Faculty of Medicine

University of Dhaka

Risk factors of cerebral palsy among term baby attended at CRP: A case control study.

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Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Physiotherapy

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for acceptance of this thesis entitled, **" Risk factors of cerebral palsy among term baby attended at CRP: A case control study",** submitted by Rumi Akter, for the partial fulfillment of the requirements for the degree of Master of Science in Physiotherapy.

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Abbreviation

BHPI: Bangladesh Health Professions Institute.

CP: Cerebral Palsy

CI: Confidence Interval.

CRP: Center for the Rehabilitation of the Paralysed.

OR: Odds ratio.

MVT: Movement.

ROM: Range of Motion.

SD: Standard Deviation.

WHO: World Health Organization

Abstract

Background: Cerebral palsy is one of the main disabilities in term born infants. The importance of studying cerebral palsy comes from the fact that this disorder imposes huge burden families, psychologically, emotionally, financially and socially. The risk factors of cerebral palsy among term baby have not been explored before in our country.

Objective: To identify the risk factors of cerebral palsy among term baby attended at CRP.

Methods: An unmatched case control study was performed in children with cerebral palsy born at term a case (n=30) and a control group (n= 30) those who were attended at CRP. The researcher used convenience sampling. The age range was 0-12 years. A structured questionnaire was introduced to all individuals' mother with cerebral palsy and mother with normal child to identify the possible exposure to the risk factor. Odds ratio was calculated as a mode of association between disease and exposure.

Result: The mean age of the child was 4years. A total 53% was male child and 46% female child. The main factors associated with cerebral palsy were h/o miscarriage [odds ratio (OR): 2.00; CI: 0.6187-6.46], birth injury [(OR): 12.42; CI: 1.44-105.74], birth asphyxia [(OR): 74.55; CI: 4.16-1335.5], jaundice & neonatal convulsion [(OR): 19.46; CI: 1.05-358.40].

Conclusion: This study came to conclusion that birth asphyxia, birth injury, hospital delivery and neonatal convulsion and jaundice were still the major risk factor in Bangladesh.

CHAPTER – I INTRODUCTION

1.1. Background

Disability is a globally focused issue especially in developing countries at present. Rapid decrease in mortality and increase in morbidity rates are important issues in health sector now a day. High morbidity rates increases disability and creates a huge burden on the society.

On the reports of world fact and statistics on disabilities and disability issues, 2013, The World Bank estimates that 20% of the world's poorest people have some kind of disability. The prevalence of disability in Bangladesh is believed to be high because of overpopulation, extreme poverty, lack of awareness and above all proper medical care and services. The prevalence of disability varies from country to country also within the country. It is estimated that Bangladesh has 5-15% of total people have some kind of disability (Mahmud & Hossain, 2005). In a study by Unnyan Onneshan (Titumir 2005) overall prevalence of disabilities in Bangladesh has been found as 5.6. According to the 2011 census, the number of disabled persons in Bangladesh is 101, 585, which accounts for 1.41% of the total population. It is seen that physical disability is the most commonly reported disability in Bangladesh (PR=0.55%). according to the 2011 census, 45% of the total population is made up of children.

Cerebral palsy is one of the most common causes of chronic childhood disability, with a frequency of 1.4-2.7/1000 of live births (Aneja, S. 2004). It is a lifelong neurologic motor disorder with first symptom early in life in worldwide (Ahlin et al 2013). It is estimated that CP is 5 to 10 times more common in underprivileged parts of the world

and the exact burden is unknown in most low and middle income countries (Khandaker et al, 2015). Bangladesh is a densely populated country in south Asia with an estimated 2.6 milion children living with severe disabilities. The key Informant Method (KIM) reported an estimated prevalence of CP up to 3.7/1000 children in Bangladesh (Merthy, S et al 2014). The causes and pathogenesis of CP are not well established particularly in developing countries in where causality and rates of survival may differ (Singhi, P. et al 2013). There are potential gaps in knowledge of CP in Bangladesh, especially in the spheres of epidemiological research, intervention and service utilization. CP research in developing countries is further compromised by the lack of a representative population sample (Khandaker et al 2015)

Cerebral palsy is an umbrella term for a group of disorders affecting body movement, balance and posture caused by a brain maldevelopment or a lesion that occurred prenatally, perinatally or neonatally or during the first years of life (Ahlin et al 2013). The causes of CP are complex and unknown. Different predisposing factors and causal pathways are responsible for developing CP (Ahlin, K et al, 2012). Preterm delivery is well established risk factors and a great deal of research has been done on children born with preterm. For this reason the prevalence of CP in children born preterm is declining. But in recent decades it is increasing the number of CP child who born at term, despite advances in obstetric and neonatal care (Ahlin, K et al., 2012).

Walson, L. et al. (2006) stated that around 50- 65% of children with CP among term baby tend to be more severely impaired than children with CP born preterm. Moreover, the severity of disability in term born group seems to be increasing day by day. So the incidence of CP among term born infants ranges between 1 and 1.7 per

1000 live births. The world health report, (2005) stated that every year 130 million infants born, among them 93% of born at term, such incidence rate suggested that between 120000 and 217600 new cases of CP occur each year. But in Bangladesh there is no data about CP born with term.

The pathology of CP is term newborn is very different from preterm infants. Brain mal developments are seen in 16% of term and 2.5% of preterm infants with CP and gray matter lesions are more often seen in term (33%) than preterm (3.5%) CP infants (Soleimani, F. 2013).

Historically it has been assumed that most cerebral palsy is caused by fetal trauma or asphyxia occurring the time of birth. In the last two decades, the view has been advanced that cerebralpalsy is rarely caused by perinatal events (M, S.2007). From the study of Tatavarti, et al. (2015) the most common risk factor associated with cerebral palsy is the maternal anaemia and the other risk factors being hypertension, pre eclampsia, eclampsia, antepartum haemoorrhage and multiple births. Michael, et al. (2004) maternal infection is a risk factor of CP both term and preterm. It is two times increase risk factor.

1.2 Justification of the study:

Cerebral palsy is one of the major causes of childhood disability in Bangladesh. It is also 5-10 times more common in underprivileged parts of the world and the exact burden is unknown in most low and middle income countries (Khandaker, et al 2015). This disorder imposes huge burden families psychologically, emotionally, financially and socially. It imposes a major burden on the national health system. Because it is a chronic disorder which needs a continuous care and multiple financial resources, collaborative efforts and team work between many parties and organizations for a

good management and rehabilitation (Saadi, S et al 2012). The prevalence and risk factors of cerebral palsy has not yet been studied properly at the community level of Bangladesh (Tabib, S. 2009)

According to the US census bureau the total number of cerebral palsy in Bangladesh was 14, 13,40,476 in 2004(Right Diagnosis from health grades, 2011). A hospital based prospective survey showed that 1.72% patients were diagnosed as CP, in nine months of the study (Khan, et al 2006)

Preterm delivery itself is a recognized as one of the main risk factors of being CP. Also a great deal of research has been done on children born preterm. To take proper preventive measures for the identifying risk factors the prevalence of CP in children born preterm is declining.(Ahlin, et al 2012)..2. in the study of Ahlin et al (2012) stated that in recent decades the prevalence of CP child among term baby is increasing despite the advances in obstetric and neonatal care. There are very few study has been done about risk factors of CP child in Bangladesh. But there is no study about the risk factors of CP among term baby in Bangladesh. So, those children who born with full term what are the risk factors behind this.

Identification of the risk factors of cerebral palsy will give us evidence by which we take necessary measure to manage this condition as well as it can help to take preventive measures to minimize the sufferings of this condition.

1.3 Operational definition:

Full term baby is the end of a pregnancy that lasted the full nine months that means those who were born after 37 weeks to 40 weeks, 6 days.

Maternal age was categorized as >19 years, 19-25, 25-30, 30-35years and <35 years. The most secure age for childbearing remains 20-35.

Normal birth weight is approximately 6 to 9 pounds (2700 to 4000 grams). Low birth weight (LBW), is sometimes used to define a baby that weighs less than 5 lb 8 oz (2500 g) regardless of gestational age.

Mode of delivery was categorized into three groups: routine vaginal, operative vaginal (using vacuum or forceps) and cesarean section.

Pre-eclampsia is a term when blood pressure (BP) ≥ 140/90 mmHg and 0.3 of protein in the urine after 20 weeks of gestation.

Birth injury refers to damage or injury to the child before, during, or just after the birthing process. Difficult labor, also known as obstructed labor occurs when the child cannot easily pass through the birth canal. This can result in fetal distress or physical trauma to the child, especially broken clavicles and damage to the brachial plexus nerves. It can also deprive the child of oxygen as the umbilical cord is pinched, potentially causing brain damage or death.

Difficult labor may occur because the baby is abnormally large, because the mother's pelvis or birth canal is small or deformed, or because the baby is in an abnormal presentation for the birth (such as breech or transverse presentation).

Duration of labor, in case of first baby active labor may take about eight hours. This is an average, though, and it could be much shorter or longer than that. Prolonged labor time is 18 to 24 hours.

Neonatal convulsion in this study was defined as a convulsion during the neonatal period based on clinical diagnosis of a physician that occurred at least once and in the absence of metabolic disorder.

Neonatal sepsis was defined as appositive blood culture during the first week of life with any organism known to cause neonatal sepsis. Parental consanguinity indicated first or second degree relation of parents.

Hyperbilirubinemia was defined as a maximal bilirubin level> 10mg. premature rupture of membranes was defined as rupture of membranes that occurred more than 18 hours before delivery.

1.4 Research Question

What are the risk Factors of cerebral palsy among term baby?

1.5 Research Objectives

1.5.1General Objective

To identify possible risk factors associated with cerebral palsy among term baby.

1.5.2 Specific Objectives

1. To explore socio-demographic characteristics of patients with cerebral palsy. .

2. To find out maternal factors and cerebral palsy.

3. To explore the association between intrapurtum factors and development of cerebral palsy.

4. To identify the association between antenatal, natal and postnatal factors and development of cerebral palsy.

CHAPTER – II: LITERATURE REVIEW

Cerebral palsy is a common developmental disability first described by William little in the 1840s (Sanka,C. and Mundkur, N., 2001). Cerebral palsy (CP) is a chronic disorder, which is caused by damage in the very young brain and begins in childhood and is characterized by non progressive. The primary manifestation in CP is the disorder of the motor function (Adouga, P et al., 2015)

Simply stated, "Cerebral" refers to the brain, and "Palsy" refers to muscle weakness/poor control. Although the brain itself will not get worse, people who have cerebral palsy will usually change over time. Sometimes they will get better, and some patients will stay the same. Cerebral palsy exactly means brain paralysis (Alvarez, 2013). ‘Cerebral’ refers to the brain and ‘Palsy’ to a disorder of movement or pressure. If someone has cerebral palsy it means because of an injury to the brain (cerebral) he or she is not able to use some of the muscles of body in normal way. CP is a group of condition that affects the movement and posture of body.There is currently no cure for cerebral palsy. But, there are different treatment options for people who have cerebral palsy. These options include therapy, medications, surgery, education and support. By taking advantage of one or more of these options, people with cerebral palsy can learn to improve their function and the quality of their lives.

The etiology of CP is very diverse and multifactorial. There are various causes of developing CP, such as, an unborn child might have suffered a brain injury, an infection, or abnormal development of the brain tissue, these are called prenatal causes that mean they happened before birth. (Elkamil, et al., 2011)

In according to Australian Cerebral Palsy Register Report (2013) Cerebral palsy is a major international public health problem in world wide. The overall prevalence of CP is 2.5 of 1000 live birth. The true incidence of cerebral palsy cannot be estimated as there are infants who die in the neonatal and infant period with brain lesions, and there is an unknown proportion that would have met the criteria for cerebral palsy had they survived.

With that caveat in mind, the two largest cerebral palsy databases, the Australian Cerebral Palsy Register (ACPR) and the Surveillance of Cerebral Palsy Europe (SCPE) both report the overall proportion of live births with cerebral palsy (not due to post-neonatal events) to be 2.0/1000.This figure has remained stable over the preceding decades, however the proportions vary dramatically when stratified by gestational age. (Odding, E. et al., 2002)

Cerebral palsy is a long term condition and most common physical disability in childhood. In adulthood children with cerebral palsy is poorly understood and usually survive. There is a male: female ratio of 1.5:1 in the population (Clinical Key, 2012).In developed countries, International assessments propose that CP affects between 1.2 and 3.0 per 1000 children (Hustad et al., 2011). In the Norwegian counties there were 494 children with CP born between 1st January 1996 and 31st December 2003, corresponding to a prevalence of 2.65 per 1000 live births (Elkamil et al., 2011). In United States, there are living almost 800,000 children and adults in with one or more of the symptoms of cerebral palsy estimated the Foundation of the United Cerebral Palsy (UCP). Every year about 10,000 babies born in the United States will develop cerebral palsy according to the federal government's (Centers for Disease Control and Prevention National Institute of Neurological Disorder and Stroke, 2012).

In United States, the specific prevalence of CP is uncertain because consistent information is lacking on follow-up of an entire population. Majority of births especially involve for term and late preterm infants. In the United States estimated a prevalence of 3.6 cases per 1000 children at eight years of age where a population study was showed, using data from three regions but the study between children with and without a history of prematurity did not distinguish (Miller, 2013). The United States shows that CP may affect up to 3.6 per 1000 children in another study (Hustad, et al., 2011).

The prevalence is presented that 1.5 to 2.5 per 1,000 live births. In CP, time trends are due to advances in perinatal care in the last 40 years. During the 1980s, there was a sharp increase in very low birth weight infants in prevalence of CP. For infants in intensive care which has been attributed to the increased survival due to advances stages of life. This recent increase seems to have leveled off and may be on the decline. Mild forms of CP patients not severe in functional impairment may remain undiagnosed, which leads to underestimation of the true prevalence of CP (Clinical Key, 2012). The prevalence of disability of moderate and severe is estimated to be 5% in children aged 0–14 years. In low-income countries disability among children is more common than high-income countries (Kawakatsu, et al., 2012). Before birth, occurs the disruption of normal development of the brain result of CP in about 70% cases. According to a 2003 report by the American College of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics (AAP) conflicting to common belief that lack of oxygen reaching the fetus during labor and delivery contributes to only a small minority of cases of cerebral palsy. A slight number of babies also develop brain injuries in the first months or years of life result in cerebral palsy. In child the cause of cerebral palsy is unknown in many cases (American

pregnancy association, 2013). We know the cause of CP is unknown. Brain injury or brain malformation is the cause of cerebral palsy that occurs while the brain is developing — before, during or after birth. Muscle control, muscle coordination, muscle tone, reflex, posture and balance also disturbed due to cerebral palsy. It can also impact fine motor skills, gross motor skills and oral motor functioning (My child, 2002).

CP is classified by three things:

- The type of movement and muscle tone: Spastic, dyskinetic, Ataxic and mixed types. (Hughes & Newton, 1992)
- The body parts or part affected: Hemiplegia, Diplegia and Quadriplegia.
- The degree of severity: mild, moderate, severe.

Spastic cerebral palsy is the most common type of cerebral palsy. It affects about 80% of all children with cerebral palsy. In spastic cerebral palsy due to the damage of motor cortex the voluntary movement is affected. In this type have damage to the pyramidal tracts, the pathway that link the motor cortex with the nerves in the spinal cord that relay motor signals to the muscles. (Geralis, E., 1998).

Diplegia means that cerebral palsy mainly affects a child's leg more than upper limbs. The most common way a baby gets diplegic cerebral palsy is because of neonatal asphyxia. This usually occurs when a newborn ends up without enough oxygen during the birthing process. Children who come out prematurely and/or have a low weight at birth are also at a greater risk of potentially acquiring this disability. Both traits can expose a baby to oxygen issues when birth occurs. Rubella, high-grade fevers, and other maternal infections during pregnancy can also lead to an infant developing diplegic cerebral palsy. Quadriplegia, when cerebral palsy affects a child's whole body- face, trunk, arms and legs and upper limbs is more affected than lower limbs.

This type of cerebral palsy may have significant impairment of the facial muscles used in feeding and speaking. Usually, hypotonic cerebral palsy is brought on by damage done to the baby's cerebellum while the child is still in the womb. Uterine ruptures, blood incompatibility between the child and mother and maternal infection can all cause the damage. A lack of oxygen during the labor and delivery can also lead to hypotonic cerebral palsy.(Blaire, E. 2008)

The second most common type of cerebral palsy is athetoid or dyskinetic. Dyskinesia means repetitive movements almost like a tic while an athetosis person who has slow involuntary movements especially in the arms. Muscle tone has varied with this type of CP children. Sometimes their muscles are stiff and rigid and other times they are loose and floppy. Athetoid or dsykinetic CP results from damage to one or more of these areas of the brain- the basal ganglia, the corticospinal tract and the motor cortex. For this reason patient may have difficulty in walking, talking, eating, sitting upright, and performing basic motor skills in case of athetoid type of CP (Discovery fit and health, 2013).

Now-a-days about 4% of people have cerebral palsy. In case of ataxic patient they have inability to activate the correct pattern of muscles functional movement. To find out very difficult to balance of people with ataxic cerebral palsy. Ataxia affects the whole body. They may also have poor spatial awareness which means it is difficult for them to judge their body position relative to things around them. Most people with ataxic cerebral palsy can walk but they will probably be unsteady with shaky movements. Speech and language can also be affected. Many children with cerebral palsy have multiple symptoms with combinations of the various forms of cerebral

palsy. For example children with spastic cerebral palsy often continue to have a head lag which is representative of hypotonic (Medicine net.com, 2013).

Cerebral palsy is a complex rather than disease. CP diagnosed during the first two years of life sometimes it resolves when functional impairment is mild. Cerebral palsy can effect: mobility, balance, posture, movement, language, fine motor control, coordination, eating, drinking and toileting, dressing, cognitive and perceptual problem etc. Other associated conditions with CP are Intellectual disability 50%, epilepsy 33%, sensory sight 40% and hearing 10% (Hughes & Newton, 1992).

In according to Hegbergs classification, spastic CP was 80% of all CP (Ahlinetal 2013).The diagnosis of cerebral palsy is based on a clinical assessment, and not on laboratory testing or neuroimaging. In clinical practice, the diagnosis of cerebral palsy is typically based on observations or parent reports of attained motor milestones, such as sitting, pulling to stand, and walking, and evaluation of posture, deep tendon reflexes, and muscle tone. Particularly among infants born prematurely, neurological abnormalities, observed in the early months of life, may not be associated with motor impairment and may resolve during the first one or two years of life. One such abnormality, transient dystonia, was described in early studies of premature infants and refers to abnormal neurological signs (e.g., hyperextension of the trunk) that are no longer present after one year of age. Because the diagnosis of cerebral palsy depends in part on neurological findings that are subject to inter-examiner variation, with regard to both the method used to elicit the neurological finding as well as the interpretation of the finding and because neurological abnormalities may be transient, many clinicians avoid basing the diagnosis on a single aspect of the parent's report or the clinician's examination and typically will make a definitive diagnosis only after repeated examination. (Ahlin, etal., 2013)

Whether a child is diagnosed with cerebral palsy shortly after birth or later in childhood, a number of diagnostic tests and screenings can help predict or explain the birth injury. The physical examinations, lab tests, and medical evaluations available to families with an injured child can provide insight into the severity of the birth injury, how and when it occurred, and the necessary interventions to minimize its associated handicaps. In this section, we'll discuss how Apgar scores, brain imaging, umbilical cord blood tests, and other diagnostic tests for cerebral palsy work (Yeh, P. et al., 2012)

For over 60 years the Apgar score had been used to quickly and simply assess the health of a baby immediately after delivery and predict survival typically conducted from one to five minutes after birth. If the score remains low for longer time intervals (such as 10, 15, or 30 minutes after birth), the child is at risk for suffering long-term neurological damage.

A cerebral palsy diagnosis is typically based on the child's history and physical examination. Once a child is diagnosed with cerebral palsy, further brain imaging tests can reveal the cause, timing, and severity of the initial brain damage. Abnormal neuro imaging studies indicate a greater likelihood of associated complications and conditions such as epilepsy, cognitive delays, and developmental disabilities. Regardless of when the diagnosis is made, brain imaging results can help predict or explain a birth injury. (Armstrong, et al., 2007)

A recent emerging concept is that sex may influence the pathogenesis of developmental brain injuries. CP is more prevalent in males than in females. Males with preterm birth had significantly reduced white matter compared with term males while white matter was equivalent in female groups. In contrast preterm female with

intra ventricular hemorrhage showed a reduction in gray matter compared with controls, but males with did not (Johnston and Hagberg, 2007).

Birth asphyxia can cause spastic diplegia in very preterm infants and quadriparetic CP with mental retardation from 34 weeks' gestation at birth. The criteria promulgated by the American College of Obstetricians and Gynecologists and American Academy of Pediatrics to attribute intrapartum hypoxia as a cause of neonatal encephalopathy and later CP in full-term newborns include: (1) an umbilical arterial pH of _7; (2) a moderate or severe neonatal encephalopathy; (3) a later quadriparetic or dyskinetic CP; and (4) an absence of other causes. However CP is seldom preceded by an intrapartum event.

Reid, S.M.,(2011) stated that approximately 80% of families and people with cerebral palsy do not know what caused the brain damage that is responsible for their disability. It is estimated that this damage occurs during the antenatal, intrapartum and neonatal time periods for between 80-90%, and in the postnatal period (after 28 days of life) for 5-15%.25, 29For many years research focused on a single cause for infants born at term; asphyxia around the time of birth. In an attempt to prevent asphyxia electronic fetal monitoring was introduced. Its use reduced neonatal seizures, but failed to decrease perinatal mortality, low Apgar scores or cerebral palsy. Instead there was a notable increase in caesarean sections (Thacker, S.B. et al., 2001).This was followed by a shift in focus towards very and extremely preterm birth due to their increasing perinatal survival, and alarming increasing proportions of infants with cerebral palsy. However, there has now also been an attempt to clarify other risk factors for cerebral palsy but no synthesis focusing on term infants. Risk factors identified broadly include:

- Prior to conception: previous gynaecological history of stillbirth or neonatal death/multiple miscarriages/premature birth, family history of cerebral palsy, maternal intellectual impairment, epilepsy and low socio-economic status.

- Antenatal: Placental abnormalities, birth defects, multiple births, male gender, maternal thyroid disorders, pregnancy complications including preeclampsia, bleeding after the first trimester, infection and inflammation and intrauterine growth restriction(IUGR).

- Intrapartum and neonatal period: Sentinel birth events, meconium aspiration, stroke, seizures, jaundice, hypoglycaemia and infection.

- Postneonatal period: Infections, accidental and non-accidental injuries, stroke both spontaneous and following surgical procedure advantage of clarifying causal pathways is that a preventive strategy might be identifiable that can be implemented well before the final event that directly causes the brain damage.

In full-term infants, hemiplegia is observed in cases of antenatal porencephaly/unilateral schizencephaly and perinatal arterial ischemic or hemorrhagic stroke. Fetuses and neonates often have larger infarcts than adults and develop cystic lesions rather than dense gliotic scars. One reason is that the full-term neonate has only one-sixth as many resident astrocytes in the white matter compared with the adult. Thus astrocytic invasion of the infarcted tissue cannot occur, resulting in cavitary lesion. Quadriplegia or dyskinesia are most often the consequence of diffuse basal ganglia and thalamic damage, cortico-subcortical injury, and/or watershed pattern dagmae.

A disorder of cortical development is rarely observed: abnormal proliferation and neuronal generation as observed in microcephaly, abnormal neuronal migration as

noted in type I lissen cephaly spectrum or absence of extracellular matrix integrity asin type II lissencephaly, or “cobblestone syndrome.(Marret, S. et al 2013).

From literally pathology which the study of disease is unique because it is a basic science as well as a medical consultant. It is indeed a fundamental discipline necessary in the education of all medical doctors which concepts of disease processes, tissue reaction and injury (Prahlow& Vogel, 1994). Importantly all four criteria must be met: 1) Evidence of metabolic acidosis in fetal umbilical cord arterial blood obtained at delivery, 2) Early onset of severe or moderate neonatal encephalopathy in infants born at 34 or more weeks’ gestation, 3) Cerebral palsy of the spastic quadriplegic or dyskinetic type and 4) Exclusion of other identifiable etiologies, such as trauma, coagulation disorders, infectious conditions or genetic disorders (Hankins, 2003).

In most cases the causes of CP remains unknown but some risk factors have repeatedly observed to be related to CP (Jacobson,B. and Hegberg, G. 2004). Ahlin et al., (2013) stated that the events during labor are entirely responsible for cerebral palsy based on multiple epidemiological studies. Among them 80% of cases are results from some sort of intrapartum event. Also infectious and inflammatory mechanism has been suggested to be involved. Some risk factors such as, low gestational age, low APGAR score, male gender, multiple gestation, intra uterine viral infection(rubella, cytomeglovirus), iodine deficiency, exposure to methyl mercury during pregnancy. Some of these risk factors are associated with CP at all gestational ages. Others factors primarily affect either term or preterm infants.

Maternal & obstetric factors have been discussed in many studies before as potential risk factors. In Bangladesh We don't have any study before about any possible correlation between maternal, obstetric and foetal risk factors with occurrence of CP. The antenatal periods extends from conception to the time of birth. Any neurological problem can occur at any point in the development process between those two events (wolraich, M., et al 2008). In world wide a few studies have been highlighted the maternal risk factors and their correlation with occurrence of CP. In one study, a researcher has found, of the 61, 45,357 deliveries examined during the study 8946 cases of CP were identified that means 1.45 per 1000 live births. In that study there were significantly increased risks of CP related to advanced maternal age (> 40 years) and increase parity, pregnancy risk factors (chronic hypertension, preeclampsia). In according to term babies' diabetes increased 19% vs. controls (Saadi, H. R., et al 2012). The higher risk of CP in multiple births has been known for many years. Multiple pregnancies are related to preterm delivery, intrauterine growth restriction, birth defects and intrapartal complications. Although CP can be related to all these events, the main reason is preterm birth or the antenatal death of a co-twin or co-triplet and the death of one twin can affect the neurological development of survivor (Pharoah, P.O. & Adi, Y., 2000).

Pre-eclampsia seems to have different associations to CP in different gestational age groups. It is associated to CP in term infants (Collins, M &Panith, N., 1998). It is potential confounder, raising the estimated degree of association between chorioamnionitis and CP. (Wu, Yw., 2002).

Maternal infection another risk factor another was seen more frequently in term cases of CP. Levinton and Adinolfi, (1993) hypothesized that, maternal infection during pregnancy might lead to neurologic impairment and the development of CP via

cytokines. Chorioamnionitis is a well known risk factor for CP. Research has got correlation between chorioamnionitis and cerebral palsy. Fever during pregnancy has also been found to be related to CP. Viral infections in pregnancy, the most common congenital viral infections (TORCH: toxoplasmosis (caused by parasite), rubella, cytomegalovirus, herpes simplex virus are known causes of long term neuro developmental disabilities. In industrialized countries, the proportion of CP attributable to TORCH infections is estimated to be 5% or less (Stanely, F. and Blaire, E., 2000).

Intrpartum means the period from the onset of labor to the end of the third stage of labor. Intrapartum complications play an infrequent role in the causation of cerebral palsy. If a fetus has experienced neurological damage during pregnancy, the neurological lesions, which are often multifocal, may affects parts of the fetal brain responsible for the autonomic nervous system that control such activities as heart rate and respiration. Reduced variability of the fetal heart rate, miconium staining seen at membrane rupture, low apgar scores, and neonatal encephalopathy may all represent the first recognized signs of chronic neurological compromise (Maclannan, A., 1999).
Fever during delivery has also been found to be related to CP. In case of fever during delivery, fetal exposure to a hostile intrauterine environment might be shorter and less intense than in case of intrauterine infection, in which fever starts before the onset of delivery. The term ‘umbilical cord complication’ was defined as true knot, cord wrapped several times around the infants neck or prolapsed.

The perinatal period is the time immediately before and after birth. Disabilities originating from this time period are primarily biomedical ones. They may result for many reasons like drug taken during labour and delivery, prematurity, injury, oxygen

deprivation or infections acquired during the way through the birth canal (Saadi, H. R., et al, 2012)

Neonatal asphyxia has also been a known risk factor for developing CP. It may occur during a prolonged or difficult birth and because the brain suffers damage very quickly a fresh and adequate supply of oxygen due to brain damage. One major danger associated with birth is haemorrhage, which is caused when very strong pressure on the head of the foetus breaks blood vessels in the brain. Another danger is failure of the infant to begin breathing soon after being separated from the maternal source of oxygen (pless, I. B., 1994).

There is a chance of being CP in extremely low birth weight infant (<1000 gm.). There is a statistics showed that respiratory distress syndrome, intra uterine growth restriction, intraventricular hemorrhage and neonatal sepsis all were significantly associated with the development of cerebral palsy (Costantine, et al., 2007).

Maternal hypertension in pregnancy or Gestational hypertension raises the likelihood of developing preeclampsia or eclampsia, conditions combining hypertension and protein in the urine. Hypertension, also known as high blood pressure, in a mother-to-be can affect her unborn baby in many ways (Doyle, et al., 2009)Severe gestational hypertension can lead to preeclampsia or eclampsia and put the unborn baby at risk for IUGR, stillbirth, preterm birth and placental abruption (Mcintyre, et al ., 2012). The more severe the case of hypertension, the higher the risk for developing CP (Doyle et al., 2009) There are reports of a higher rate of neurodevelopment problems8–10 in the infants of hypertensive mothers, while a large regional study found similar rates of disability for infants of mothers with or without hypertension during pregnancy (Steyn, et al., 2013).

Anaemia is very common feature during pregnancy but mild anaemia is normal during pregnancy due to an increase in blood volume whereas more severe anemia, however, at a higher risk for anemia later in infancy (Goonewardene et al., 2012).In addition, if anaemia occurs at second trimesters, it has greater risk for having a pre-term delivery or low-birth-weight baby. Being anemic also burdens the mother by increasing the risk of blood loss during labor and making it more difficult to fight infections and has a chance to child's cerebral palsy (Mcintyre et al., 2012)

But maternal seizure disorder has no relation with stillbirth, microcephaly, cerebral palsy, mental retardation and other neurological abnormalities among infant(Vaile et al., 2015). Eventually if the women take antiseizure drug there is no possibility to have infant's abnormalities (Mann et al., 2011).

Pre-eclampsia is very common during pregnancy and this occur due to urinary tract infection in pregnancy and associated with an increased risk of cerebral palsy in term infants (Conde-Agudelo et al., 2008). The presence of pre-eclampsia may result in elective preterm delivery, avoiding the inflammatory responses of spontaneous preterm labour with all their associated problems such as infection and precipitate delivery (VanderWeele& Hernández-Diaz., 2011). During the intrapartam and antenatal period there is a chance to mother's preeclampsia and it leads to cerebral palsy though the child is in term baby (Kulak et al., 2010).

Sometimes women who have not previously had diabetes develop a form of diabetes during pregnancy (called gestational diabetes)and this condition or other metabolic condition poses a risk for both the mother and also child's abnormality (Mcintyre et al., 2012). Maternal metabolic disorder are strongly and widely associated with some neurodevelopmental disorder like autism, developmental delay, cerebral palsy among

children (Krakowiak et al., 2012). Gestational diabetes puts the fetus at greater risk of cerebral palsy (Resources and information for brain & spinal cord, 2011).

Maternal trauma in pregnancy had implicated as a possible cause of cerebral palsy; this issue is not resolved Physical trauma to a pregnant mother or the infant can cause brain damage as well as increasing the cerebral palsy risks in pregnancy. Blows to the infant's head due to an automobile accident, physical abuse or other such trauma can result in cerebral palsy (Himmelmann et al., 2011).

Study shows that more miscarriage, still births, physical and more weakness of the living child and diseases of nervous system such as epilepsy and cerebral palsy result from consanguineous marriage (Bittle., 2003)).Risk for first cousins is still low (i.e. 4% instead of 2%, 96% have healthy children) but this is doubled, not a 2% increase. Child of random first cousins has risk that 6% (1/16) of genes are homozygous (Saggar&Bittle., 2008). Child of first cousins from UK communities preferring consanguinity has risk that 11% of genes are homozygous (Woods 2006).Birth incidence data has shown that congenital or genetic disorders occur at a rate of 2% for child birth in the world. This risk increase about 4% for first cousin couples and this genetic risk is a recessive disorder (Shaw 2004).

It has observed that many infants who were born in the feet-first position could be found to have cerebral palsy. It also observed that babies who are first born to a couple could have greater chances of having the condition (Admin, 2011).

Birth asphyxia is a common responsible factor to provoked cerebral palsy and much of cerebral palsy occurred due to birth asphyxia (Ellenberg and Nelson et al., 2012). After birth many children needs oxygen supplementation; due to lack of oxygen to the

brain, cell damage occur to the brain and thus causes cerebral palsy to the infants (Kulak et al., 2010).

Perinatal hyperbilirubinemia causes cerebral palsy and other neurological condition. Though hyperbilirubinemia cannot directly causes cerebral palsy, hyperbilirubinemia causes periventricular leukomalacia was the main predictor of cerebral palsy in preterm infants (Ikonen et al., 1992).

Transmission of respiratory diseases is common in this type of housing (Behrman 2004). The area of residence had a significant influence on low birth weight, which ware closely related with cerebral Palsy of children (Nahar, et al, 2002). There is a small but inconclusive literature on the relationship between cerebral palsy and socio-economic status. It could be expected that, as low birth weight is a strong risk factor for cerebral palsy and is strongly socio-economically related (Dolk et al., 2010). The prevalence of acquired CP is higher among communities with poorer socioeconomic conditions (Sundrum et al., 2005).

Evans K, et al., (2001) find that only a minority of cases, including those meeting strict criteria for ‘‘hypoxic-ischemic encephalopathy’’ and having CP as the later outcome, can account for only a minority of cases by such ‘‘sentinelevents’’ during birth as uterine rupture, cord prolapse, or major placental abrup- tion. What causes the majority of such cases that look clinically identical during the newborn period? This is an important unanswered question. The study of Badawi and others contain some hints, inclu-ding maternal fever in labor, maternal thyroid disorder, family history of neuro-logic disease, and other factors. Incor-poration of broader maternal medical history and of examination of placental pathology might advance knowledge in this

area, which remains, despite its importance, highly under researched. (Badawi, N. et al.,1998)

Currently, there are four primary preventive interventions shown to be effective in reducing the incidence of cerebral palsy arising from early pregnancy pathways. They are rubella vaccination, iodine supplementation in areas of severe deficiency, preventing methyl-mercury contamination and anti-D vaccination in cases of potential Rhesus iso-immunisation.29These practices are now well-established in Australia, and other developed countries and therefore will not further reduce incidence. More recently, meta-analyses have identified two secondary preventive interventions that reduce the incidence of cerebral palsy. Antenatal magnesium sulphate for neuroprotection of infants born less than 30 weeks31and therapeutic hypothermia for term born infants with moderate to severe hypoxic-ischaemic encephalopathy (HIE) or birth asphyxia. It is expected that these interventions, now both supported by national clinical guidelines, will reduce proportions of cerebral palsy in the sub-groups that they target. It is currently estimated that therapeutic hypothermia (aimed at term born infants) may reduce birth prevalence of cerebral palsy by 3.5%. Much is left to do, both to prevent rare intrapartum events where possible34maximise the effectiveness of therapeutic hypothermia35and to identify other discrete groups of causal pathways to cerebral palsy for term born infants.(Doyle, et al., 2009)

CHAPTER – III: METHODOLOGY

3.1. Study Design

Case-control study design was used for identifying the risk factors for cerebral palsy among term baby. Children with cerebral palsy were selected as case. Those babies who came to CRP for normal health check up were as control group. The entire sample was then searched for the exposure. Figure 1 is demonstrating the design of the case control study.

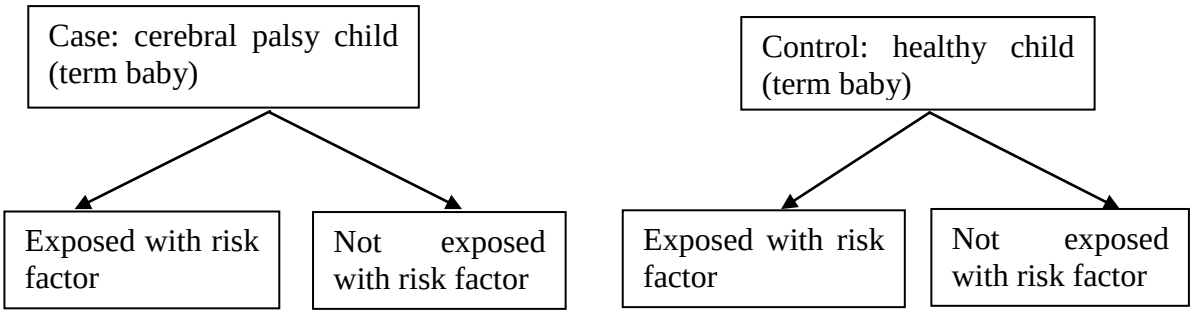

Fig 1: Case control design

3.2 Conceptual Framework

The anticipation for choosing this design was because cerebral palsy is not so common. On the other hand the risk factors take long latent period for develop the disease. The conceptual framework of this study is presented below. It was assumed that some antenatal, intrapartum and perinatal factors are the causes of cerebral palsy among term baby.

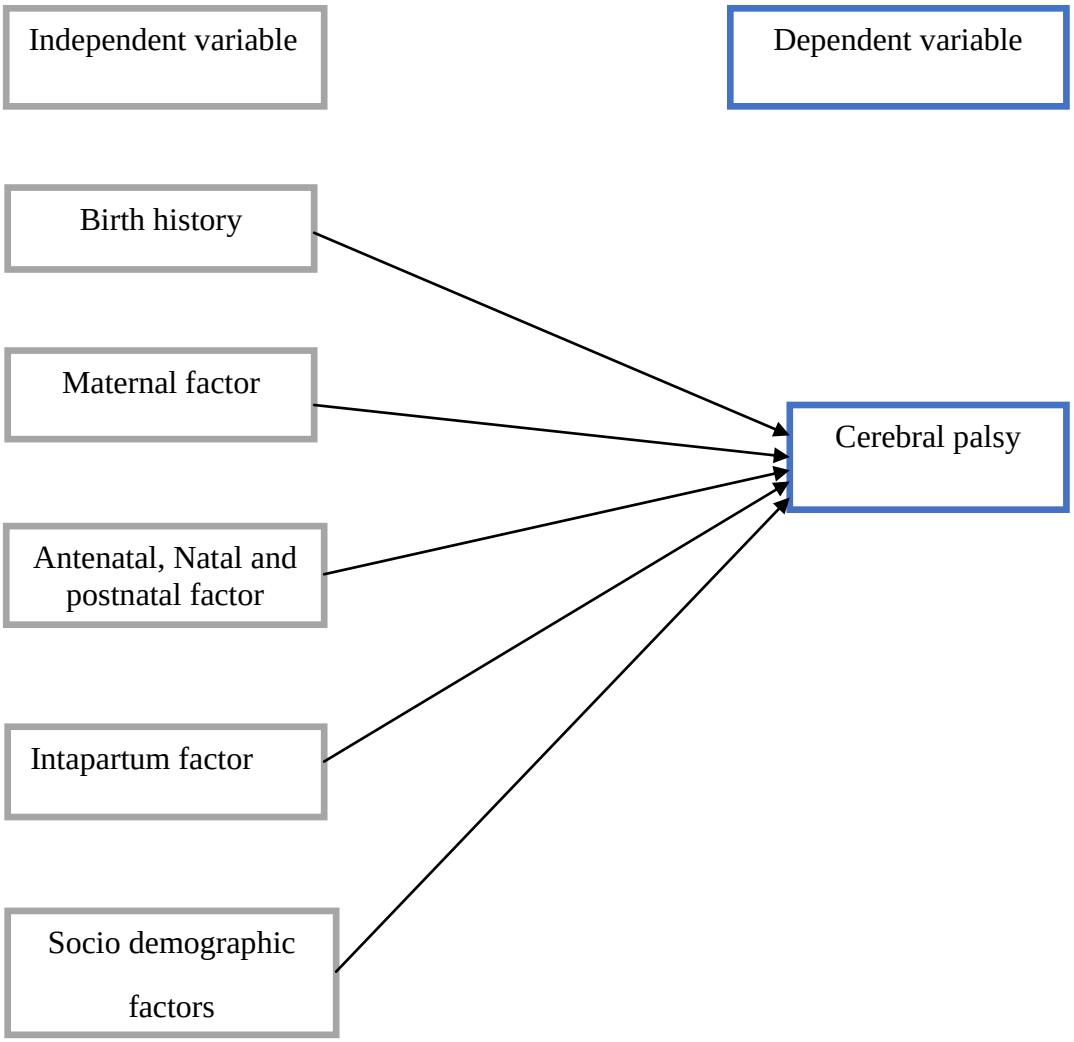

Fig 2: Conceptual framework

3.3 Study site:

The study was conducted in Paediatric unit CRP Mirpur and CRP Savar. This place comes to Cerebral palsy patients for physiotherapy treatment from different area of Bangladesh, so the investigator selected this place.CRP is one of the specialized rehabilitation centers for those types of children. That is why this study place was selected for sample collection.

3.4 Study Period:

This study was from August 2016 to October 2016. This study started with protocol preparation and finished with submission of final report in November 2016.

3.5 Study population and sample population:

All patients with Cerebral Palsy in Bangladesh were the target population and Sample population were those who came to CRP to receive physiotherapy treatment during the investigator study time from July 2016 to September 2016 as a case group. For control group all healthy children in Bangladesh were the target population and those children who came to CRP for health checkup.

3.6 Sampling procedure:

For this patients attended at CRP, Savar and CRP, Mirpur children with cerebral palsy among full term were selected conveniently as case and the mother of healthy children those who came here for health checkup chosen conveniently as a control.

3.7 Inclusion Criteria for case group:

- Age limitation 0-12years.
- Diagnosed cerebral palsy confirmed by a consultant Paediatrician or Neurologist among term baby were considered as case.
- Both male and female were included.
- Parents who were willingly participated.

3.8 Inclusion Criteria for Control group:

- Mother of healthy children those who came in CRP for normal health checkup.
- Parents who were willingly participated.

3.8 Exclusion criteria for case group:

- Undiagnosed cerebral palsy
- Preterm baby.

3.9 Exclusion criteria for control group:

- Preterm baby

3.9 Sample size:

$$\frac{[Z_{\alpha}\sqrt{(1+m)p`(1-p`)} + Z_{\beta}\sqrt{p_1(1-p_1)+mp_o(1-p_o)}]^2}{(p_1 - p_o)^2}$$

$$p` = \frac{p_1 + p_o/m}{1 + 1/m}$$

$$p_1 = \frac{p_o\Psi}{1 + p_o(\Psi - 1)}$$

Where,
Z_{α}= alpha = 95% confidence level = 1.96
Z_{β}= 1 – power = 80% power = 0.84
Ψ = odds ratio = 3
(Adougu, et al. 2015).
p_o = Prevalence of cerebral palsy in Bangladesh= 6.1% (Tabib, 2009).

Using the above formula and the parameter the sample size calculation is given below

$$p_1 = \frac{.061\times3}{1+.061(3-1)}$$

= 0.1645

$$p` = \frac{0.1645+0.061/1}{1+ 1/1}$$

$$= \frac{0.2255}{2}$$

= 0.1127

$$n = \frac{[Z_{\alpha}\sqrt{(1+m)p`(1-p`)} + Z_{\beta}\sqrt{p_1(1-p_1)+mp_o(1-p_o)}]^2}{(p_1 - p_o)^2}$$

n=

$$\frac{[1.96\sqrt{(1+1)0.1127\ (1-0.1127)}+0.84\sqrt{0.1645(1-0.1645\ )+1\times0.061(1-0.061)}]^2}{(0.1645-0.061)^2}$$

$n=\frac{2.49}{.0107}$

n=233

Due to time limitation final sample size became 60 (30 cases and 30 controls).

3.10 Data collection procedure:

All new consecutive patients who attended at CRP and were diagnosed as cerebral palsy were asked to parents to participate in the study as a case group and the parents of healthy child those who came here for health check up. Data were collected by direct interviewing the questionnaire. Beside this, paper, pen, pencil, computer, printer and calculator comprehensive field note would be used as the materials of data collection.

A structured questionnaire (appendix 1) was used for identifying the risk factors. This questionnaire has demographic criteria, maternal and foetal risk factors. This questionnaire was taken from Saadi, et al., (2012) their research. In that research the researchers identify the risk factors in their country by self administered questionnaire. The researcher used their questionnaire as a reference. Also some questions were added in context of Bangladesh in according to do pilot study. So the researcher has done pilot study for 20 mothers of CP children to ensure that, the

questions were easily understood. Informed consent was obtained from all parents whose children were studied.

Data including infant gender, diagnosis, maternal age at delivery, birth order, parental consanguinity, birth method, maternal health during pregnancy, duration of labor, any abnormality during labor, birth weight, h/o birth injury, birth asphyxia, h/o post natal complication and h/o of mothers addiction.

3.11 Data analysis:

Quantitative data was analyzed using SPSS. Descriptive and inferential statistics was used for data analysis. Continuous variables were expressed as mean ± SD, and categorical variables as percentages. Prevalence rates was presented as percentage and compared among different patient groups (case & Control; Male& Female etc). SPSS 16 version was used to analyze data. Data was analyzed in the form descriptive statistics for demographic data.

As this was a case-control study for finding the risk factors Odds ratio. An odds ratio is a measure of association typically used to quantify the strength of association between a potential risk or protective factor (exposure) and an outcome.

Individuals who have the disease (cases) and the odds of exposure among individuals who do not have the disease (controls) from a typical 2 x 2 table as below:

	case	control
Exposure	a	b
N exposure	c	d

Odds of exposure among cases: a/c
Odds of exposure among controls: b/d

The odds ratio (OR), its standard error and 95% confidence interval are calculated according to Altman, 1991.

The odds ratio is given by

Odds ratio (OR) = (a/c)/ (b/d)
= ad/bc

The odds ratio can also be used todetermine whether a particular exposure is a risk factor for a particularoutcome, and to compare the magnitude of various riskfactors for that outcome.

OR=1 Exposure does not affect odds of outcome

OR>1 Exposure associated with higher odds of outcome

OR<1 Exposure associated with lower odds of outcome

95% confidence interval was used to identify significance of the OR the risk factors by using following formula:

$$95\%\ \text{CI} = \exp\left(\ln(OR) - 1.96 \times \text{SE}\{\ln(OR)\} \right) \quad \text{to} \quad \exp\left(\ln(OR) + 1.96 \times \text{SE}\{\ln(OR)\} \right)$$

Where e is the base on the natural logarithms (e ≈ 2.71828…), z is a Standard normal deviate corresponding to the desired level confidence (z = 1.96 for 95%), and

$$\text{SE}\{\ln(OR)\} = \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$$

Confidence interval having 1 between its ranges was considered to be a non-significant risk factor.

3.12 Ethical consideration:

The study protocol was sent to BHPI for Institutional review board for approval as per the existing rules. Permission from in charge of Physiotherapy department of CRP was taken to conduct the study. Verbal consent was taken from the participant informing them about the purpose of the study, anonymity, their rights to refuse answering any question, withdrawn from the study at any point of time and other issues mentioned in the form before starting the interviews. For any kind of use of the study there was no identification of any participants only the data was used. The data was kept in a se secure place where only the researcher had the access.

3.13 Informed consent

The aim and objectives of this study was informed to the subjects verbally. The researcher gave the consent form to the subjects and explained them. The subjects have the rights to withdraw themselves from the research at any times. The name or address would not be used. The information of the subjects might be published in any normal presentation or seminar or written but they would not be identified the participants or subject will also be informed or given notice that the research result will not be harmful for them, but in future participants will be benefited. Every participant has the right to discuss about his or her problem with senior authority.

3.14 Limitations of the study

The limitations of this study were as follows: The study did not represent the total population of the condition because-

- There was lack of randomization.
- This was a hospital based study which also is not an ideal sample.
- The sample number is minimum so the result didn't represent the whole population
- If the control group take from community than the actual picture come in front.
- Another limitation that faced us during the study was the availability and reliability of individual patient medical cards.
- In Bangladesh there was very little research about risk factors of cerebral palsy for this reason there was a lack of upgrade and recent data in this sector.
- If I get recent and upgrade data then I can link between them and get an appropriate questionnaire which was appropriate for our country.
- Time was very limited for this study.
- There was a chance of recall bias mothers of both groups due to insufficient information about birth history in prescription.

CHAPTER – IV: RESULTS

4.1 Risk factors associated with cerebral palsy: This study was a case control study and the mode of association between disease and risk factors was Odds ratio. 95% confidence interval was calculated for finding out the significant of the association. If 1 came between the lower bound and the upper bound of confidence interval it was considered as non-significant.

Table I :Risk factors of cerebral palsy

Variable	Case	Control	OR	95% CI	
				Lower	Upper
Sex					
Male	17	15	1.3077	0.473	3.61
Female	13	15			
Mothers Age					
Below 25 years	22	15	2.7500	0.9336	8.100
Above 25 years	8	15			
Number of pregnancy					
Primigravida	20	20	1.000	0.3418	2.925
multigravida	10	10			
Cousin marriage					
Yes	5	1	5.80	0.6345	53.01
No	25	29			
Delivery done					
Home	12	3	6.000	1.4841	24.29
hospital	18	27			
History of miscarriage					
yes	10	6	2.000	0.6187	6.465
no	20	24			
Birth injury					
Yes	9	1	12.428	1.44	101.49
No	21	29			
Birth asphyxia					
Yes	16	0	74.55	4.161	1335.5
No	13	30			
Jaundice & neonatal Convulsion					
Yes	7	0	19.46	1.05	358.40
No	23	30			

Since the 95% CI of 0.473 to 3.61 the increased odds (OR 1.30) of male gender among cerebral palsy child baseline does not reach statistical significance. Also it's not a strong association. The p value was 0.605, which was greater than 0.05 that means it was not significant.

The odds ratio of the mother's age was during delivery 2.75 that mean there was 2 times higher risk those mother whose age during delivery below 25 years. The p value is = 0.0665, that is greater than 0.05. So, statistically it was not significant so there was no association between the mother's age and cerebral palsy. The Odds ratio of number of pregnancy was 1.00, it indicates that the odds of exposure among case-patients are the same as, or similar to, the odds of exposure among controls. The exposure is not associated with the disease.

Odds ratio of cousin marriage was 5.80, that suggesting that shoulder cousin marriage is 5 times more frequent among those who were the parents of cerebral palsy. The confidence interval of odds ratio was ranging from 0.634 to 53 indicating that this association was not significant.

Odds ratio of delivery done in hospital/ home was found to be 6.00 which indicating that hospital delivery was 6 times more frequent among the mothers of normal child and the p value is 0.0120, which is less than 0.05 and was statistically significant.

The odds ratio of history of miscarriage was 2.00 that mean it is 2 times higher risk those mother who had history of miscarriage. The confidence interval of odds ratio was ranging from 0.6187 to 6.46 indicating that which was not significant.

Since the 95% CI of 1.46 to 105.74 the increased odds (12.42) of birth injury among cerebral palsy child reach the statically significant. The p value is less than 0.05 that

means it is highly significant. It indicates that there was association birth injury and cerebral palsy.

The odds ratio of birth asphyxia is 74.11. The confidence interval range 4.16 to 1335 and the p value is 0.002. It indicates that it was highly significant and it has strong association between birth asphyxia and cerebra l palsy.

The odds ratio of neonatal convulsion and jaundice is 19 and the p value is 0.0458 which is less than 0.05.the result is significant. It indicates that neonatal convulsion and jaundice has strong association with cerebral palsy.

4.2 Characteristics of respondents:

A total 30 children with cerebral palsy and healthy children's mother (30 Control) was interviewed for this study. Socio-demographic characteristics of the respondents are presented in table II.

The mean age of the respondents was 1.6 years that means 4 years and 2 months with a standard deviation of 1 (table II). Majority of the respondents (50%) were 0 to 3 years old followed by 4 to 6 years old (25%). Only 3% of the respondents were 10- 12 years old. A total 53% respondent was male and 43% of the cases were female whereas in the control group male and female ratio was equal. In the table 1 if we see the respondents living area the majority of respondents (56%) live in urban area whereas in control group (73%) were live in urban area and only (23%) live in rural area**.**

Table II: Characteristics of respondents

Variables	Total N= 60	Case n= 30	Control n= 30
Age: (mean± SD)	1.6± 1	1.6± 1	1.6± 1
0-3 years	30(50%)	16(53%)	14(46%)
4-6 years	15(25%)	7(23%)	8(26%)
7-9 years	13(21%)	6(20%)	7(23%)
10-12 years	2(3%)	1(3%)	1(3%)
Sex			
Male	32(53%)	17(56%)	15(50%)
Female	28(46%)	13(43%)	15(50%)
Living area			
Rural	14(23%)	10(33%)	4(13%)
Urban	34(56%)	12(40%)	22(73%)
Semiurban	22(20%)	8(26%)	4(13%)

4.3 Cousin marriage:

In this chart very few percentage of cousin marriage in both groups. In case group 8% parents have cousin marriage and 3% in control group.

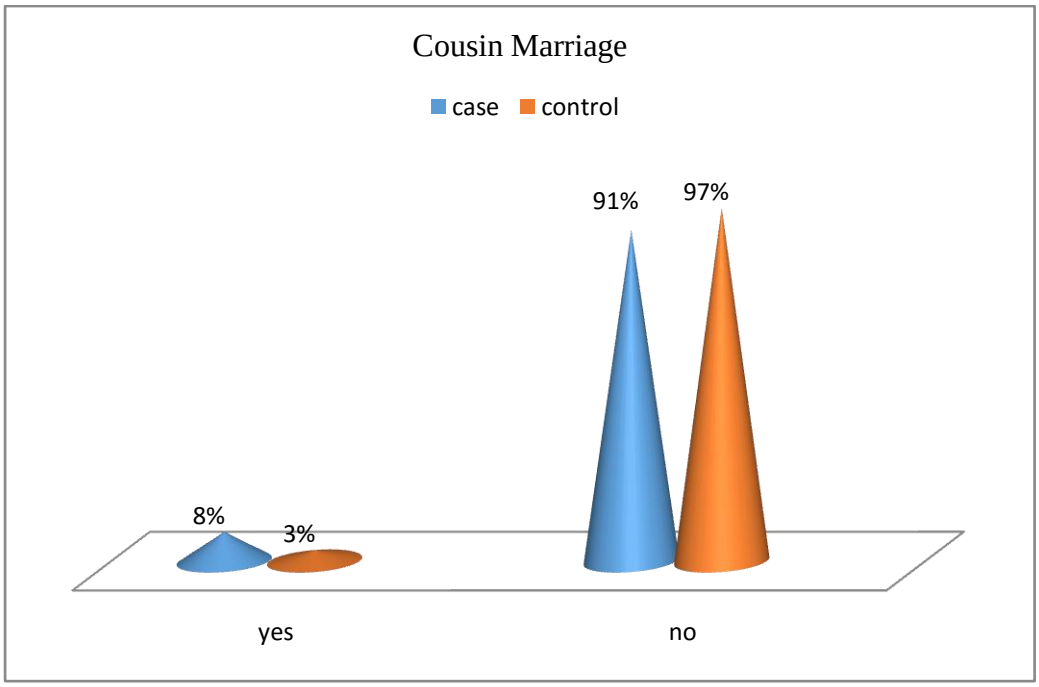

Fig 3: Percentage of cousin marriage among parents of case and control

4.4 Education of mother:

A total (73%) respondent (mother) has at least secondary education. In cases only (10%) mothers are illiterate but in control no one have found illiterate.

Table III: Mothers education

		illiterate	primary	secondary	higher secondary	graduation	post-graduation	
	case	3(10%)	9(30%)	4(13%)	6(20%)	6(20%)	2(6%)	30
	control	0	3(10%)	3(10%)	4(13%)	9(20%)	11(36%)	30
Total		3	12	7	10	15	13	60

4.5 Employment of mother:

If we see the employment status of mother only 3% mothers of CP child were service holder but in control group 60% mothers were service holder

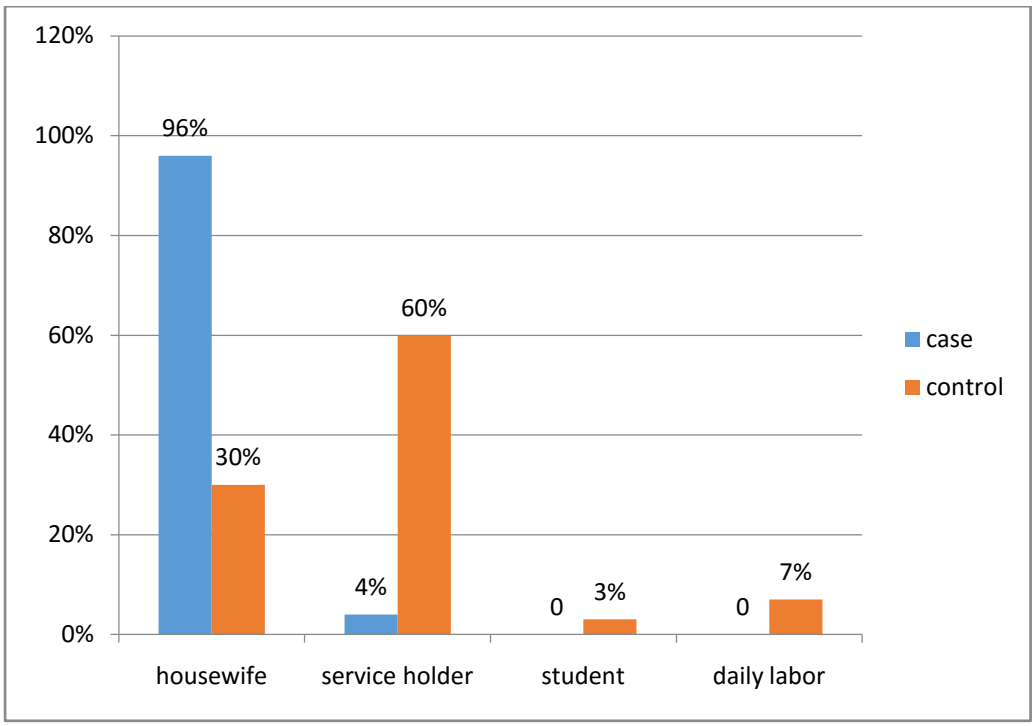

Fig 4: Number of employment of mother case and control group

4.6 Education of father:

Among 60 samples in according to case group 23% has completed secondary education, 23% completed primary education and 20% has completed graduation. In control group 46% has completed graduation and 33% has completed post-graduation. Comparatively fathers of control group were more educated than case group.

Table IV: Fathers education

		illiterate	primary	secondary	higher secondary	graduation	post-graduation	
	Case	3(10%)	7(23%)	7(23%)	3(10%)	6(20%)	4(13%)	30
	control	1(3%)	4(13%)	1(3%)	0	14(46%)	10(33%)	30
Total		4	11	8	3	20	14	60

4.7 Employment of father:

In this chart majority of fathers of control group 60% were service holder compare with case group (30%) and 37% were businessman in case group and 20% of control group. 27% daily labor in case group and 10% in control group.

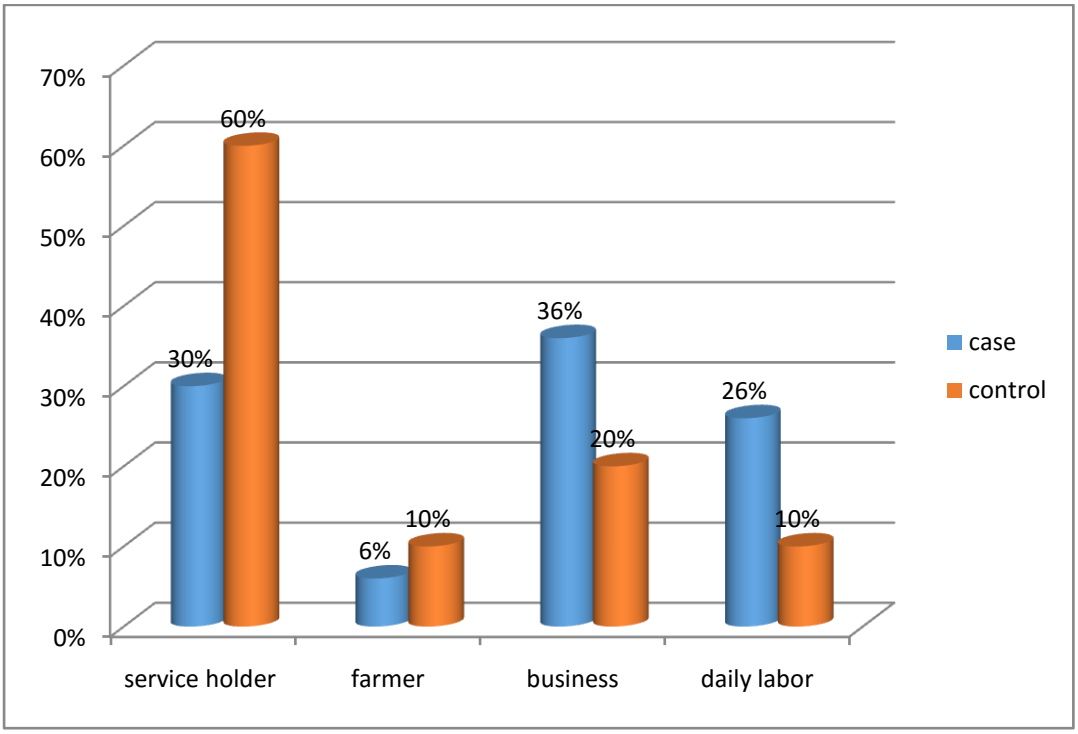

Fig 5: Comparison of employment of father among case and control group

4.8 Types of cerebral palsy:

The figure shows that among the case groups (30), 43% cases are diplegic CP, 20% are dyskinetic CP and 17% are quadriplegic CP. Comparatively diplegic cerebral palsy more than other types of cerebral palsy.

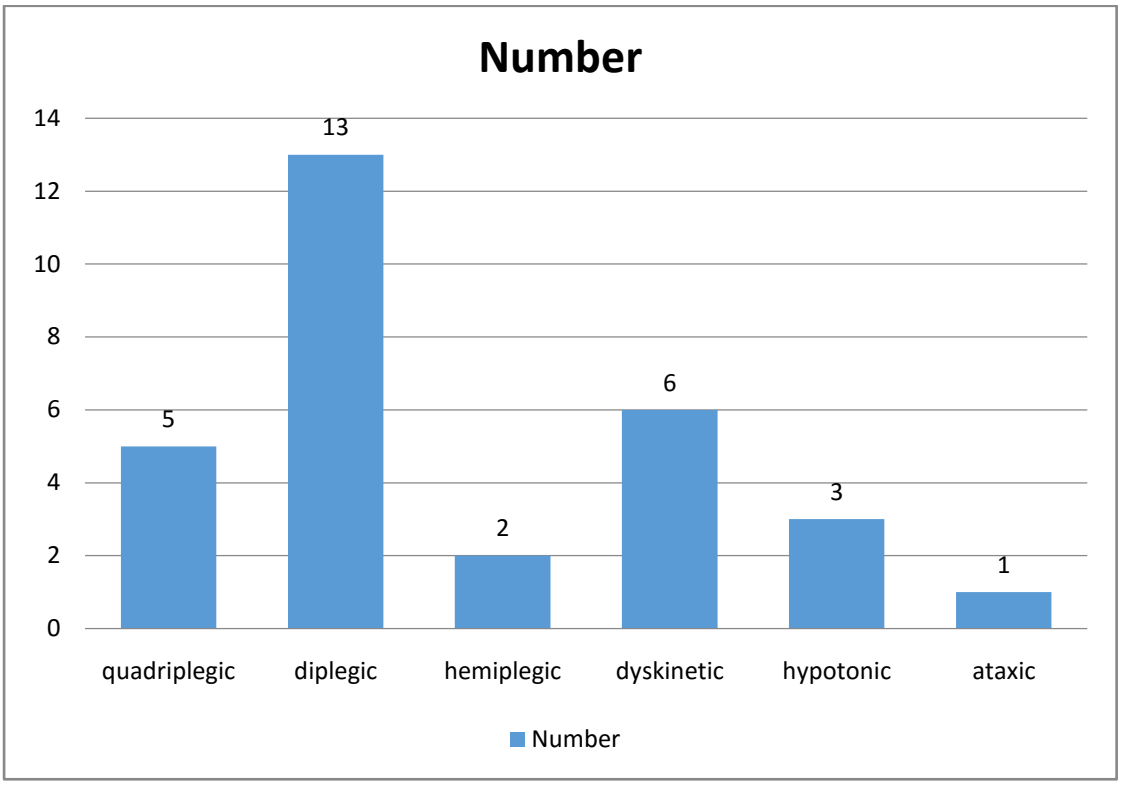

Fig 6: Types of cerebral palsy

4.9 Comparison of birth history:

Table V: Birth history CP child and healthy children

Variable	Case	Control
Mode of delivery		
Normalvaginal delivery	14(47%)	8(26%)
ceaserian section	5(50%)	21(70%)
operative vaginal / Instrumental / forceps	1(3%)	1(3%)
Duration of labor		
less than 12 hours	12(40%)	14(46%)
morethan 12 hours	12(40%)	14(46%)
sudden birth	6(20%)	2(6%)
Birth weight		
2.5-4kg	21(70%)	21(70%)
2-2.5kg	5(17%)	8(26%)
2.5-2kg	2(7%)	1(3%)
1-1.5kg	2(7%)	0%

In this table we see the comparison of birth history according to case and control group. In case of mode of delivery in case group 50% of caesarian delivery and in control group 70% were caesarian delivery. If we see the normal vaginal delivery 47% case group and 26% control group and only 3% forceps delivery.In second point about 50% delivery of case group were attended by doctor but in control group the percentage was 83%. Another in case group only 20% deliveries was done by midwife compare with control group.If we see the 3rd point duration of labor both case and control groups were equal number of labor pain less than 12 hours and more than 12 hours and minimum number 20% were sudden birth in case group and 6% in control group. In according to birth weight 70% children in case and control group were in 2.5- 4 kg this range and rest of the 30% below 2.5 kg.

4.10 Delivery Birth attended by:

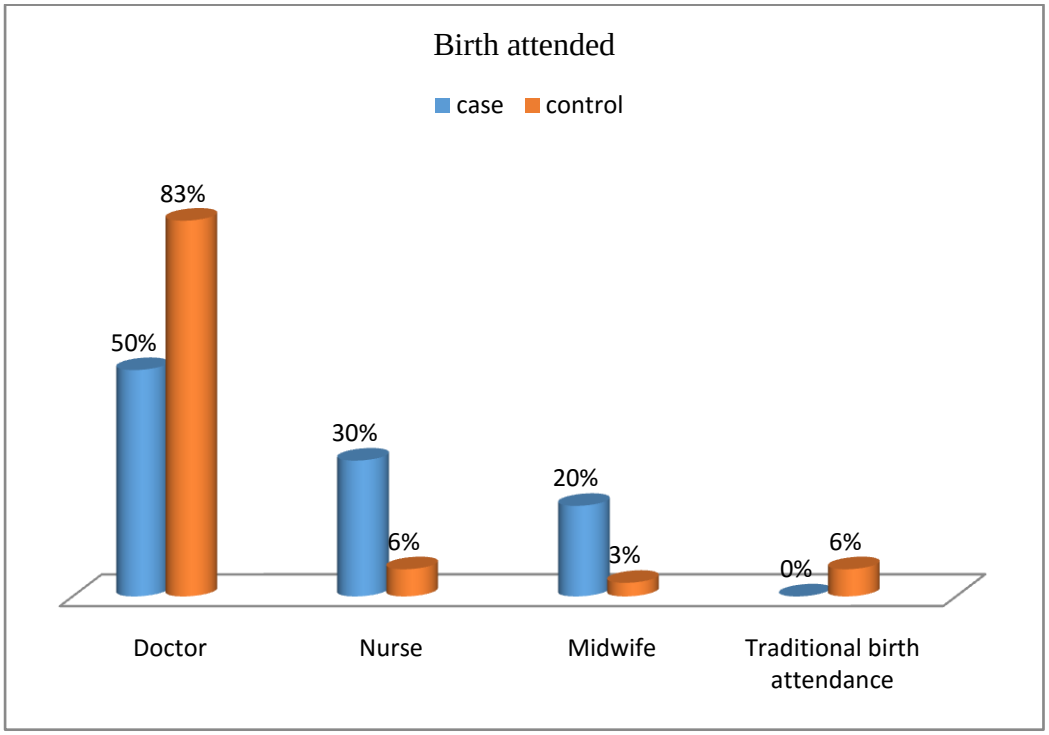

Fig: 7 Delivery birth attended by

In this figure we see that in control group more than 50% mothers of the healthy children delivery has done by doctor and in case group 50% delivery has done by doctor. Another 30% mother of cerebral palsy child delivery nurse and rest of the 20% delivery have done by midwife which was more than control group.

4.11 Place of delivery:

In this chart we understand that the percentage of hospital delivery was same that was 46%. In case group 40% were home delivery and 10% were home delivery in control group. It is noticeable that in control group 43% delivery was done in clinic and in case group the percentage was 13%.

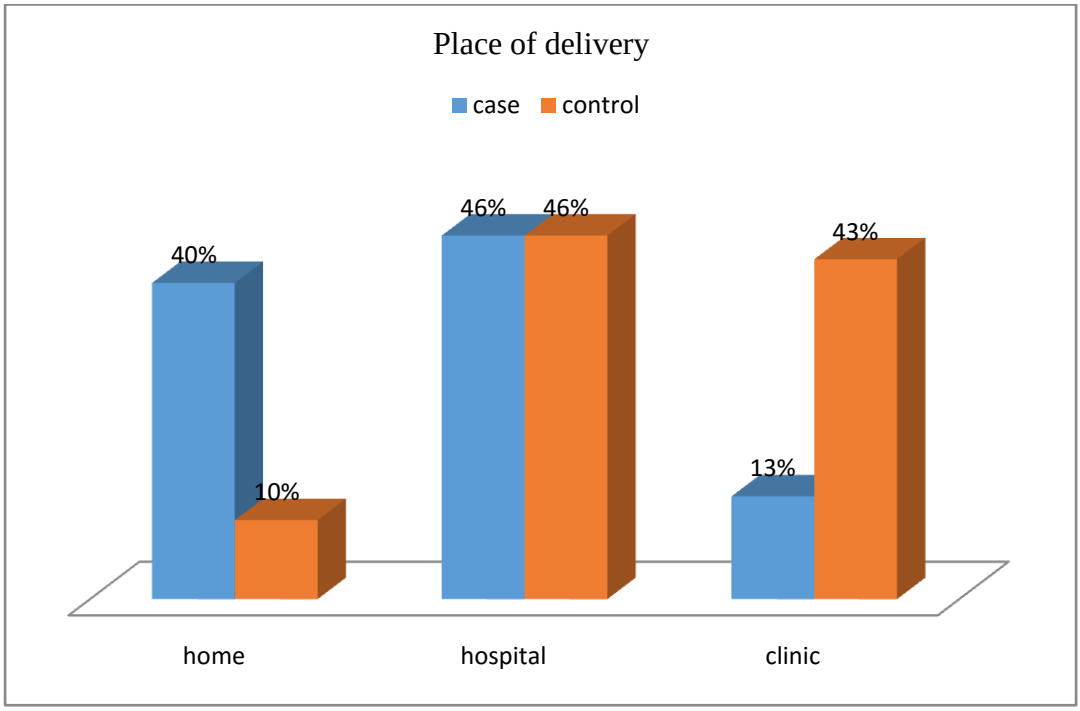

Fig 8: Place of delivery

4.12 Siblings with disability

Table VI: Siblings with disability among case and control group

Disable siblings	Case	Control
Yes	2 (7%)	4(14%)
No	28 (93%)	26(86%)
Total	30(100%)	30(100%)

This table shows that in control group there is 14% disable siblings which are more than case group. In case group there is 7% disable siblings.

4.13 mothers age during delivery

Table VII : Mothers age during delivery

		<18 years	19-25 years	26- 30 years	31-35 years	>35 years	Total
	case	4(13%)	18(60%)	6(20%)	0	2(2.3%)	30
	control	1(3%)	14(46%)	11(36%)	4(13%)	0	30
Total		5(8.3%)	32(53.3)	17(28.3%)	4(6.7%)	2(3.3%)	60

In this table we see that 73% mothers of cerebral palsy child below 25 years and only 2.3% mothers were above 35 years. This finding indicates that children with CP are more likely to be born at the early age of the mother.

4.14 Medical consultancy during pregnancy:

In this table shows that 50% o0f In this table shows that 50% of cases and 70% of control has taken medical consultancy per month, 36% of cases has taken consultancy per 3 month Only 10% cases visit to doctor once During pregnancy. That means maximum mother aware about their health.

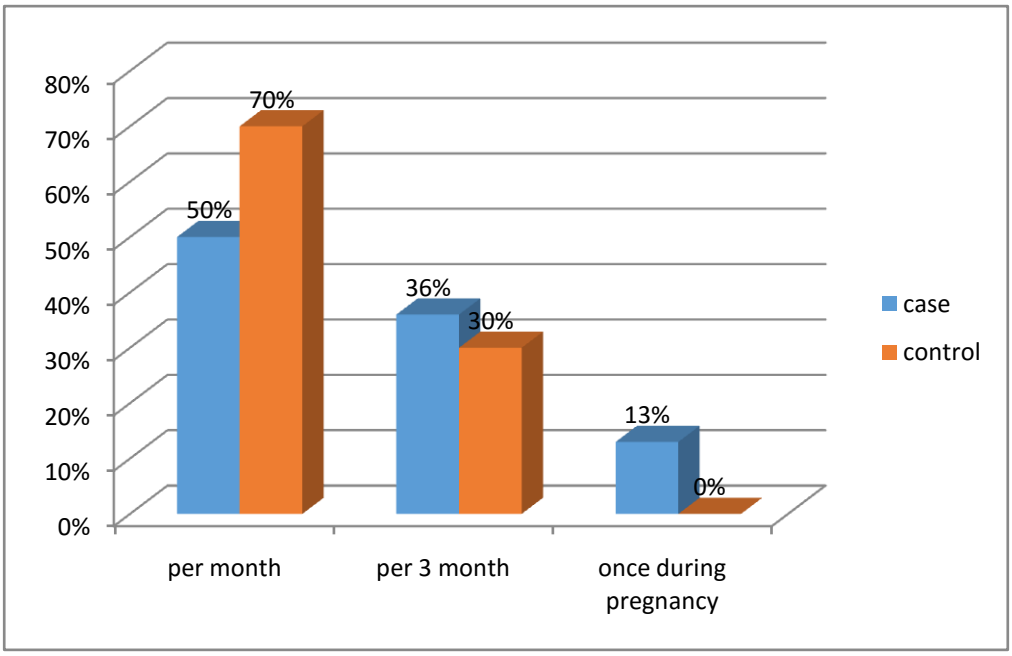

Fig 9: Medical consultancy during pregnancy

4.15 Birth asphyxia:

In this table 56% cases were suffered by birth asphyxia and rest of the 43% had no birth asphyxia in case group and in control group total 100% had no birth asphyxia.

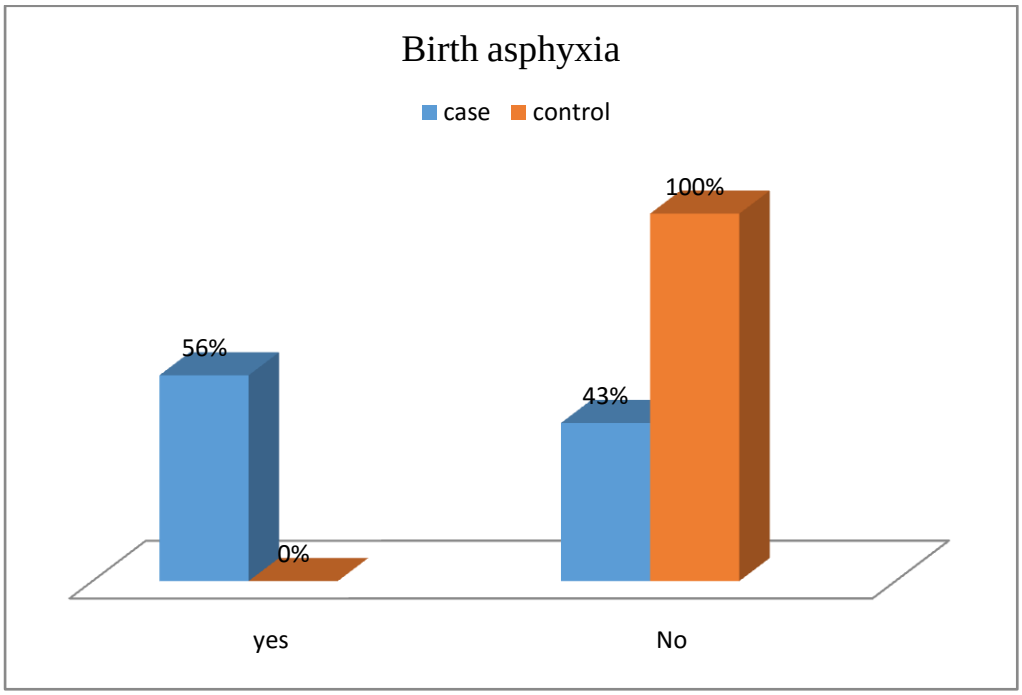

Fig 10: Birth asphyxia

4.16 History of miscarriage:

In this table among 60 samples 16 mothers hasa history of miscarriage among them 10mothers has CP child and rest of 6 mothers have normal child.

Table VIII: History of miscarriage

		yes	no	Total
	Case	10(33%)	20	30
	control	6(20%)	24	30
Total		16	44	60

4.17 Maternal health during pregnancy:

This table shows that the percentage of HTN among mother of cerebral palsy child is lower (6.7%) than the mother of control (16.7%) group. Also the percentage of anemia among the mother of cerebral palsy is also lower than the control group. There is no significant percentage in maternal infection, decrease fetal movt, fluid loss and fetal position.

Table IX: Maternal health during pregnancy

Variable	Case	Control
Hypertension	2(6%)	5(16%)
Diabetes Mallitus	0	2(6%)
Anaemia	2(6%)	4(10%)
Maternal Infection	0	3(8%)
Trauma during pregnancy	2(6%)	0
Twin pregnancy	2(6%)	0
h/o previous C/S	0	3(10%)
Other illness	8(26%)	2(6%)
Nil	6(20%)	7(23%)

4.18 Birth order:

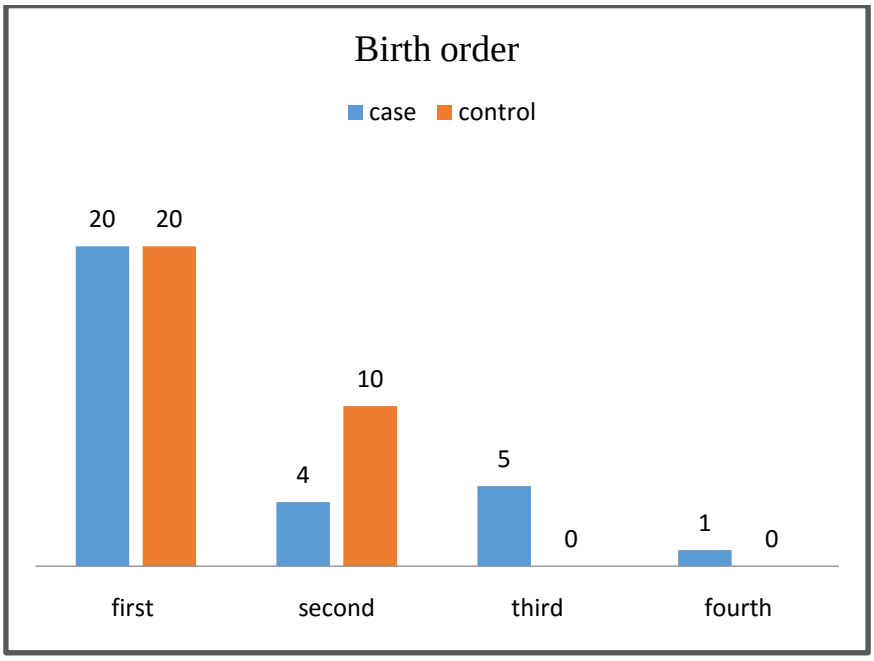

Fig 11: Birth order

This study shows that comparison between case and control group birth order 1st child of the family had CP 20 among 30 samples. In case of 2nd child and fewer rate had CP among 3rd and 4th issue in the family

4.19 Birth injury:

Among 60 respondents 10 children has a history of birth injury. Among 10 child attacked by birth injury 9 children was cerebral palsy.

Table X: Birth injury

		yes	no	Total
	Case	9(30%)	21(70%)	30
	control	1(3%)	29(97%)	30
Total		10	50	60

4.20 Post natal complication:

This table shows that only 7 children suffered by jaundice and neonatal convulsion among 30 sample of case group comparatively control group no one has suffered by jaundice and neonatal convulsion. Another 5 respondents have neonatal convulsion compare with control group. But there were no complication 9 children among 30 children. So the percentage of no complication after birth was more than other complication.

Table XI: Post natal complication

Variable	**Case**	**Control**
Jaundice	4	12
Neonatal respiratory distress	1	0
Neonatal convulsion	5	0
Encephalopathy	1	0
Pneumonia	1	1
Jaundice & neonatal convulsion	7	0
Jaundice & microcephaly	1	0
nill	9	17

4.21 Miconium aspiration:

This table shows that total 60 samples only 5% has a history of meconium aspiration. Among them only 3% has case group.

Table XII: Miconium aspiration

		yes	no	Total
	Case	1(3%)	29(97%)	30
	control	2(6%)	28(94%)	30
Total		3(5%)	57	60

4.22 Mother's addiction:

This table said that very few mothers have an addiction of tobacco chewing and gul. There are only 3 mothers have addiction of gul and only one mother has addiction of tobacco chewing.

Table XIII : Mothers addiction

		Tobacco chewing	gul	nil	total
	Case	1	1	28	30
	control	0	2	28	30
Total		1	3	56	60

CHAPTER – V: DISCUSSION

The idea of this study was to identify the risk factors of cerebral palsy among term baby which might help to explore the underlying mechanism of cerebral palsy.

Majority of the respondents of this study was male child and some studies have shown the association of the gender of the children with cerebral palsy. In one Swedish study where male gender was repeatedly found to constitute a risk factor for cerebral palsy (Hagberg, B et al 2001) which indicate similarities from our findings. A hospital based study in Bangladesh also found more male patients (66.7%) with CP than female patients (33.3%) (Khan, M. and Islam, 2006). Johnston, M. V. and Haqberq, H. (2007) stated that there is major differences between male and female neurons grown separately in cell culture, suggesting that sex differences in the fetal or neonatal period result from intrinsic differences in cell death pathways. This new information indicates that there are important neurobiological differences between males and females with respect to their response to brain injuries.

It is found in the study that highest number of children admitted to the CRP paediatric program (53%) was between 0-3 years of age (see table II). This finding corresponds to another study by Pandey, Jha, Dhungana, Lamsal in 2009 that found younger children were brought to the hospital sooner; children less than five years were brought earlier, particularly infants.

This study also shows that parents brought their children to CRP irrespective of their gender at 0-3 years of age (male=17, female=13) Different studies show that medicalcare is positively predicted by male gender, geographic location, greater socioeconomic status, and serious illness of long duration.

Though a total 56% respondents living area was urban the percentage of cerebral palsy child much higher than rural and semi urban. We know that in urban area the health sector facility more established than in rural area. In spite of better facility in urban the incidence of cerebral palsy child more than in rural area. So there may some hidden factor which is the risk factors of cerebral palsy.

In this study we found that the percentage of diplegic cerebral palsy is 43%, 20% dyskinetic cerebral palsy and 17% spastic quadriplegic cerebral palsy. One of the study found that neonatal infection was associated with a very high risk of spastic diplegia (Ahlin, et al,. 2013).

One independent variable the birth order has no association of being cerebral palsy in this study. But some study found that primigravida showed significance and low risk for cerebral palsy. (Saadi, et al., 2012). But in case of multigravida the percentage of cerebral palsy child reduced may be the awareness.

If we observe cousin marriage in this study it was found that 8% had a history of cousin marriage of the parents (see fig: 3). Sinha, Corry, Subesinghe, Wild, Levene (1997) studied on 39 Asian families who have a child with CP. They found 15 of the families had first cousin marriages and nine of these families had another first or second degree family member with a similar type of CP to the index child.Gulten et ai, (2008) reported that the most frequently encountered risk factors of CP were low birth weight (45.1%), preterm birth (40.5%), birth asphyxia (34.6%) and consanguineous marriage (23.8%). Low birth weight, 'preterm birth, birth asphyxia and consanguineous marriage were top-ranked risk factors that were determined in Turkish children with CP Compared with other countries; consanguineous marriage is still an important problem in Turkey. But in this study consanguineous marriage is not

exhibited as a prominent factor whereas evidence strongly suggests a positive relation with CP. In this study only 7% cases (see in table 4) have some kinds of disability with their sibling's rest of percent of no disability.

If we see the mode of delivery the percentage of ceaserian section delivery was 50% in case and 70% of control group which was more than normal vaginal delivery. But in clinically we know that without any complication doctor didn't advice for ceaserian delivery. So, if the sample is more we will find the actual figure.

Cesarean deliveries do not prevent children from developing cerebral palsy, despite long-held medical and community beliefs about the causes of cerebral palsy, according to new research led by the University of Adelaide.

In the biggest study of its kind, the Australian Collaborative Cerebral Palsy Research Group (2013), based in the University's Robinson Institute, has analyzed all published studies involving more than 3,800 cerebral palsy cases and almost 1.7 million healthy children. The findings show that the risk of cerebral palsy is not lowered by either elective cesarean delivery before labor or emergency cesarean delivery during labor.

"For over a century it was assumed, without good evidence, that most cases of cerebral palsy were due to low oxygen levels or trauma at birth," says research leader Emeritus Professor MacLennan, A. (2013) from the University of Adelaide's Robinson Institute.

"Numerous recent studies have shown that despite an increase in caesarean deliveries over 50 years, which have risen from 5% to 34% in Australia, there has been no overall change in cerebral palsy rates. (Science daily, 2015)

Another independent variable history of miscarriage was not associated with cerebral palsy in this study. So there was a similarity of this study and Soleimani, et al., (2013) study. In this study 56% respondents have birth asphyxia with cases and statistically it is highly significant. Birth asphyxia is a vague and controversial term that denotes a clinical diagnosis lacking specificity for any single underlying pathological condition. We considered neonatal convulsion, and/ or low Apgar score (<5) at 5 minutes or beyond the presentation of birth asphyxia, regardless of whether true hypoxia ischemia was present. The Swedish population based of CP report by the Hagberg group, which showed birth asphyxia to be the likely cause of CP in 28% of term children with CP three times higher than the figure quoted. (Hagberg, G. 2004). A Swedish report attributed 58% 0f cerebral palsy incidences in the term infants to birth asphyxia. Experts in developing countries, such as Iran, have recognized asphyxia as a major cause of cerebral palsy in their countries.(Soliemani et al. 2010)

In this study jaundice and neonatal convulsion is one of the independent variable in post natal complication about 23% cases has a history of neonatal convulsion and jaundice. In the study of Soleimani et al (2010) found that neonatal convulsion is the risk factors of cerebral palsy child. So there is a similarity about in this research finding.

If we see the birth weight both group that means case (70%) and control (70%) weight of the baby between 2.5- 4 kg and very few low birth weight 1.5-2.00 kg. that means maximum respondents normal birth weight.

This study found that 6.7% of mothers had high blood pressure, 6.7% of mother had anemia,26.60% of mothers had other complications (for example amino fluid loss, fever, history of fall down etc.) and 20% of mothers had no complication . Early

epidemiological studies have suggested that there is an association between maternal hypertension and CP Maternal disorders like hypertension during pregnancy was detected as one of the strong risk factors for causing CP (OultenetaI, 2008). The role of maternal anemia in the pathogenesis of preterm birth has been controversial. Anemia is not a strong risk factor for pre-term birth when an appropriate comparison group was used (OultenetaI, 2008). So, further research is required with increase the sample size into the effects of other complications during birth that lead to CP.

This study found that 40% of mothers had prolonged labor, 40%of mother had short laborand 8.7% of mother had sudden birth (see table 3). According to Karin, Nelson, Jonas and Ellenberg, (1985) duration of labor, whether precipitated or prolonged, is not a risk factor for CP. But Arrowsmith, et al., (1996) stated that labor period has an association with birth injuries and it leads to CP. So, it can be summarized that though there is no direct association between labor and CP, it does have an indirect influence on CP.

Among 60 sample 10 (see table X) of them had a history of birth injury. From 10, 9 of them case group and rest of the one control group. Birth injury encounter head trauma during delivery. Blair and Stanley (1992) reported in their study that during non-metropolitan delivery head trauma is common cause of sustained permanent brain damage and it may lead to CP. Damage to the laryngeal nerve may affect a child's ability to breathe and swallow. It may also cause paralysis of the vocal cords. This damage often occurs when an infant's head is turned to the side during childbirth. A newborn with this type of nerve damage will show respiratory distress and may have a hoarse cry. Most babies born with laryngeal nerve damage will recover within a few

months. Other types of injury to the brain, however, can cause brain damage. There a few main causes of infant brain damage. One is hypoxic ischemic encephalopathy, or HIE. This is brain damage caused by lack of oxygen to the infant's brain during childbirth. Inadequate oxygen can cause brain cells to die. This is a common cause of cerebral palsy. If lack of oxygen is severe enough, it can lead to periventricular leukomalacia. This is the death of white brain matter, which leads to the loss of significant amounts of tissue in the brain. The white brain matter is specifically tied to motor function and its loss effects movement.

One study found that there is association smoking and cerebral palsy but not risk factor. It may give rise to a similar situation through increased vascular resistance in the placenta from the fetal side. But in our culture smoking is not common for women. In our culture tobacco chewing and gul are common for women. But we didn't find any association between cerebral palsy and smoking.

CHAPTER – VI: CONCLUSION & RECOMMENDATION

6.1 Conclusion:

CP is one of the major common childhood disabilities that affect children's overall development. Children with CP can be characterized with movement disorder, speech and language difficulties, hearing and vision difficulties. When taking a case history from parents about their children, predetermined questions are asked to determine prognosis and counseling to the parent. This study has shown that a significant relationship exists between cerebral palsy and the following risk factors- hospital delivery, birth injury, birth asphyxia and jaundice & neonatal convulsion. Some other factors also associated with cerebral palsy such as, h/o miscarriage, hospital delivery, cousin marriage, maternal infection, maternal anemia, hypertension in mother but they are not statistically significant in this study. The strength of this study comes from the fact that all the cerebral palsy cases were diagnosed professionally by either a pediatrician or neurologist or both. The researcher used self-administered questionnaire from one of Iraqi CP children study among term baby. Another limitation that faced us during the study was the availability and reliability of individual patient medical cards and the hospital medical records. This study was a case control study, which was conducted based on prospective events. If we can do cohort study in the future with similar objectives, we would definitely have more accurate results especially in terms of temporal relationship between the outcome and the risk factors.

6.2 Recommendation:

The study findings demand an awareness of health care service providers and health policymakers to have the appropriate facilities in the labor room to prevent birth asphyxia and give emphasis on the treatment of seizure. In Bangladesh neonatal care services should be reviewed and it should get more attention and support from the governmental and nongovernmental organizations as neonatal asphyxia, birth injury still constituted the major risk factors for cerebral palsy in Bangladesh. If we want to solve the problem of cerebral palsy in Bangladesh, we should allocate more resources to develop a better neonatal care services in Bangladesh. Aggressive health education of the general public on the nature of CP emphasizing that it is cause of major disability in children. This will raise people's awareness to adopt adequate preventive measure by taking their pregnant women to well-equipped health facilities for delivery. Education of pregnant women is needed in particular the nature of neonatal jaundice. Routine and regular screening for infections among pregnant women is needed. Early assessment and treatment is essential. Further study should be needed with larger sample.

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<u>Appendix 1</u>: Risk Factors of cerebral palsy among term baby attending at CRP Questionnaire (English)

1. Patient code:
2. Patient ID:
3. Age:
4. Sex: M: F:
5. Cerebral Palsy: 1. Yes 2. No
6. Living area:
   1.Rural
   2. Urban
   3. Semiurban
7. Type of cerebral palsy?
   1. Spastic quadriplegic
   2. Spastic diplegic
   3. Hemiplegic
   4. Dyskinetic
   5. Athetoid
   6. Hypotonic
8. Mothers educational level:) illiterate 2) primary 3) secondary 4) Higher secondary 5) Graduation 6) Post Graduation 7) Others

9. Fathers educational level:) illiterate 2) primary 3) secondary 4) Higher secondary 5) Graduation 6) Post Graduation 7) Others.
   Mothers occupation: 1) housewife2) service holder
   3) Student
   4) Daily labor
   5) Others

10. Fathers occupation: 1) Service holder
    2) Farmer
    3) Business
    4) Student
    5) Daily labor
    5) Others

11. Mothers age during delivery: <18 years
    19-25 years
    26-30 years
    31-35 years
    >35 years
12. Birth order:
    1. First
    2. Second
    3. Third

13.Any other siblings, 1) yes 2) No. Do they poses disability, yes/ no

14. Cousin marriage: 1) yes 2) No

15. Birth history:

a) Mode of Delivery:
   1. NVD
   2. C/S
   3. Operative vaginal(using vacuum or forceps)/ Instrumental
b) If c/s why?.....
c) Where was the delivery done?
   1. Home
   2. Hospital
   3. Clinic
d) Delivery of birth is attended by :
   1. Doctor
   2. Nurse
   3. Midwife
   4. TBA (traditional birth attendance)
e) History of maternal health during pregnancy:
   1. HTN
   2. DM
   3. Anemia
   4. Eclamsia
   5. Maternal Infection
   6. Trauma during pregnancy
   7. Fluid loss
   8. Decrease foetalmovt
   9. Fetal position
   10. Other illness
   11. H/O previous c/s
   12.Nil
f) Have you ever been treated by doctor during pregnancy?
   1) Yes
   2) No

g) Did the health care service available in your area? 1. Yes 2. No
h) Did you gain proper body weight during pregnancy?
   1) Yes
   2) No
   3) Over weight
   4) Not measure
i) Have you taken any unprescribed drug during pregnancy?
   1) Yes
   2) No
   If yes type of drug?

16) During of labor:

   1. Less than 12 hours

   2. More than 12 hours
   3. Sudden birth

17) Have you ever been treated by doctor during pregnancy?
    3) Yes
    4) No

18) Did the health care service available in your area? 1. Yes 2. No
19) Did you gain proper body weight during pregnancy?
    1. Yes
    2. No
    3. Over weight
    4. Not measure
20) Have you taken any unprescribed drug during pregnancy?
    1) Yes
    2) No
    If yes type of drug?.....

21) Any abnormality during labor

    1) Umbilical cord complication

    2) Premature rupture of membrane

    3) History of Birth injury: 1. Yes 2. No

22) History of Birth asphyxia: 1. Yes 2. No
    If yes: Minutes until baby cried:…….

23) History of post natal complication:

1. Jaundice
2. Dehydration
3. Seizure
4. Encephalopathy
5. Pneumonia
6. hyperbilrubinemia
7. Microcephaly
8. Neonatal convulsion & jaundice
9. Nil
10. Neonatal respiratory distress

24) Birth weight:

    1) 2.5-4kg
    2) 2-2.5
    3) 1.5-2
    4) 1-1.5
    5) <1 kg

25) History of mother addiction:

1.Yes 2. No ..If yes..tobacco chewing/ gul

26) Did your child get trauma before 3 years of age?
    1. Yes
    2. No

<u>Appendix 2</u>: Risk Factors of cerebral palsy among term baby attended at CRP: A case control study Questionnaire (Bengali)

১। রোগীর সনাক্ত কারী নাম্বারঃ ঃ

২। রোগীর আইডিঃ

৩। বয়সঃ

৪। লিঙ্গঃ ১) পুরুষ ২) মহিলা

৫। সেরেব্রাল পালসি: ১। হ্যাঁ ২। না

৬। বসবাসের স্থানঃ

১) গ্রাম
২) শহর

৩) মফস্বল

৭। সেরেব্রাল পালসির প্রকারভেদঃ মাংসপেশীর টোন এবং ব্রিস্তি অনুসারে----

৮) মাতার শিক্ষাগত যোগ্যতা ঃ

১। অশিক্ষিত

২। প্রাথমিক

৩। মাধ্যমিক

৪। উচ্চ মাধ্যমিক

৫। স্নাতক

৬। স্নাতকোত্তর

৭। অন্যান্য

৯) পিতার শিক্ষাগত যোগ্যতা ঃ

১। অশিক্ষিত

২। প্রাথমিক

৩। মাধ্যমিক

৪। উচ্চ মাধ্যমিক

৫। স্নাতক

৬। স্নাতকোত্তর

৭। অন্যান্য

১০) মাতার পেশাঃ

১। গৃহিণী

২। চাকুরীজীবী

৩। শিক্ষার্থী

৪। দিনমজুর

৫। অন্যান্য

১১। পিতার পেশাঃ

১। চাকুরি জীবী

২। কৃষক

৩। ব্যবসায়

৪। শিক্ষার্থী

৫। দিনমজুর

৬। অন্যান্য

১২। প্রসবকালিন সময় মাতার বয়সঃ

১। ১৮ এর কম

২। ১৯- ২৫ বছর

৩। ৩১-৩৫ বছর

৪। ৩৫ এর উরধে

১৩। জন্ম ক্রমান্বয়ঃ

১। প্রথম

২। দ্বিতিয়

৩। তৃতীয়

৪। চতুর্থ

১৪। ভাইবোন-

১। হ্যাঁ

২। না

১৫। আত্নিয় সম্পর্কে বিবাহ-/ আত্নিয়তার মধ্যে বিবাহ

১। হ্যাঁ

২। না

১৬। জন্ম ইতিহাসঃ

ক। প্রসবের ধরন-

১। যোনি পথে প্রসব

২। অস্ত্র পাচার

৩। যোনীর অপারেশন (ভ্যাকিউম/ ফোরসেফ/ অন্যযন্ত্রপাতি)

খ। যদি অস্ত্র পচার হয় তবে কেন?.....

গ। প্রসবের স্থান-

১। বাড়ি

২। হাসপাতাল

৩। ক্লিনিক

ঘ। প্রসবকালিন তত্তাবধায়ন-

১। ডাক্তার

২। নার্সে/ সেবিকা

৩। ধাত্রী

ঙ। গর্ভবস্থায় মাতার স্বাস্থ্যগত অবস্থা-

১। উচ্চ রক্তচাপ

২। বহুমূত্র রোগ

৩। রক্ত স্বল্পতা

৪। খিঁচুনি

৫। মাতৃ কালীন জীবাণু আক্রমণ

৬। পানি স্বল্পতা

৭। ফিটাল মুভমেন্ট হ্রাস/ ভ্রূণের নড়াচড়া

৮। ভ্রূণের পজিশন

৯। অন্যান্য অসুস্থতা

১০। পূর্ববর্তী অস্ত্রপচারের ইতিহাস

চ। আপনি কি গর্ভবস্থায় কোন চিকিৎসা নিয়েছেন-

১। হ্যাঁ

২। না

ছ। আপনার এলাকাই পর্যাপ্ত স্বাস্থ্য সেবা আছে কি?

১। হ্যাঁ

২। না

জ। আপনি কি গর্ভবস্থায় পর্যাপ্ত ওজন অর্জন করেছিলেন?

১। হ্যাঁ

২। না

৩। অতিরিক্ত ওজন

৪। মাপা হয়নি

ঝ। গর্ভবস্থায় আপনি কি বাবস্থাপত্র বাতিত ঔষধ খেয়েছেন?

১। হ্যাঁ

২। না

-যদি হ্যাঁ হয় তবে কোন ধরনের ঔষধ---------

ঞ। আপনার কি গর্ভ পাতের ইতিহাস আছে-

১। হ্যাঁ

২। না

১৭। প্রসবের সময়

১। ১২ ঘণ্টার কম

২। ১২ ঘণ্টার বেশি

৩। হঠাত বাচ্চা প্রসব

১৮। প্রসবের সময় অস্বাভাবিকতা

১। নাড়ীর জটিলটা

২। ঝিলীর ছিদ্র(অপরিপক্ক)

৩। জন্ম আঘাত- ১) হ্যাঁ ২) না

৪। জন্মলগ্ন অক্সিজেন স্বল্পতা-১) হ্যাঁ ২) না

যদি হ্যাঁ হয়- ক্রন্দন সময়---------

১৯। জন্ম পরবর্তী জটিলটা-

১। জন্ডিস

২। পানিশূন্যতা

৩। নবজাতকের শ্বসন জটিলটা

৪। নবজাতকের সেপসি

৫। খিঁচুনি

৬। এঙ্কেফালোপাথি

৭। নিওমোনিয়া

৮। ম্যাক্রো সেফালি

৯। হাইপারবিলির্বিনেমিয়া

২০। জন্ম ওজনঃ

১। ২.৫-৪ কেজি

২। ২-২.৫ কেজি

৩) ১.৫-২ কেজি

৪। ১-১.৫ কেজি

৫) এক কেজির কম

২১। মাতার আসক্তির ইতিহাস- ১) হ্যাঁ ২। না

যদি হ্যাঁ হয়--------

১। তামাক

২। গুল

২২। আপনার সন্তান কি ৩ বছরের আগে কোন আঘাত পেয়েছিল?

১। হ্যাঁ

২। না

Appendix 3: Verbal Inform Consent
Research Consent Form

Risk Factor of cerebral palsy among term baby attended at CRP: A case control study

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Principal Investigator: Rumi Akter

(Please read out to the participant)

Assalamualaikum / Namasker, My name is Rumi Akter, I am conducting a research project study (dissertation) as a part of my M. Sc. In Physiotherapy program under Bangladesh Health Professions Institute (BHPI). My research title is "Risk factors of cerebral palsy among term baby attended at CRP: A case control study". I would like to know about some personal and other related information regarding your child. This will take approximately 20-30 minutes.

I would like to inform you that this study is purely academic and will not be used for any other purpose. The researcher is not directly related to this cerebral palsy area, so your participation in the research will have no impact on your present or future treatment. All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that source of information remains anonymous.
Your participation in this study is voluntary and you may withdraw yourself at any time during the study without any negative consequences. You also have the right not to answer a particular question that you don't want to answer during interview.
If you have any query about the study or your right as a participant, you may contact with me or my supervisor Dr. Kamal Ahmed, Associate Professor, BHPI, CRP, Savar, Dhaka-1343.
Do you have any questions before I start?
So may I have your consent to proceed with the interview?

☐ YES

☐ NO

Signature of the participant ----------

Signature of the witness ----------

Signature of the interviewer----------

Appendix 4: মৌখিক অনুমতি পত্র

গবেষণার শিরোনাম: "পূর্ণ মেয়াদে জন্মগ্রহণ করা শিশুর সেরিব্রাল পলসির ঝুঁকিসমূহ নিরূপণ "।
(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম / নমস্কার আমার নাম রুমি আক্তার । আমি এই গবেষণাটি বাংলাদেশ হেলথ প্রফেসন্স ইন্সটিটিউট এ করছি যা ঢাকা বিশ্ববিদ্যালয় এর অধিভুক্ত । আমার গবেষণার শিরোনাম হল "পূর্ণ মেয়াদে জন্মগ্রহণ করা শিশুর সেরিব্রাল পলসির ঝুঁকিসমূহ নিরূপণ " । আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং আনুসাঙ্গিক তথ্য আপনার এবং আপনার শিশুর সম্পর্কে জানতে চাচ্ছি, যা আনুমানিক ২০-৩০ মিনিট সময় নিবে ।

আমি আপনাকে অবগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং অন্য কোন উদ্দেশে ব্যবহার হবে না । গবেষক সরাসরি এই সেরিব্রাল পলসির চিকিৎসায় সাথে সম্পর্কিত নয় । তাই এই গবেষণায় আপনার বর্তমান এবং ভবিষ্যৎ চিকিৎসায় কোন প্রভাব ফেলবে না । আপনি যেসব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনা প্রবাহে এটা নিশ্চিত করা হবে যে, এর উৎস অপ্রকাশিত থাকবে ।

এই অধ্যয়নে আপনার অংশগ্রহণ ঐচ্ছিক এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়া নিজেকে প্রত্যাহার করতে পারবেন । সাক্ষাৎকারের সময় কোন প্রশ্ন পছন্দ না হলে উত্তর না দেওয়ার অথবা না দিতে চাওয়ার অধিকারও আপনার আছে । এই অধ্যয়নে অংশগ্রহণকারী হিসেবে আপনার যদি কোন প্রশ্ন থাকে তাহলে আপনি আমার সাথে বা অধ্যাপক ডাঃ কামাল আহমেদ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩ এ যোগাযোগ করতে পারেন ।

সাক্ষাতকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এইসাক্ষাতকার শুরু করতে যাচ্ছি ।

হ্যাঁ ☐

না ☐

অংশগ্রহণকারীর সাক্ষর.....

সাক্ষাৎগ্রহণকারীর সাক্ষর..... তারিখঃ.....

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref. CRP-BHPI/IRB/08/16/13 Date: 11/8/16

Rumi Akter
Part – II, M.Sc. in Physiotherapy
Session: 2013-2014, DU Reg. No.: 1182
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal – "Risk factors of cerebral palsy among term baby attending at CRP: A case control study" by ethics committee.

Dear, Rumi Akter,

Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on August 5, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Thesis Proposal
2	Questionnaire (English and Bengali version)
3	Information sheet & consent form.

Since the study involves answering a questionnaire that takes 15 to 20 minutes, have no likelihood of any harm to the participants and have possibility of benefit patients in their diabetes management and rehabilitation from the information of their physical activity behavior, the members of the Ethics committee has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on 10th August, 2016 at BHPI.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

S.M. Ferdous Alam
Assistant Professor
Dept. of MSc in Rehabilitation Science
Member Secretary, Institutional Review Board (IRB), BHPI.

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন ঃ ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স ঃ ৭৭৪৫০৬৯
CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

Dated: 24.09.2016

To

The Head of the Physiotherapy Department,

Center for the Rehabilitation of the Paralysed (CRP)

Subject: Permission to collect data to conduct a research study.

Sir,

With due respect I, Ms. Rumi Akter am a student of final year M.Sc in Physiotherapy at Bangladesh Health Professions Institute (BHPI). In part II we have to conduct a thesis and I have chosen a title that is "Risk factors of cerebral palsy among term baby attending at CRP". I have chosen the Paediatric unit CRP Mirpur and Savar.

I therefore pray and hope that you would be kind enough to give permission to do this study successfully in your department.

Sincerely yours

Rumi Akter

Roll: 08

M.Sc in Physiotherapy

BHPI, CRP, Chapain, Savar, Dhaka

Forwarded
24/09/16

Approved
24/09/16
Mohammad Anwar Hossain
Associate Professor &
Head of Physiotherapy Dept.
CRP, Chapain, Savar, Dhaka-1343

Approved
24/09/2016