal tracts, which in turn affects motor control, decreases the number of effective motor units, and produces abnormal muscle control and weakness. Simultaneously, the loss of descending inhibitory input through the reticulospinal tract and other systems increases the excitability of gamma and alpha neurons, producing spasticity\(^{(28,29)}\) or as excessive,
inappropriate involuntary muscle activity associated with upper-motor-neuron paralysis or syndrome\(^{26}\).

Spasticity associated with cerebral palsy can lead to musculoskeletal complications such as contractures, pain, and subluxation\(^{26}\).

Injury to extrapyramidal systems results in movement disorders such as athetosis, chorea, dystonia, or rigidity. Ultimately, the clinical manifestations of the neurological injuries depend on the extent and type of CNS damage, the location of the irreversible insult, and the ability of the CNS to adapt or reorganize after the insult.

1.6. **Classification of CP:**

Cerebral palsy has been classified according to various criteria. Several classification has been suggested Taking into consideration pathological findings, etiologic factors, and clinical signs\(^{1,2,3}\). In clinical practice the modified Swedish classification is the widely used classification which is based on the tone, number and distribution of the affected limbs\(^{30}\).
1.6.1. Classification according to anatomic site of the brain lesion:

This include three categories:

1.6.1.a) Pyramidal tract involvement:

Characterized by neurologic signs of upper motor neuron lesion with increased muscle tone, increased deep tendon reflexes, pathologic reflexes and spastic weakness \( ^{(31)} \).

1.6.1.b) Extra pyramidal tract involvement:

This covers involvement of primarily of basilar nuclear areas and their connections. Clinically patients has abnormalities of motion such as athetosis, chorea, tremors, dystonia and rigidity.

1.6.1.c) Involvement of the cerebellum:

This includes the ataxic form of cerebral palsy.

1.6.2. Classification according to clinical symptoms:

This classification is based on observed clinical symptoms, and its divided into:
1.6.2.a) *Spastic syndromes*:

These are characterized by clinical signs of upper motor neuron lesions. In this form of cerebral palsy muscle contractions are commoner than other forms. Also convulsions and mental retardation are commoner than other forms.

1.6.2.b) *Dyskinesias*:

Characterized by prominent involuntary movements or fluctuating muscle tone; with the choreoathetosis is the most common subtype. Distribution is usually symmetric among the four limbs\(^{(31)}\).

1.6.2.c) *Ataxia*:

The outstanding symptom is disturbance in the sense of balance and equilibrium. Dysnergia, past pointing, and intention tremors are usually present.

1.6.2.d) *Mixed type*:

In some cases of cerebral palsy there are combination of clinical types eg. spastic-athetoid, spastic-rigid, choreo-athetoid, and is usually due to extensive brain lesion.
1.6.3. Classification according to topographic involvement of the extremities:

Topographic classification is limited to the spastic types; it is not used in other types because these types show four-limb involvement and are classified by the nature of the movement disorder (2).

1.6.3.a) Diplegia: In which the legs are more affected than the arms (10, 24).

1.6.3.b) Quadriplegia: This involves all four limbs, often with legs more affected than arms (10, 24, 31).

1.6.3.c) Hemiplegia: This condition is lateralized to the half of the body (10, 31).

1.6.3.d) Triplegia: This involves three extremities, usually both legs and one arm are involved.

1.6.3.e) Monoplegia: This involves one limb and extremely rare.
1.6.4. Classification according functional capacity:

It is divided into four grades:

1.6.4.a) Class I: There is no limitation of activity.

1.6.4.b) Class II: There is slight to moderate limitation of activity.

1.6.4.c) Class III: There is moderate to great limitation of movement.

1.7. Clinical Features:

This Swedish classification is chosen because it is the most used one in clinical practice and it is used in this study. It depends on the nature of observed motor deficit \(^{(30)}\).

1.7.1. Spastic cerebral palsy:

This is the most common type of cerebral palsy \(^{(32)}\). Early manifestations are those of hyper-reflexia and decreased spontaneous movement. Tonic neck reflexes are often obligatory and may continue to be present for long time after the normal age
of its disappearance. When hip adduction is marked, it leads to scissoring of the legs.

Tendon reflexes are brisk, often with sustained ankle clonus. As the child grow up spasticity and rigidity become more evident and leads to abnormal posture of the limbs, limitation in abduction and external rotation of the hip, limitation in extension and supination of the forearms are common. Pseudobulbar palsy is present when spasticity is bilateral and accounts for the swallowing difficulties and excessive drooling in affected children\(^{(2,10,24)}\).

1.7.1.a) Spastic quadriplegia:

All four limbs are involved. This is most severe form of cerebral palsy. The child will be immobile and expectation is life in a chair with only passive movement. There is usually associated mental deficit.

1.7.1.b) Spastic hemiplegia:

It account for about one third of children with cerebral palsy. These infants have decreased spontaneous movement and shows hand preference at a very early age. The gait is characterized by
limping and circumduction of the affected leg. The intelligence can be normal or subnormal \(^{(10,24)}\).

**1.7.1.c) Spastic diplegia:**

Affect all four limbs, but is much more severe in lower limbs than the upper limbs. Involvement of the hand may be minimal, expressing itself as clumsiness in grasping and in later life. Intelligence is often normal or borderline.

**1.7.1.d) Spastic paraplegia:**

It is a rare form of cerebral palsy, only the lower limbs are affected. The possibility of spinal cord lesion must always be considered \(^{(2)}\).

**1.7.1.e) Spastic monoplegia:**

Spastic weakness confined to one limb is rare. Careful examination usually reveals an asymmetric diplegia or hemiplegia, with one limb is more severely affected than the other.

**1.7.2. Extrapyramidal cerebral palsy:**

This manifest as hypotonia in early infancy and choreathetosis and dystonia in later childhood. After six months of
age it usually appears as abnormal posturing of the hand or on attempt to reach an object. The combination of motor handicap and absence of speech caused by deafness give an impression of severe mental retardation \(^{(2,10,24)}\).

1.7.3. **Ataxic cerebral palsy:**

It is a rare form of cerebral palsy in which hypotonia and sluggish tendon reflexes are present in early infancy. Nystagmus is uncommon. There may be associated mental defect, which is usually mild \(^{(10,24)}\).
1.8. Associated Disabilities:

Although cerebral palsy diagnosis is based on neuromuscular deficit; brain damage is not confined to the motor system alone. Therefore associated disabilities indicating dysfunction in areas other than motor system is common\(^{(2,10)}\). These include:

1.8.1. Mental retardation:

Mental retardation was found to be the commonest associated problem in children with CP, severe cognitive problems seen in about 20% of children with CP\(^{(33)}\). Conventional tests of intelligence may not be of value in children with CP because of motor and communication deficits. Age appropriate non-verbal intelligence tests have to be administered for this purpose\(^{(34)}\).

1.8.2. Visual problems:

Visual defects are common in children with CP. Overall 11% of patients with CP have severe visual impairment\(^{(35)}\).

Strabismus is the common in children with cerebral palsy followed by refractive errors and may reach to half of cases\(^{(36)}\).
1.8.3. **Auditory problems:**

It is frequent association with CP. It is most associated with the chorioathetoid type and it would be of high frequency hearing loss\(^{(37)}\).

1.8.4. **Epilepsy:**

The incidence of epilepsy in children with cerebral palsy ranges between 20% and 50%. Type of epilepsy and onset of seizures varied with type of CP; generalized seizures are the commonest, followed by partial seizures, infantile spasms, and the other myoclonic seizures are the least prevalent. The maximum incidence is in children with spastic hemiplegia, followed by quadriplegia and the least one is diplegia\(^{(38)}\). Epilepsy in patients with cerebral palsy often might be of severe nature and difficult to control. Most children with CP had onset of seizures in the first or second year of life.

1.8.5. **Speech and language problems:**

Slow or defective speech may be observed in any clinical type of CP\(^{(39)}\). These problems may be due to hearing impairment, cognitive deficits, or oro-motor dysfunction leading to
dysarthria. Difficulty in communication by language or gestures may further compound the behavior problems in the child affected\(^{(34)}\).

### 1.8.6. Sensory deficits:

As CP is defined as a defect of movement and/or posture it is not a pure motor problem but is often called sensorimotor disorder because of coexisting cortical sensory deficits e.g. finger agnosia and two point discrimination \(^{(24)}\).

### 1.8.7. Feeding and dental problems:

Oromotor dysfunction, inability to self feed, and inability to request for food due to communication problems; result in feeding problems and poor nutritional status in children with CP \(^{(40)}\). In addition these children may have gastro-esophageal reflux or choking/coughing while feeding which may further cause aversion to food \(^{(41)}\).

### 1.8.8. Behavioural problems:

Behavioral and emotional problems are common. Children with cerebral palsy begin to regard themselves as
different as early as four years of age and may have poor self
esteem as they grow up \(^{(42)}\).

**1.8.9. Orthopedic problems:**

They are common in CP patients, especially the spastic type. Children with cerebral palsy are prone to different deformities and they should be examined to look for evidence of hip subluxation, scoliosis, equinus deformity, and contractures of hamstring muscles and tendoachilles.
1.9. Diagnosis:

1.9.1. History:

To reach a diagnosis first have a full family history and history of the pregnancy, birth and perinatal period should be obtained in addition to the medical records. Also drugs, smoking and alcohol consumption during pregnancy should be included. Transient febrile illness may be relevant, particularly in early infancy.

1.9.2. General examination:

It may reveal indicators such as congenital cataracts, retinitis (rubella), microphthalmia, microcephaly, cardiac lesion, hepatosplenomegaly.

1.9.3. Neurological examination:

Conventional neurological examination on the couch can be misleading. It is necessary to gain the child confidence to cooperate with examination in addition to good observation of child movement and posture during history taking. Children with cerebral palsy show stereotyped posture with lack of variety of movement. Assessment of tone and reflexes is difficult. Most
children with cerebral palsy have a degree of bulbar palsy and brisk tendon reflexes when relaxed\textsuperscript{(31)}.

1.9.4. **Differential diagnosis:**

These include:

i) A normal child with transient neurological abnormality.

ii) Brachial plexus lesions.

iii) Spinal muscular atrophy.

iv) Congenital myopathic disorders including muscular dystrophies.

v) Cerebral degenerative diseases.

vi) Brain tumors and spinal cord tumors.

vii) Metabolic diseases.

1.9.4. **Recommended investigations in cerebral palsy:**

i) Serum antibodies to TORCHS

ii) Urine culture for rubella virus and cytomegalovirus.

iii) Aminoacid chromatography.

iv) Skull x-ray.
v) CT scan.
vi) EEG
vii) Magnetic resonance image for brain and if indicated also for spinal cord.
viii) Chromosomal analysis and genetic studies especially in patients with congenital malformations.
x) Lysosomal enzymes.

1.10. Management:

The management of cerebral palsy involves these issues:

1.10.1. Repair of the injured brain:

At this time, there are no clinically meaningful interventions that are able successfully to repair existing damage to the areas of the brain that control muscle coordination and movement\(^{(43)}\).

1.10.2. Management of the impairments of neuromuscular function:

The treatment options that are used change with the age and developmental stage of the child. However, the concept is that
spasticity associated with cerebral palsy should be treated before the child reaches the age of 5 or 6 years, so that contractures do not have the chance to develop\(^{(44)}\).

1.10.2.a) Physiotherapy:

The first principle to try to achieve muscle relaxation, to develop controlled muscle function and to purposeful pattern of movement. Physiotherapy is a vital component of therapy. There are several methods of physiotherapy:

(i) Temple fay: which uses abnormal reflexes to facilitate movements.

(ii) Bobath therapy: which is based upon understanding of neurodevelopment of infant movement pattern\(^{(45)}\).

(iii) Vojta: In which physiotherapist uses excitatory trigger areas to produce reflexes that produce movement, it also improves postural control\(^{(46)}\).

(iv) Hydrotherapy: It is helpful in decreasing the amount of medication required, as the effect of gravity is diminished the child become more mobile\(^{(47)}\).
(v) Hippotherapy (Horse riding): At proper control and guidance, it can cause an improvement in posture, tone, inhibition of pathological movement patterns\(^{(48)}\).

1.10.2.b) Device-assisted modalities:

Those have been developed to add to the techniques used by physicians and therapists to decrease impairment and improve function. These include biofeedback and therapeutic electrical stimulation\(^{(49,50)}\).

1.10.2.c) Orthoses:

A good orthoses is essential in the management of CP. A common use of orthoses in cerebral palsy is for controlling ankle position\(^{(51)}\); with the use of ankle-foot orthosis (AFO) which is worn within the shoe to control the equines deformity\(^{(24)}\).

1.10.2.d) Oral pharmacotherapy and parental medication:

Drug treatment can be used for generalized spasticity or targeted to focal problems. The oral agents most commonly used to treat spasticity are baclofen, tizanidine, benzodiazepines, dantrolene, and gabapentin\(^{(52)}\).
1.10.2.e) **Chemical denervation:**

Includes: phenol injections and botulinum toxin injections.

(i) *Botulinum toxin:* Botulinum toxin is a potent neurotoxin produced by the anaerobic bacterium *Clostridium botulinum*\(^{(53)}\). It is essential that botulinum toxin injections would be given in conjunction with physiotherapy to obtain the maximum benefit.

(ii) *Phenol injection:* Is a non-selective proteolytic agent and produce selective denervation when injected into motor nerves or muscles\(^{(54)}\).

1.10.2.f) **Selective dorsal rhizotomy (SDR):**

Involves the cutting of lumbar spinal laminae and dura, isolating the dorsal nerve roots and cutting selected fibers\(^{(31)}\). SDR combined with physiotherapy and occupational therapy leads to significant greater functional motor improvement when compared with physiotherapy and occupational therapy alone\(^{(55)}\).

1.10.2.g) **Surgery:**

There are many uses of surgery in treatment of spasticity associated with cerebral palsy.
(i) Neurosurgery: It has a limited place in treating CP patient; as mentioned before in section (1.10.1).

(ii) Neurectomy: It is usually used specifically in the obturator nerve to weaken the adductor muscles. It is usually used as adjunct to some other form of more definitive orthopedic surgery (24).

(iii) Orthopedic surgery: It is used in CP to improve ambulation, improve seating, help nursing and to treat pain (56). Lengthen of the Achillis tendon is the commonest operation performed in children with cerebral palsy. Other operations done may involve osteotomies and lengthening of the muscles (24).

1.10.3. Management of the associated disabilities:

Some times the associated disabilities become more disabling than the motor disability itself. Some main problems are discussed here:

(i) Visual problems: Requires early intervention with the ophthalmologist to correct the refractive errors and strabismus (32).
(ii) **Seizures disorders**: They are difficult to control and polytherapy is required in one third of cases\(^{(32)}\).

(iii) **Auditory and speech problems**: A complete evaluation by an audiologist and speech pathologist is needed in all children with CP. \(^{(32)}\).

(iv) **Feeding problems**: Special feeding techniques and prokinetics may be required.

(v) **Excessive salivation and drooling**: Oral exercises are taught to the child. Atropine and benztropine have been used occasionally for temporary relief.

(vi) **Behavioural problems**: Behaviour modification techniques and parental counselling are helpful\(^{(57)}\). In severe cases appropriate drugs may be required.

Because of the range of treatments for cerebral palsy, a child typically receives care from a pediatrician, who coordinates all aspects of the child's treatment; an orthopedist, who specializes in surgery to treat muscular and skeletal problems; and a variety of other therapists and aides. The treatment that's right for someone with cerebral palsy depends not only on the person's symptoms but also on his or her life stage. The treatment should be geared to help the child to develop skills appropriate for his or her age and
prepare the handicap child for future educational and occupational activities.

1.11. **Prognosis:**

The prognosis of a child with CP depends on the severity and extent of the motor disability and the associated disability. Most of the children with hemiplegic CP can achieve walking independently with circumduction gate\(^{(10)}\). 63% of the pure ataxic CP children, 61% of the diplegic type and 21% of the dyskinetic children can achieve walking independently, but none of the tetraplegic children is able to walk\(^{(58)}\).

1.12. **Prevention:**

- Get regular prenatal care clinics and well equipped NICU.
- Women should be immunized against rubella before getting pregnant.
- Parents should follow safety precautions such as using child safety seats in vehicles to prevent head injury.
- Parents should seek treatment right away for a baby who is jaundiced.
- Labor room should be well equipped for fetal monitoring and neonatal resuscitation if needed.

1.13 Psychological Impact and Knowledge of Attitudes and Practice of Mothers of Children with Cerebral Palsy (CP):

CP is benign, not progressive condition and the brain insult has already happened, but it can be changing in nature. Parents have the lifetime task of accepting their child’s developmental disability. Parents frequently experience varying periods of denial, anger, and sorrow once disability is diagnosed in their child (59).

In nation-wide study Westbrook et al used health practitioners from the Chinese, Italian, German, Greek, Arabic, and Anglo-Australian communities used social distance scales to rate the attitudes of people in their communities toward 20 disability groups. Significant differences were found in community attitudes toward people with 19 of these disabilities. Overall the German community expressed the greatest acceptance of people with disabilities, followed by the Anglo-Australian, Italian, Chinese, Greek and Arabic groups. In all communities people with AIDS, mental retardation, psychiatric illnesses and CP were the least accepted of the disability group (60).
In American study Feldman studied public perception of cerebral palsy, he selected randomly adult population from the waiting room of a suburban pediatrics office in New Jersey school of osteopathic medicine. 5% of his study group were at the lowest education which was found to be high school. He reported that about 40% believe that CP has a genetic etiology, and affected children can’t speak in 20%, die earlier in 57% and can’t hold jobs as an adults in 20%. A small percentage 4% believes that CP is infectious (61).

In East Carolina, Radeka, et al studied parents opinions concerning possible causes of CP, they found that parents agreed with several possible causative factors of CP, but there is also confusion concerning some factors that have been associated with CP (62).

Breslau studied the impact of child disability on psychological distress in 369 mothers of children with cystic fibrosis, CP, myelodysplasia, or multiple physical handicaps compared to 456 mothers from randomly selected sample and they found that mothers of disabled children scored higher in psychological distress and this finding persist when mother education, family
income and racial composition are controlled. The more dependent the child the greater was the mother distressed \(^{(63)}\).

Sillanpaa studied public awareness and attitudes towards cerebral palsy in Finland; he found that CP was known to 95.4% and its meaning to 60.7% and 88.4% would let their children play with cerebral palsy patients. He found that knowledge about CP was independently related to good basic education, but a good knowledge of CP fostered a positive attitude towards people with this disease \(^{(64)}\).

In Michigan they studied the influence of disabling condition on family functions; there were two groups compared to each other, one was including children with CP, the other was diabetic children; the results showed both groups of families exhibited high levels of family functions and, there was no difference between the ways mothers and fathers were perceiving family problems. Also neither visibility nor severity of disability differentially impacted family functioning \(^{(65)}\).

Other American study assessed the importance of severity of the disability on maternal depressive symptoms, Manuel found that about one third of the mothers had depressive symptoms and the
severity of disability and the child functional status were not predictors to maternal depression, although perceived social support moderates the relationship between the child functional status and maternal depression (66).

Glasscock studied 15 mother of children with CP who were receiving care at high risk and neurology clinic; the mothers expressed about their experience as being mothers of children with CP, she found that the mothers reported that strong family relationships are counted on during difficult times and care giving stressors and day-to-day caregiving is difficult, but therapy and social services assisted them with their children, also their family financial status is affected (67).

Wake had studied the effect of the child well being on the psychometric properties of the Child Health Questionnaire in Australian population, composed of parents of 80 child with CP. Wake found that the health status of the children didn’t vary by cognitive status or epilepsy, the psychological health and emotional impact on parents were similar for mild and severe CP. This finding shows that we shouldn’t assume less prevalent emotional impact when CP is mild (68).
In Russian Romanova studied the maternal attitudes towards children with cerebral palsy in 62 mothers of infantile CP. The study revealed that mothers' cognitive and emotional spheres were changing as the child grew older. He found that the maternal attitude of women having little children was acceptance because of the nature of the defect and disease sequelae were incomplete and emotional experience has a defensive nature. But with the nature of the deficit and the disease after effects being objective at pre-school age of a child, the maternal attitude shifted to unacceptance (69).

A study in Malaysia done to compare parenting stress among 87 mothers of children with cerebral palsy and a control group of mothers of children without disability, using Parenting Stress Index (PSI); they found that mothers of children with cerebral palsy scored significantly higher than control group in all sub scales of (CDS) and PDS, except for the sub group of "role restriction". The presence of cerebral palsy and activities of daily living (ADL) scores were significantly associated with CDS. Factors predictive of PDS were ADL scores are the number of hospitalizations over the past year, level of maternal education and being a Chinese mothers. Although this study demonstrated
that Malaysian mothers of children with cerebral palsy experienced higher levels of stress than the controls, the impact of cerebral palsy per se on parenting stress was modified by other factors such as increased care-giving demands, low maternal education and ethnic background\(^{(70)}\).

A Bengali study done to identify the stress experienced by mothers of young children with cerebral palsy in Bangladesh and to determine predictive factors. They studied 91 mothers of children with cerebral palsy ages 1.5 to 5 years as they sought services at an urban and a rural center for their children. Mothers were interviewed with the Self-Report Questionnaire and other family background and child behavior measures. The children were examined by a pediatrician and by a psychologist. Of these mothers 41.8% mothers were at risk for psychiatric morbidity. Significantly associated factors included living in the rural area within a poor family, with a relatively older child. The strongest predictor of maternal stress in multivariate analysis was child behavior problems, especially those related to burden of caring\(^{(71)}\).

Enwemweka studied in Nigeria the problems presented in 53 families due to presence of handicapped children arising from CP, poliomyelitis, Erbs palsy, talipes, arthrogryposis multiplex
congenital and trauma. He found that the fathers were indifferent to their handicapped children and there was highly significant difference in attitudes between educated and non educated fathers. Significant proportion of children were prevented from going to school due to their disability and in half of the families there was occasional squabbles arouse because of the presence of a handicapped child\(^{(72)}\).

In USA Warfield et al studied the extent to which child-related and parenting stress vary during the early childhood period among mothers of children with developmental disabilities. The degree to which specific aspects of the family environment predict stress levels measured at presentation, age 3 years and 5 years. They found that the child-related stress increased significantly across the three time points, whereas parenting stress remained fairly stable. By age 5 years, one-third of the mothers had child-related stress scores above the clinical cutoff point. Regression analyses revealed the importance of the family environment in predicting both stress outcomes. The only statistically significant predictor of child-related stress at 3 years age was family cohesion, whereas parenting stress at the same time was predicted by income, cohesion, and family support. The predictors
of both child-related and parenting stress at 5 years were the same. The greater family cohesion and fewer negative life events predicted lower stress scores at 5 years age \(^{(73)}\).

The hypothesis that stress in families increases as a child with developmental delays grows older was evaluated in Canadian mothers. Mothers with children ranging in age from 2 to 18 years were assigned to a preschool, middle childhood, or adolescent group and asked to complete the Parenting Stress Index (PSI). The results indicated that Child Domain scores were high for all groups, but Parent Domain scores were within normal limits. The middle childhood group was consistently higher in both domains than either the younger or older groups and the degree of handicap was not associated with mothers' stress in the preschool group, but was related to PSI scores for both other groups. Behavior problems were highly correlated with maternal stress for the middle childhood and adolescent groups\(^{(74)}\).

Krauss studied the similarities and differences in child-related and parenting stress between mothers and fathers of 121 toddlers with disabilities. He found that fathers reported more stress related to their child's temperament and their relationship to their child, but the mothers reported more stress from the personal
consequences of parenting. He concluded that the differences between mothers and fathers regarding the most powerful predictors of child-related and parenting stress were that the fathers were more sensitive to the effects of the family environment, whereas the mothers were more affected by their personal support networks\(^{75}\).

Zissermann assessed the knowledge of CP among parents of cerebral-palsied children who attended a rehabilitation center through self recording questionnaire. According to the results obtained from the questionnaire, both parents tended to believe that mothers are more knowledgeable about cerebral palsy. Although the parents knowledge score was influenced by the sex of the handicapped child\(^{76}\).

Green studied the extent of the theory of experiencing stigma in families of children with disabilities. The study utilizes a mixed methods approach through a survey of 81 mothers of children with disabilities in Florida, USA, to test the hypotheses related to the impact of perceived stigma on emotional and social outcomes for mothers and children. They found that the results indicate that controlling for the effects of salient maternal and child characteristics and the daily hassles of caring for a child with a
disability (objective burden), maternal perceptions that individuals with disabilities are devalued and discriminated against (stigmatized) by others increases maternal distress (subjective burden). Their findings also indicate that children of mothers who perceive high levels of stigma interact less frequently with age peers in the informal settings of homes and neighborhoods\(^{(77)}\).

In Saudi Arabia, Taha studied 102 children with severe cerebral palsy for etiology and clinical features. Ninety-one children were under the age of two years. Male to female ratio was 3:2. The causes of CP were prenatal in 23.5%, perinatal in 48%, and postnatal in 28.4% of cases. Cerebral palsy was considered medically preventable in at least 30% of the cases\(^{(78)}\).

In Dar Es Salam, Karumuna studied clinical pattern of CP and its associated handicaps among 100 children with cerebral palsy. 56 boys and 44 girls ranging in age between four months and 10 years were seen. The commonest type of cerebral palsy seen was spastic tetraplegia which occurred in 36% of the cases followed by spastic diplegia and hemiplegia seen in 20% and 15% of the cases respectively. In 70 children the cerebral palsy was associated with other severe handicaps, the commonest being epilepsy which occurred in 35% of the children followed by
deafness, speech disorders and blindness. Birth asphyxia, convulsions of undetermined causes, low birth weight, meningitis and cerebral birth trauma were found to be the leading causes of cerebral palsy\(^{(79)}\).

In Sudan, Mohammed in 1983 studied CP as medical and social problem in 100 Sudanese child, he found 45% of children were seen by religious healers, 95% of families were suffering serious economical problems; despite this 98% of the mothers strongly rejected putting the child in an institute \(^{(80)}\).

In Khartoum Cheshire Home for physically Handicapped Children Ibrahim studied the new cases attended for a year ,he found that cases of CP comprised 42% of the new cases ,the male to female ratio was 1.7:1 and 74% of those children were under 5 years .the disability was discovered within the first year in 73% . Mothers of 77% were aged between 20 and 30 years .they found that the commonest causation was perinatal asphyxia in 30% ,followed by meningo-encephalitis in 29% and prolonged febrile convulsions were incriminated in 19% of cases. the commonest presentation was spastic tetraplegia 45.9% and was significantly associated with birth asphyxia; while prolonged febrile convulsions were significantly associated with spastic hemiplegic type of CP.
Associated handicaps including speech delay, mental subnormality and epilepsy were found in 61%, 52% and 21% respectively. The majority of the patients were dependent on their families for activities of daily living. Extrfamilial help was negligible and the list of unmet needs were endless \(^{(81)}\).

Another study done in the same Home by Ibrahim included 1200 cases of CP were seen over a 16 year period to document the etiology, clinical presentation and the changing pattern with time. The mean age at the first presentation was 36.4 months; and 63% of cases were seen before the 5 years of age. The male:female ratio was 1.28:1. History of one or two affected sibling was found in 6% and 5% respectively. The spastic syndromes was in 79.7% of cases. Perinatal asphyxia 28.1%, convulsions 16.8% and meningo-encephalitis 14.6% remained the leading causes of brain insult in Sudan \(^{(82)}\).
JUSTIFICATION

1- Cerebral palsy is a common pediatrics problem with possibly increasing incidence.

2- There is lack of awareness of parents concerning cerebral palsy.

3- Cerebral palsy has a great impact on parents and community.

4- Attitudes towards cerebral palsy was not studied before in Sudan.
OBJECTIVES

1- To study the knowledge, attitudes and practice of mothers towards cerebral palsy.

2- To evaluate the psychological impact of cerebral palsy and the disability on the mothers.
Chapter Two

2- Patients and Methods

2.1. Study design:

Descriptive cross sectional hospital and institutional based study.

2.2. Study area:

The study was conducted in

1- Khartoum Cheshire Home for Rehabilitation of Handicapped Children. It is one of more than three hundred homes, throughout the world, of International Cheshire Home Foundation. It is located in Eltaeif in Khartoum state. It was first opened in 1973 but services in 1974, the home provides medical and orthopaedic treatment together with rehabilitation of physically handicapped children; through a team of pediatrician, orthopaedic surgeon, physiotherapist and social worker take care of patients in the clinic days. The activities include physiotherapy and occupational therapy including swimming cessions and horse ridding. The mothers are also trained; so that they can take care of the handicapped children.
2. Khartoum Teaching Hospital.

3- Khartoum Emergency Pediatrics Hospital.

4- Reffered Pediatrics Clinics in Khartoum hospitals.

2.3. Study duration:

The data was collected in the period between the 1st of April 2005 to August of the same year.

2.4. Study population:

Children presenting in the above mentioned Institute and hospitals with a confirmed diagnosis of CP attending with their mothers were the subject of the study.

2.4.1. Case definition and inclusion criteria:

Definition CP is defined as non-progressive disorder of movement and posture due to a defect or insult of immature brain. The Swedish classification of CP has been employed for this study\(^{30}\).

Any child included in this study fulfill the following criterias

a) Children fulfil the criteria for definition of CP.
b) Children with CP aged fifteen years or less.

c) Children presented with their mothers.

2.4.2. **Exclusion criteria:**

Children with any of the following were excluded from the study:

a) A child with mental retardation without physical disability.

b) A child with blindness, deafness or dumbness without physical disability.

c) A child with physical disability of progressive nature.

d) A child presented without his or her mother.

e) A child whose parents refuse to participate in the study.

2.5. **Sample size:**

Sample size calculation was calculated according to the equation below =204

\[ N = Z^2 \times pq/d^2 \]

- \( N \) = Sample size
- \( Z \) = Statistical certainty = 1.96 (at 95% level of confidence)
- \( P \) = Prevalence = 16%
- \( Q \) = Probability of failure
- \( D \) = Desired margin of error = 0.05
2.6. **Research tools:**

The mothers were contacted and informed about the purpose of the study, then consented and personally interviewed by the author with the help of a pre-structured questionnaire.

The questionnaire was composed of six parts.

The first part concerned about personal data of the child and his parents.

The second part considered regarding cerebral palsy; its possible cause from the history, full clinical examination and clinical classification system.

The third part of the questionnaire assessed the knowledge of the mothers toward cerebral palsy. The knowledge was about the nature of the disease, possible causes, associated disabilities and probably the fate and prognosis.

The forth part of the questionnaire assessed the attitude of the mothers toward cerebral palsy patients.

The fifth part was used to obtain data about practices toward cerebral palsy children, including feeding, physiotherapy and schooling if the child's age is appropriate.

For assessing the psychological impact of the CP on the mothers, the sixth part of the questionnaire had included the
Arabic translation of the State-Trait Anxiety Inventory (STAI) and Beck Depression inventory (BDI) scale.

Separate measures of state and trait anxiety. According to the author, state anxiety reflects transitory emotional state or condition of the human, that is characterized by subjective consciously perceived feelings of tension and apprehension and heightened autonomic nervous system activity. Scores on the STAI have a direct interpretation, high scores on their respective scales means more trait or state anxiety and low scores mean less\(^{(83)}\).

Beck Depression Inventory (BDI) was developed in early 1960s to rate severity of depression. This scale focus on behavioral and cognitive dimensions of depression. Current Beck II has added more coverage of somatic symptoms to be compatible with DSM-IV and it covers the most recent two weeks. Because it is self reporting; it can be used to screen major depression as outpatient screen\(^{(84)}\).

2.7. Data entry and statistical methods:

The data obtained from the questionnaire was entered into the computer and analyzed using statistical package of social sciences (SPSS). Descriptive and comparative statistics were
performed. Chi-square test was used in assessing the effect of general characteristics on attaining the required knowledge.

**Scoring system:** A scoring system was used to assess the general knowledge of mothers of CP children whom were included in the study. Using scores of one and zero for correct and incorrect responses respectively. The total of responses were analyzed a cut-off point of 60% were used to divide the responses to good and poor knowledge according to a previous study (85). Scores of more than 60% were considered as good knowledge and scores equal to or below 60% were considered as poor knowledge.

The inventory, which was used in this study to assess the anxiety level of the parents, was not adjusted to be used in the Sudanese environment except for a recent study. So using the original inventory to analyze the results of our study was not feasible. In general the inventory scored high in individuals with high anxiety and low in those with low anxiety. The possible highest score was 80 and the possible lower score was 20. There was 60 grades between them which were divided equally to represent mild, moderate and severe anxiety on the scale. So mild anxiety was considered with scores from 20 to 40, moderate anxiety with scores from 41 to 60 and severe anxiety with scores from 61 to 80. The Beck scale scores high in individuals with sever
depression and low in those with no and mild depression. The possible lowest score is zero and possible highest score is 39. The grades between them is divided as normal (no depression) between 0-4, mild depression between 5-7, moderate depression between 8-15, severe depression between 16-39.

2.8. **Input of the author:**

The role of the author was to:

1. Design the study and questionnaire.
2. Make necessary contacts and permissions.
3. Conduct full history and physical examination, interview the mothers and fill the questionnaire.
4. After interviewing the parents the author sits with them and educate them about CP (natural course and prognosis), corrects wrong concepts (if any) and teach the mothers suitable practices to be applied.
5. With the help of psychologist try to counsel the psychologically affected mothers.

2.9. **Ethical consideration:**

- Approval consent of the study was taken from our local
committee of Paediatric and child health University of Khartoum.

- Mothers of children with CP were informed about the purpose of the study and then consented and interviewed.
- Verbal consent was also taken from the different health authorities.
- Counseling and health education was given to the mothers after completion of the questionnaire.
- Psychological counseling was given to the mothers who had scores suggesting moderate to severe depression or/and anxiety by a trained psychologist.
Chapter Three

3- RESULTS

A total of 204 children with a confirmed diagnosis of CP were included in this study. The mothers were interviewed using the questionnaire and data obtained.

3.1. Socio-demographic characteristics of the study group and their parents:

3.1.1. Age and sex of the CP children:

The age of the children included in the study ranged between six months and thirteen years with a mean age, 46.06 month ± 33.23 (mean ± SD) as shown in (Table 1). 57.8% of them were males and the remainder (42.2%) were females, male to female ratio was 1.37 : 1 (Figure 1).

3.1.2. Origin:

Thirty of the children (14.7%) were from Central Sudan, 75 (36.8%) from Northern Sudan, 3 (1.5%) from Eastern Sudan, 85
(41.7%) from western Sudan and 11 (5.4%) from the South (Figure 2).

### 3.1.3. Parents age, educational level and occupation:

In the sample the mean age of the mothers was $31.5 \pm 6.59$ years (mean ± SD) as shown in (Table 2) and mean age of fathers was $39.82 \pm 8.7$ years (mean ± SD).

Forty five of the mothers (22.1%) were illiterate, 66 (32.3%) received Khalwa or only primary school education, 59 (28.9%) received secondary school education and only 34 (16.7%) had university or higher-grade education. The majority of fathers had school education (Figure 3).

The majority of the mothers were housewives with a percentage of 89.2%, 7 (3.4%) were employee and 15 mother (7.4%) was a professional (Figure 4), while most (56.4%) of fathers were employees.

The majority of families 157 (77%) had monthly income between 10,000 and 50,000 SD (Figure 5)

### 3.2. The Cerebral Palsy:

#### 3.2.1. Family history of cerebral palsy:

The majority 198 (97.1%) have no family history of cerebral palsy and only 6 (2.9%) have a positive family history of cerebral
palsy in first or second degree relative.

3.2.2. **Risk factors for cerebral palsy:**

From the history trying to find possible causes or risk factors; we found the most common cause is perinatal asphyxia in 54 (26.5%), the next one is meningitis after the neonatal period in 35 (17.2%), 34 (16.7%) had history of neonatal sepsis, 20 (9.8%) had history of neonatal meningitis, 11 (5.4%) had history of neonatal jaundice, 7 (3.4%) had history of being twin pregnancy without any complications, 5 (2.5%) had history of delivery by cesarean section, 4 (3.9%) had been delivered by forceps, 3 (1.5%) had history of convulsion without apparent cause and the last 26 (12.7%) had no cause from the history (Table 3).

3.2.3. **Age of the child at diagnosis of CP:**

Only 4 (2%) were diagnosed as having cerebral palsy in the neonatal period, most of them 154 (75.5%) were diagnosed beyond neonatal period and before reaching their first birthday, and the rest 46 (22.5%) were diagnosed after one year of age (Table 4).
3.2.4. **Classification of cerebral palsy in the study group:**

The majority are of spastic type 180 (88.2%), 17 (8.3%) are atonic, 3 (1.5%) are ataxic, and 2 (1%) for both the athetoid and mixed type; this according to physiological classification (*Figure 6*).

According to anatomical involvement the most common is quadriplegic involvement found in 86 (42.1%) followed by hemiplegic one found in 64 (31.4%) and then diplegic in 33 (16.2%), monoplegic in 12 (5.9%), paraplegic in 9 (4.4%) (*Figure 7*).

According to severity of disability 38 (18.6%) have mild disability, 88 (43.1%) have moderate disability and 78 (38.3%) have severe disability (*Figure 8, Table 5*).

3.2.5. **Associated disabilities in the study group:**

The most common disability found was speech problems in 65 (31.9%) followed by blindness in 5 (2.4%) and the least disabilities was deafness in 3 (1.5%) (*Table 6*).

3.2.6. **CP and convulsive disorders:**
In the study group associated convulsion was found in 20 (9.8%); the most prevalent was the generalized type in 14 (6.9%), the remainder was partial convulsions in 6 (2.9%).

3.3. Knowledge:

The knowledge of the mothers regarding various aspects of CP was assessed using the third part of the questionnaire.

3.3.1. Knowledge of CP prior to the diagnosis:

Only 13 (6.4%) of the mothers knew about cerebral palsy before her own child was diagnosed and for the rest 191 (93.6%) it was their first time to know about CP.

3.3.2. Possible risks factors of CP as mentioned by mothers:

About 33.8% relate it to perinatal events, 3.4% relate it to witchcraft, another 9.3% related it directly to an evil-eye, 0.5% related the cause to an underlying brain abnormality, 2% relate to preterm labor, 28% relate it to other causes like febrile illnesses and 23% can not find any cause to blame (Figure 9).

3.3.3. Knowledge about the relationship between brain insult and CP:
Forty two percent of the mothers believe that there is direct relationship and it is necessary to have an insult in the brain to have the condition, 23.5% think there is no connection between brain damage and CP, and the rest 33.9% do not know if it related to brain insult or not (Figure 10).

3.3.4. **Knowledge of causes of brain damage:**

Mothers were questioned about the causes of brain damage, the results are as follows, 28.5% think it is perinatal asphyxia, and another 27% think it is meningitis, 3.4% relate it to difficult labor, 2.9% to neonatal jaundice, 9.3% to febrile illnesses and 28.9% do not know the cause (Figure 11).

3.3.5. **Nature of CP:**

CP was considered as a benign condition in 191 (93.6%) of the mothers; while a minority of 13 (6.4%) of mothers think it is a progressive disease. And a small number of responders 26 (12.7%) mentioned that CP run in certain families; while only 4 (2%) thinks it is hereditary or infectious disease.

A small number of mothers 9 (4.4%) believe if there is one child affected with CP there is a chance to have another affected sibling and of those only 3 (33.3%) are using contraceptives in order not to have any more affected children; while the rest of the mothers are divided between there is no increased risk to have
another child affected if they already had affected one in 47.5% and
a group who did not know whether there is increased risk to have
other affected child or not 48%.

171 (83.8%) of the mothers believed that CP has a strong
association with other physical disabilities, small number 30
(14.7%) do not agree with them and only three (1.5%) can not tell.

3.3.6. *CP and immunization:*

Fortunate enough the great majority of mothers 189
(92.6%) thinks there is no point in delaying or ceasing
immunization.

3.3.7. *Source of information:*

The source of information was mainly obtained from medical
personnel and health workers in the majority of mothers 84.3%
while from media (television & radio) in 12.8% and the least source
was from friends or neighbors in 2.9% (*Figure 12*).

3.4. *Attitude:*

3.4.1. *CP and mental retardation:*

CP was a risk factor for later development of mental
retardation in 61.8% of the mothers and a minority 11.8% of them
thinks it shortens the life span of the affected individual (*Figure
13*).
3.4.2. *Effect of CP on the needs of the child:*

65.2% claimed that children who had CP should have special schools and live in special communities that affords their needs. While a close percentage 66.2% of mothers said their children expect a special treatment owing to their disability (*Figure 13*).

3.4.3. *Role of traditional medicine in the treatment of CP:*

Traditional medicine was strongly advocated by 63.2% of the responders (*Figure 14*). (*Table 7*) summarizes some of the commonly used modes of management by the mothers. There is significant correlation between educational level of mothers and believe in traditional medicine (P value=0.001).

3.4.4. *The effect of CP on the family:*

Although most of mothers 98.5% claimed that having a child with cerebral palsy put the family in great discomfort,

Only 3.4% prefers not having a child at all to have a child affected, while almost all the mothers said that it is better to have a child with CP than not having any child (*Figure 15*).

3.4.5. *The overall look of the CP child:*
98% claimed that more care and attention are needed for those children. Only 8.8% thought it is shameful and embarrassing to have a child affected (Figure 15).

3.5. Practice:

3.5.1. Feeding methods:

About 3.4% of mothers were feeding their child by breast, also the same percentage by bottle and the remainder 93.2% are fed by mouth, either actively in 35.3% of them or passively in the rest 64.7% (Figure 16).

3.5.2. CP and physiotherapy:

Fortunately enough most of the children are on physiotherapy 85.8%. Those on physiotherapy 56.9% of them came for cessions twice per week, 32.8% are on three or more cessions per week and the remainder 10.3% for many reasons come once per week (Figure 17). At home mothers were responsible of conducting physiotherapy in most of families 77% (Figure 18).

3.5.3. CP and schooling:
Thirty five children included in the study group are 7 years or more 22.9% of them are at school with satisfactory school performance, the remainder 77.1% can not go to school probably for mobility factors (Figure 19).

3.5.4. CP and medications:

Fifteen percent of the children included in the study are on medications always been given by their mothers, 98% of these are anticonvulsant drugs.

3.6. Psychological Impact of CP on the Mothers:

3.6.1. Immediate effect of the diagnosis on the mother:

The predominant immediate effect was crying (54.9%), followed by gastrointestinal symptoms (19.6%) , shocked (10.3%), fainting in (7.4%) and denial in (7.8%) as shown in (Figure 20).

3.6.2. Results of STAI:

We managed to assess the anxiety level of 204 mothers using the state part of STAI. 118 of the mothers (57.9%) had mild anxiety (40 and less), 83 (40.7%) had moderate anxiety (41-60) and only three mothers (1.5%) had severe anxiety (61- up to 80) as shown in (Table 8).
3.6.3. **Results of Beck Depression Inventory (BDI):**

We managed to assess the depression whether it is presented or not and also grading it using (BDI) on all 204 mothers in the study. 57 (27.9%) had no depression (4 and less), 73 (35.8%) had mild depression (5-7), 61 (29.9%) had moderate depression (8-16), and 13 (6.4%) had severe depression (16-up to 39) as shown in (Table 9).

3.7. **Knowledge Score:**

The possible maximum score for the correct answers in knowledge-oriented questions was 15, and the attained scores by the interviewed mothers ranged between 4-14, the mean ± SD was 8.94 ± 1.99. Good knowledge (more than 60% of correct answers) was found in 101 (49.5%) and poor knowledge in 103 (50.5%) of the responders (Figure 25).

3.8. **Effect of Some Variables on the Knowledge Score:**
Considering the effect of educational level of the mother (P.value = 0.0001), age of the mothers (P.value = 0.015) we found that the educational level of the mothers has direct correlation with the knowledge score, the higher the educational level was the higher knowledge score. The age of the mother also directly correlates with the knowledge score, as we found that the more younger the mothers, the lesser knowledge score. Considering the type of CP and the degree of disability, there was no statistical significance (Table 10).

### 3.9. Effect of some variables on the anxiety level score:

Assessing the degree of disability of the children in the study, in correlation with the level of anxiety of their mothers, it was found that the more disabled the child, the more anxious mother (P.value = 0.035). On assessing the type of CP in correlation with the level of anxiety in the mothers it was highly significant; the spastic type associated with higher scores (P value =0.005).

Considering the educational level of the mothers, the knowledge score and the presence of convulsions, in correlation with the level of anxiety there was no statistical significance was
found in attaining high scores (P value =0.757) and (P value =0.841) As shown in (Table 11).

3.10. Effect of some variables on the depression level score:

Assessing the knowledge score of the mothers and their educational level in correlation to the presence or level of depression it was found that the higher the education of the mother and the higher knowledge score, the higher attaining depression score (P value =0.0001) and (P value =0.006). When considering mothers age in correlation with depression score it was found that the lesser the age is the lesser level of depression (P value =0.0001). Also we found that the degree of disability and type of CP have direct correlation with the depression score (P value =0.0033) and (P value =0.023), the more spastic and disable the child is the higher depression scores in their mothers as shown in (Table 10).

Considering other variables like the presence of convulsions and other associated physical disabilities, there was no statistical significance (P value =0.722) as shown in (Table 12).
3.11. Effect of some variables on some aspects of attitudes:

On assessing some aspects of attitudes, the educational level of the mothers is highly influencing the believe in traditional medicine (P value =0.001), the link between mental retardation and CP (P value =0.03) and the expectation of special treatment by the child (P value =0.05) (Table 13).

On the other hand only one aspect of attitude is influencing by the depression scores of the mothers, it is about the believe in the need of those children to be put in special schools and communities(P value =0.004).

Table 1: Distribution of the study group according to age

\[ n = 204 \]

<table>
<thead>
<tr>
<th>Age</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>&lt; 1yr</td>
<td>11</td>
<td>5.4</td>
</tr>
<tr>
<td>1 – 5yrs</td>
<td>150</td>
<td>73.5</td>
</tr>
<tr>
<td>5 – 10yrs</td>
<td>32</td>
<td>15.7</td>
</tr>
<tr>
<td>10yrs or more</td>
<td>11</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>204</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 2: Ages of mothers of the study group children

$n = 204$
<table>
<thead>
<tr>
<th>Age in yrs</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20yrs</td>
<td>8</td>
<td>3.9</td>
</tr>
<tr>
<td>20 – 30yrs</td>
<td>60</td>
<td>29.4</td>
</tr>
<tr>
<td>30 – 40yrs</td>
<td>108</td>
<td>53</td>
</tr>
<tr>
<td>40 yrs or more</td>
<td>28</td>
<td>13.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>204</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3  Risk factors for CP  \( n = 204 \)
<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinatal asphyxia</td>
<td>54</td>
<td>26.5</td>
</tr>
<tr>
<td>Meningitis after neonatal period</td>
<td>35</td>
<td>17.2</td>
</tr>
<tr>
<td>Neonatal sepsis</td>
<td>34</td>
<td>16.7</td>
</tr>
<tr>
<td>Neonatal meningitis</td>
<td>20</td>
<td>9.8</td>
</tr>
<tr>
<td>Neonatal jaundice</td>
<td>11</td>
<td>5.4</td>
</tr>
<tr>
<td>Twins</td>
<td>7</td>
<td>3.4</td>
</tr>
<tr>
<td>Cesarean section delivery</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Forceps delivery</td>
<td>4</td>
<td>3.9</td>
</tr>
<tr>
<td>Convulsion without apparent cause</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>No cause found</td>
<td>26</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>204</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Table 4: Ages of the children at diagnosis of CP  
\( n = 204 \)*
<table>
<thead>
<tr>
<th>Child age</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 month</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>1 month – 1 year</td>
<td>154</td>
<td>75.5</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>46</td>
<td>22.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>204</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5: Classification of CP in the study group:

n = 204
<table>
<thead>
<tr>
<th>Type</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spastic quadriplegia</td>
<td>81</td>
<td>39.7%</td>
</tr>
<tr>
<td>Spastic hemiplegia</td>
<td>54</td>
<td>26.6%</td>
</tr>
<tr>
<td>Spastic diplegia</td>
<td>31</td>
<td>15.3%</td>
</tr>
<tr>
<td>Spastic paraplegia</td>
<td>7</td>
<td>3.4%</td>
</tr>
<tr>
<td>Spastic monoplegia</td>
<td>7</td>
<td>3.4%</td>
</tr>
<tr>
<td>Atonic type</td>
<td>17</td>
<td>8.4%</td>
</tr>
<tr>
<td>Ataxic type</td>
<td>3</td>
<td>1.4%</td>
</tr>
<tr>
<td>Athetoid type</td>
<td>2</td>
<td>0.9%</td>
</tr>
<tr>
<td>Mixed type</td>
<td>2</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>204</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6: Associated disabilities in the study group:

<table>
<thead>
<tr>
<th>Disability</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech delay</td>
<td>65</td>
<td>31.9</td>
</tr>
<tr>
<td>Blindness</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Deafness</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>73</td>
<td>35.9</td>
</tr>
</tbody>
</table>
Table 7: Types of traditional management of CP as stated by some mothers

<table>
<thead>
<tr>
<th>Type of management</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cauterizing the child’s forehead</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Visiting Al-Sheikh + Quraan</td>
<td>28</td>
<td>13.6</td>
</tr>
<tr>
<td>Higab – Mahaya</td>
<td>52</td>
<td>25.5</td>
</tr>
<tr>
<td>Bakhour &amp; Azaaim</td>
<td>30</td>
<td>14.7</td>
</tr>
<tr>
<td>Anxiety level</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>--------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Mild anxiety</td>
<td>118</td>
<td>57.8</td>
</tr>
<tr>
<td>Moderate anxiety</td>
<td>83</td>
<td>40.7</td>
</tr>
</tbody>
</table>

*Table (8): Anxiety level of the mothers as assessed by STAI
  \( n = 204 \)*
### Table (9): Depression level of the mothers as assessed by (BDI)

$n = 204$

<table>
<thead>
<tr>
<th>Depression level</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No depression</td>
<td>57</td>
<td>27.9</td>
</tr>
<tr>
<td>Mild depression</td>
<td>73</td>
<td>35.8</td>
</tr>
<tr>
<td>Moderate depression</td>
<td>61</td>
<td>29.9</td>
</tr>
<tr>
<td>Severe depression</td>
<td>13</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>204</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (10): Effect of some variables on the knowledge score (poor or good) among the mothers of the children included in the study (n=204)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Good knowledge</th>
<th>Poor knowledge</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education level of the mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>7(15.6%)</td>
<td>38(84.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quaraan &amp; primary school</td>
<td>25(37.9%)</td>
<td>41(62.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary school</td>
<td>43(72.9%)</td>
<td>16(27.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University &amp; postgraduate</td>
<td>26(75.5%)</td>
<td>8(23.5%)</td>
<td>47.105</td>
<td>.0001</td>
</tr>
<tr>
<td><strong>Age of the mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 15-20yrs</td>
<td>6(75%)</td>
<td>2(25%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30yrs</td>
<td>20(33.33%)</td>
<td>40(66.66%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40yrs</td>
<td>58(53.7%)</td>
<td>50(46.3%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table (11): Effect of some variables on the anxiety level score attained by the mothers of children included in the study (n=204)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>(X^2)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education level of the mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>23(51.1%)</td>
<td>22(48.9%)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Quaraan &amp; primary school</td>
<td>39(59.1%)</td>
<td>26(39.4%)</td>
<td>1(1.5%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Secondary school</td>
<td>37(62.7%)</td>
<td>20(33.9%)</td>
<td>2(3.4%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>University &amp; postgraduate</td>
<td>19(55.9%)</td>
<td>15(44.1%)</td>
<td>-</td>
<td>4.813</td>
<td>.568</td>
</tr>
<tr>
<td><strong>Age of the mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 15-20yrs</td>
<td>5(4.2%)</td>
<td>2(2.4%)</td>
<td>1(33.33%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30yrs</td>
<td>33(28%)</td>
<td>27(32.5%)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40yrs</td>
<td>57(48.3%)</td>
<td>49(59%)</td>
<td>2(66.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40yrs &amp;more</td>
<td>23(19.5%)</td>
<td>5(6%)</td>
<td>-</td>
<td>16.397</td>
<td>.012</td>
</tr>
<tr>
<td><strong>Degree of disability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild disability</td>
<td>15(39.55%)</td>
<td>21(55.3%)</td>
<td>2(5.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate disability</td>
<td>56(63.6%)</td>
<td>32(36.4%)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table (12): Effect of some variables on the depression level attained by the mothers of children included in the study (n=204)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No N (%)</th>
<th>Mild N (%)</th>
<th>Moderate N (%)</th>
<th>Severe N (%)</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level of the mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>21(46.7%)</td>
<td>17(37.8%)</td>
<td>7(15.6%)</td>
<td>-</td>
<td>33.537</td>
<td>0.0001</td>
</tr>
<tr>
<td>Quatrain &amp; primary school</td>
<td>18(27.3%)</td>
<td>18(27.3%)</td>
<td>25(37.9%)</td>
<td>5(7.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary school</td>
<td>5(8.5%)</td>
<td>24(40.7%)</td>
<td>22(37.3%)</td>
<td>8(13.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University &amp; postgraduate</td>
<td>13(38.2%)</td>
<td>14(41.2%)</td>
<td>7(20.6%)</td>
<td>-</td>
<td>33.537</td>
<td>0.0001</td>
</tr>
<tr>
<td>Age of the mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 15-20yrs</td>
<td>-</td>
<td>3(4.1%)</td>
<td>2(3.3%)</td>
<td>3(23.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30yrs</td>
<td>23(40.4%)</td>
<td>24(32.9%)</td>
<td>11(18%)</td>
<td>2(15.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40yrs</td>
<td>18(31.6%)</td>
<td>36(49.3%)</td>
<td>46(75.4%)</td>
<td>8(61.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40yrs &amp;more</td>
<td>16(28.1%)</td>
<td>10(13.7%)</td>
<td>2(3.3%)</td>
<td>-</td>
<td>46.915</td>
<td>0.0001</td>
</tr>
<tr>
<td>Degree of disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Severe disability**: 47(60.3%) 30(38.5%) 1(1.3%) 10.319 0.035

**Type of CP**

- **Spastic type**: 99(83.9%) 78(94%) 3(100%) 21.745 0.005
- **Atonic type**: 17(14.4%) - -
- **Athetoid type**: 2(1.7%) - -
- **Ataxic type**: - 3(3.6%) -
- **Mixed type**: - 2(2.4%) - 21.745 0.005

**Presence of convulsions**

- **Convulsions present**: 12(60%) 8(40%) -
- **Convulsions not present**: 106(57.6%) 75(40.8%) 3(1.6%) 0.346 0.841

**Knowledge score**

- **Poor knowledge**: 61(59.2%) 40(38.8%) 2(1.9%)
- **Good knowledge**: 57(56.4%) 43(42.6%) 1(1%) 0.558 0.757
| Mild disability | 7(18.4%) | 15(39.5%) | 10(26.3%) | 6(15.8%) |
| Moderate disability | 32(36.4%) | 26(29.5%) | 28(31.8%) | 2(2.3%) |
| Severe disability | 18(23.1%) | 73(35.8%) | 61(29.9) | 5(6.4%) |

| Type of CP |  |
| Spastic type | 47(26.1%) | 63(35%) | 57(31.7%) | 13(7.2%) |
| Atomic type | 8(47.1%) | 8(47.1%) | 1(5.9%) | - |
| Athletic type | - | 2(100%) | - | - |
| Ataxic type | - | - | 3(100%) | - |
| Mixed type | 2(100%) | - | - | - |

| Presence of convulsions |  |
| Convulsions present | 6(30%) | 8(40%) | 4(20%) | 2(10%) |
| Convulsions not present | 51(27.7%) | 65(35.3%) | 61(29.9%) | 11(6%) |

| Knowledge score |  |
| Poor knowledge | 40(38.8%) | 33(32%) | 25(24.3%) | 5(4.9%) |
| Good knowledge | 17(16.8%) | 40(39.6%) | 36(35.6%) | 8(7.9%) |

Table (13): Effect of educational level on some aspects of attitudes of the mothers of children included in the study (n=204)

<table>
<thead>
<tr>
<th>Attitude aspects</th>
<th>Educational level of the mothers</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Illiterate</td>
<td>Quatrain &amp; primary school</td>
<td>Secondary school</td>
</tr>
<tr>
<td>Expectation of special treatment</td>
<td>Yes</td>
<td>30(22.2%)</td>
<td>38(28.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>15(21.7%)</td>
<td>28(40.6%)</td>
</tr>
<tr>
<td>Role of traditional medicine</td>
<td>Yes</td>
<td>34(26.4%)</td>
<td>41(31.3%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11(14.7%)</td>
<td>25(33.3%)</td>
</tr>
<tr>
<td>CP can lead to mental retardation</td>
<td>Yes</td>
<td>30(23.8)</td>
<td>41(32.5%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>14(18.2%)</td>
<td>25(32.5%)</td>
</tr>
</tbody>
</table>
Cerebral palsy is static encephalopathy syndrome which hinders child mobility and independence.

Cerebral palsy had been extensively studied in other countries regarding risk factors, clinical aspects and psychological impact but we had few studies in our country.

Socio demographic characteristic of the study group:

The male to female ratio in our study is 1.37:1 which is found lower than that was reported previously by Ibrahim (1.7:1) \(^{(81)}\), and higher than what was reported by Ahmed (1.2:1) \(^{(80)}\). Our findings, suggests CP have a slight male predominance in Sudanese children as also found in literature\(^{(80)}\).

Almost one quarter of the mothers of children in the study were illiterate (22.1%), which is a high percentage, in comparing to the results reported by Feldmann\(^{(61)}\) only 5% were with lowest education which was high school; this reflects that still illiteracy is a big problem in Sudan. Only 15.2% of the fathers were illiterate.
More than half of the mothers received only khalwa or primary education, and the majority of them are housewives.

Regarding the monthly income; almost all the population in the study had restricted income, which was less than 50,000 SD.

Cerebral palsy:
In our study group a small percentage 2.9% had a positive family history of cerebral palsy, which is comparable to what was found before in previous studies in Sudan (82).

The bulk of our study population were diagnosed by the end of their first year of life 77.5%, this finding matches with that found previously in Sudan (81), which may indicate that the causative factors of CP in Sudan are mostly prenatal and perinatal factors.

Classification of CP:
About 88% of our study group were of spastic type which is comparable to that found by Ibrahim 79.7% (82) and spastic tetraplegia being the commonest presentation in 38.7%, followed by spastic hemiplegia 26.6% which is comparable with the results that found previously here (81) and in Dar Es Salam study the next common type was found to be spastic diplegia (79).

The commonest associated disability was speech delay (31.9%) which is less than that found by Ibrahim (81), although it was still in contrast to Dar Es Salam study (79) it was the second
disability after the convulsion. Associated convulsions represented only 10% which is less than that was reported in the literature\(^{(80,81)}\).

**Risk factors for CP:**

In our study we tried to identify the risk factors from the history, as there was no available medical records. We found that the major risk factor was perinatal asphyxia 26.5% which is close to what was found in Ibrahim & Muneer 27%\(^{(81)}\). It is followed by meningitis in post neonatal period 17.2% which is less than what found by Ahmed \(^{(80)}\) and comparable to what was reported by Ibrahim\(^{(81)}\). Neonatal sepsis and convulsions were found in (16.7%) and neonatal jaundice was found in (5.4%) of our study group which is a bit higher than reported in literature \(^{(81)}\). Obstetrical difficulties and forceps delivery was noted in (3.9%) which is lower than that reported by Ibrahim \(^{(82)}\), this may be explained by much improvement that happened in obstetrical care in Sudan. Still the leading causes of CP are the same in Sudan and Dar Es Salam \(^{(79)}\).

**Knowledge of CP:**

Knowledge of mothers about the meaning or definition of CP prior to the diagnosis of their children was found only in only 6.4% of the mothers included in the study, this is in contrast to the
Our mothers knowledge score of CP is related to good education and older age which is consistent with what was found in the same study.

Misconcepts about the causes of CP were found in 12.7% in our study group mothers who thought that CP was due to evil eye or witch craft, 23% don’t know the cause of cerebral palsy and the rest of the mothers give possible causes that were comparable with the literature. Regarding some aspects of attitudes and practices of the mothers included in the study we found that 63.2% believes in traditional medicine which is less than that found by Mohammed. Despite the fact that almost all mothers admitted that the CP child needs more attention and care 98%, and the family was in great discomfort due to his or her disability, only 8.8% had confessed that it is shameful to have a child with CP; almost all mothers strongly refused the idea of putting the child in an institute which was similar to what was found in literature. Almost all mothers preferred having a disabled child than not having a child at all, which reflects a positive attitudes of the mothers toward children with CP.

Answering some questions about CP a small percentage 4% of mothers, thinks it is infectious diseases which matches with that found by Feldmann 4% in population wide assessment about
CP\textsuperscript{(61)}. The same percentage thinks it is genetic disease which is much low than that found by Feldmann. A small percentage 11.8\% thinks children with CP have short life span which is far below what found in literature \textsuperscript{(61)}.

About options of management, CT scan and EEG were strongly advocated by 32\% and 30\% of the mothers. Half of the mothers 49.1\% thought neurological follow up is essential.

We were lucky to have only 7.4\% of our mothers considering that a child with CP had a reason to postpone the immunization schedule, which reflects a good knowledge about immunization.

We observed in our study the great role that health institutes, medical personnel play to provide health education 84.3\%, the media play a small part 12.8\% to provide health education.

**Practices:**

Knowledge and practices of the physiotherapy methods by the mothers was high in 77\%, mothers also conduct the exercises of physiotherapy at home, besides what the child have in the physiotherapy clinics, the fathers had the smallest role only 1.7\% of fathers do the exercises at home. Schooling was deficient in 77\% of children at school age due to transportation problems, the remainder were in ordinary schools.
Psychological impact of CP on the mothers:

The immediate effect of the diagnosis on the mothers was crying in 56% followed by GIT symptoms in 19%. The hypothesis that the mothers may have psychological disturbance due to her child disability was provided. All mothers have anxiety and less than half of the mothers 41% had moderate and severe anxiety. Anxiety had direct correlation with the degree of severity, which is comparable to what found by Breslau (63). In contradiction to depressive symptoms which is found in 72% of mothers above the cutoff line ranging between mild to severe depression, the depression had direct relationship with the degree of disability and also with spasticity, these results are comparable with that found by Breslau, Manuel, Glasscock, Long, and Mobarak in their studies (63,66,67,70,71). It was found that the greater dependent the child the greater affected the mother by depressive symptoms.

Knowledge score:

More than half of the mothers studied have poor knowledge about CP according to our score. We assessed the effects of some variables on attaining high knowledge scores: mothers educational level, the age of the mothers and there was strong correlation which is comparable to what was found in the literature (64).

CONCLUSION

- Cerebral palsy is the commonest physical disability and the majority of cerebral palsy cases were related to preventable causes.

- CP was not known to, almost, all mothers before they had an affected child. They had a poor knowledge of CP.

- Health institutes and workers play a major role in providing health education to the community and most of the information were very simplified and they would not provide deeper information's to the mothers of affected children.
• We found that the knowledge about CP is highly influenced by the level of education of the mothers.

• CP is associated with a great deal of depression in the mothers which was found to correlate with the knowledge of the mothers and the degree of disability in children.

• We found no association between attained knowledge about CP, educational level of the parent or the presence of convulsions and anxiety scores attained by the mothers.

• The more disabled the child is the higher scored the mothers on both STAI and BDI scales.

**RECOMMENDATIONS**

There is a need to know more facts about CP among Sudanese children, so we recommended that:

1- Conducting prospective studies to know the actual incidence of CP among our children.

2- Neonatal resuscitation programs should be one of the priorities in our health programs.

3- There is a need to specialized NICU in tertiary level for high risk babies.

4- There is a need to multidisciplinary centers in order to take care of children with CP and counsel their parents.
5- Doctors and other medical personnel should give time to parents especially the mothers of children with cerebral palsy and make it one of their tasks to:

- Identify factors that predispose to CP.
- Inform them about nature of CP and the methods of management.
- Incorporate knowledge of CP in the curriculum of health visitors and nursery schools.
- Assess the psychological impact of disability on parents and offer counseling.

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