

**EFFECTIVENESS OF SPECIAL SEATING TO IMPROVE
SITTING ABILITY FOR THE CHILDREN WITH CEREBRAL
PALSY**

Umma Kulsum

Bachelor of Science in Physiotherapy (B.Sc. PT)

Session: 2006-2007

BHPI, CRP, Savar, Dhaka.



Bangladesh Health Profession Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka-1343

Bangladesh

August, 2012

We the under signed certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

**EFFECTIVENESS OF SPECIAL SEATING TO IMPROVE
SITTING ABILITY FOR THE CHILDREN WITH CEREBRAL
PALSY**

Submitted by **Umma Kulsum**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

.....
Nasirul Islam

B.Sc.PT (Hons.), MPH
Assistant professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka
Supervisor

.....
Md. Sohrab Hossain

B.Sc. PT (Hons.), Dip. Ortho. MED., MPH
Associate professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

.....
Mohammad Anwar Hossain

B.Sc. PT (Hons.), Dip. Ortho. MED., MPH
Associate professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

.....
Md. Shofiqul Islam

B.Sc. PT (Hons.), MPH
Lecturer
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

.....
Md. Obaidul Haque

B.Sc. PT (Hons.), Dip. Ortho. MED., MPH
Associate Professor & Course Coordinator
Deptment of Physiotherapy
BHPI, CRP, Savar, Dhaka

Declaration

I declare that the work presented here is my own. All source used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of the study. I would be bound to take written consent from my supervisor.

Signature:

Date:

Umma Kulsum

Bachelor of Science in Physiotherapy (B.Sc. PT)

Session: 2006-2007

BHPI, CRP, Savar, Dhaka.

Acknowledgement

I start with the name of Allah who is the most merciful and kind. With taking His all holy name I declared that this study is a great mercy of Him to me.

I am extremely grateful to my honorable and praiseworthy Supervisor Nasirul Islam, Assistant Professor, BHPI, CRP, Savar, Dhaka for his excellent guidance from the very beginning to winding up of this study. It was impossible to carry out this study without his proper direction & advice.

I would like to pay my highest gratitude to Iffat Rahman, In-charge of special seating unit for providing an immense support for collecting data for this study.

I would like to express my gratitude to Md. Shofiqul Islam lecturer of Physiotherapy department for his valuable class and guidelines, it was impossible to complete my research project without his valuable supervision. I am also indebted to Md. Obaidul Haque, Md. Sohrab Hossain and Mohammad Anwar Hossain, Associate Professor, Dept. of physiotherapy for sharing their precious knowledge that enabled me to fine-tune various aspects concerning this study.

I also pay my thanks to the library assistant Anichur Rahman and Md. Rubel dakua who helps me to find out books for collecting literature of the study & other staffs for providing resources.

I would like to thank my parents and brother who were encouraging in all my work. Lastly I would like to thank to those entire individual who are directly or indirectly involve with this study.

Abbreviations

&	And
BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council
CP	Cerebral Palsy
CRP	Center for Rehabilitation and Paralyzed
CSAS	Chailey sitting Ability Scale
DMD	Duchene Muscular Dystrophy
GBS	Guilliaine Barrie Syndrome
ICF	International Classification of Functioning
ICP	Infantile Cerebral Palsy
MDT	Multidisciplinary Team
MS	Musculoskeletal
NGO	Non Governmental Organization
PT	Physiotherapy
ROM	Range of motion
SNP	Standard Neutral Posture
SS	Special Seating
WHO	World Health Organization

CONTENTS

	Page No.
Declaration	i
Acknowledgement	ii
Abbreviations	iii
List of Tables	vi
List of Figures	vii
Abstract	viii
CHAPTER- I INTRODUCTION	
1.1 Background	1-3
1.2 Rationale	4
1.3 Aims of the study	5
1.4 Objectives of the study	5
1.4.1 General objectives	5
1.4.2 Specific objectives	5
1.5 Research question	5
1.6 List of variables	6
1.6.1 Independent variable	6
1.6.2 Dependent variable	6
1.7. Operational definition	6
CHAPTER-II LITERATURE REVIEW	7-19
CHAPTER-III METHODOLOGY	
3.1 Study design	20
3.2 Study site	20
3.3 Study population	20
3.4 Sampling procedure	21
3.5 Sampling size	21
3.6 Inclusion criteria	21

3.7	Exclusion criteria	22
3.8	Pilot study	23
3.9	Data collection tools	24
3.10	Data collection procedure	25
3.11	Data analysis	25
3.12	Ethical considerations	26
3.13	Informed consent	27
3.14	Limitation	27-28
CHAPTER-IV RESULTS		32-36
DISCUSSION-V		37-38
CHAPTER-VI CONCLUSION		39-40
REFERENCES		41-44
APPENDIX		
	Informed consent (Bangali)	45
	Informed consent (English)	46
	Questionnaire (English)	47
	Permission letter	48

List of tables

	Page No.
Table-1: Chailey sitting ability scale	24
Table-2: Presented at a glance of subject, who were used special seating more than six months for their diagnosing type of cerebral palsy who had poor sitting ability	29
Table-3: Children's pre-test score & post-test score	30
Table-4: Comparative improvement of all participant sitting ability according to Chailey sitting ability scale	31

List of figures

	Page No.
Figure-1: Comparative sitting ability	33
Figure-2: Improvement of sitting ability from level-1	34
Figure-3: Improvement of sitting ability from level-2	35
Figure-4: improvement of sitting ability from level-3	36

Abstract

The purpose of the study was explore the effectiveness of special seating to improve sitting ability for the children with cerebral palsy. *Objectives:* To evaluate the improvement of sitting ability of cerebral palsy children according to Chailey Sitting ability scale, to identify the improvement of every component of sitting ability level.

Methodology: Single group Pre- test & Post-test design was used for the study design. Total 26 children with cerebral palsy having impaired sitting ability were selected through convenience sampling for the study. The study is conducted at Special seating Unit of CRP. Chailey sitting ability scale was used to measure the cerebral palsy children's sitting ability. *Results:* Data was analyzed with a pre-test and post-test design and score is calculated by manually and Microsoft Excel worksheet 2010 according Chailey sitting ability scale and verified frequency of every sitting ability. After observing pre-test and post-test score the study found that sitting ability is significantly improved by using Special seating. According to Chailey sitting ability scale 19 children or 73% children out of 26 children are observed in level-1or unplaceable in pre-test score, but during post-test score those who have level-1, sitting ability have been improved to 4 children or 21% children in level-2, 11 or 58% in level-3, 4 or 21% in level-4. 6 children or 23% children are level-2 in pre-test score but during post-test score those who have level-2 sitting ability have been improved to 4 or 67% in level-3, 2 or 33% in level-4. 1 children or 4% children are level-3 in pre-test score, but in post-test score level-4 in that children. *Conclusion:* When using Special seating chair, statistically significant increases in cerebral palsy children's sitting ability. The researcher concluded the study with the result that special seating is effective to improve sitting ability for the children with cerebral palsy.

Key words: Cerebral palsy, Special seating, Sitting ability.

1.1 Background

The World Health Organization has defined health as “a complete state of physical, mental social and spiritual well-being, not merely the absence of disease or infirmity so that each citizens can lead an economically productive life”. The concept has more recently been extended to include health related quality of life. The World’s population, now almost 5.7 billion is growing at a record pace of more than 90 million persons a year. The United Nations Medium or most likely projection puts the world’s population at 10 billion in 2050. Some 1.1 billion people in the world live in a state of absolute poverty with income and consumption levels below nationally defined poverty level (Campbell & Notson, 1998).

Bangladesh situated in the South Asia is one of least developed countries in the world as measured in terms of average income, calories consumed per person, high infant mortality rate (Hosain et al, 2002). The rising numbers of poor and the population boom have been two major challenges facing Bangladesh. The continued stress on national resource potentials caused by increasing population will retard the poverty alleviation efforts (Kafiluddin, 2001). Over population is the major problem in Bangladesh. The literacy rate is increasing but most of the people are less aware about health.

International classification of impairment, disability, and handicap define disability the term disability is defined as “any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being” (Barbotte et al, 2001). According to World Health Organization (WHO) 10% of total population in Bangladesh are disabled (Akter & Rahman, 2006). In Bangladesh, where life is difficult for many able-bodied people, disabled people are more likely to face much greater problems in the absence of a disabled-friendly environment. They are less likely to be educated, employed, or rehabilitated. Social segregation of disabled persons is extremely widespread. As a result disability is going to be matter of concern besides all other major problems in Bangladesh. In Bangladesh every 1-minute 6 new children are born. CP is one of type

Bangladesh. In Bangladesh every 1-minute 6 new children are born. CP is one of type of motor disorder. A recent figures estimate that there are 7 CP (Cerebral palsy) child birth per 1,000,000 births. In developing countries the incidence of CP children is 2 per 1000 children (Ebrahim, 1993). Cerebral palsy is the most common condition that is responsible for the child disability. The calculation based on estimations and forecasts of the U.S. Bureau of the census, International data base indicate that in 2010 the number of patients with the infantile cerebral palsy (ICP) were increase to 17340000 people in the world (Cerebral palsy statistics, 2010). According to statistics population with cerebral palsy in USA exceeded 75000. Currently there are more than 10000 new cases occur each year. Chatterjee (1998) stated that the prevalence rate of cerebral palsy is 2-25 per 1000 children in developing country. Bangladesh has recently seen an increase in the number of children diagnosed with cerebral palsy. According to disability profile, the client assess in the shishu bikash clinic (Rural Clinic) during January to December 1999 showed a report of child disability were 42% of total disability was cerebral palsy, among these spastic 9%. Athetoid cerebral palsy is 2%, Ataxic cerebral palsy is 3% and rest of patient is other type of cerebral palsy (Khan & Rahman, 2000). Also according to data based report of CRP,s Pediatric Unit from June 2006 to July 2007 showed that types of conditions treated lead to impairment among 1178 patients, 1000 were cerebral palsy, autism 43, erbs palsy 20, down's syndrome 15 and others 86. But from July 2009 to 2011 it is shown that 91% is cerebral palsy patient and 4% is other patient. From this statistics it is clearly seen that cerebral palsy has covered a large area in the field of child disability of Bangladesh. Hinchcliff (2003) stated that the majority of children with cerebral palsy are born with abnormalities in parts of the brain that means cerebral palsy primarily characterized by central nervous system abnormalities, such as loss of selective motor control and abnormal muscle tone. As a result of growth of these primary characteristics often lead to secondary deficits, including bone deformity, muscle contracture, poor posture, sitting ability and balance. Cerebral palsy is a catchall term for a variety of disorders that affect a child's ability to move and to maintain posture, sitting ability and balance (Geralis, 1998). All type of cerebral palsy each child has been suffers poor sitting ability and sitting posture.

McClenaghan et al, (2000) stated that dysfunction of sitting ability leading to poor postural control is a key problem in children with cerebral palsy. The poor sitting

ability is largely interfere with the daily life activities of the children with cerebral palsy and hamper the development of the child into an independent individual.

Cerebral palsy is one of the most common causes of impaired sitting ability (Green, 1987). Among the population about 0.47% people have different types of disability and 16.41% of total disability are due to birth injury in cerebral palsy. Among the total disabled children about 9.5% receive family treatment, 31.2% receive treatment from doctor with degree and specialized center.

Most of cerebral palsy children are treated in different way in Bangladesh. They may treat by doctor, homeopath, traditional healer (Banerjee, 1996). But is important to treated & rehabilitee the cerebral palsy child by the pediatric physiotherapist. The pediatric physiotherapist often becomes involved with the handicapped child & his family in the early weeks or months. There is also an important role in giving parents confidence in handling their child (McCarthy, 1992). Due to brain damage in the early age of children, development stops or abnormal or disorganized functional abilities can be occurs i.e., like sitting, standing & walking problems may occur (Ryan et al, 2009). For encouraging the normal development & prevent secondary complication of CP it is very important to maintain standard neutral sitting posture for this reason in 1999 CRP developed a Special seating unit. This unit was established by Motivation Team (funded by a charitable trust in the UK). It aims to integrate CP children in their family & society. A Special Seating Service is an important service for children with physical disabilities and CRP is the only organization in Bangladesh which is providing this service. CRP started this service in December 1999. It was set up with the help of Motivation, an organization based in England. Special seating Department of CRP provides special seat for the children who are not able to seat independently without having any external support.

A special assessment is required in order to make decision about who is getting which sorts of special chair. The objectives of providing such chair are- to develop the ability of a child to seat independently, to correct postural deformity, to develop fine motor skills perform by hand, to enhance ambulation (Zollars, 1999).

This is not recent but new assistive technology unit in Bangladesh.

1.2 Rationale

Sitting ability is a vital prerequisite to the establishment of a functional sitting posture. Sitting ability is the crucial part of human being by which they performed maximum activity of daily living. In cerebral palsy large number of children has facing difficulty of sitting ability. In cerebral palsy child who have facing difficulty of sitting ability special seating helps to maximize child function, adapt limitation in life as much as possible that can facilitate independence of these child group in their activities of daily living. Sitting ability involves the control of the body's position in space in order to obtain stability and orientation so special seating also increase the child's sitting stability and postural control as a result he or she participate fully his or her education and social program which is very essential and basic needs for a child. The purpose of this study is to identify or explore the effectiveness of using special seating in improving sitting ability in cerebral palsy children. Because when sitting ability will increase that means sitting posture, head, neck and trunk control will increase and improve comfort, reduced feeding problems and decreased risk of development of pelvic pressure ulcers. From this research the researcher wishes to explore the Effectiveness of special seating to improve sitting ability for children with cerebral palsy so that their activity of daily living will perform properly and more efficiently.

1.3 Aims of the study

To find out the effectiveness of special seating to improve sitting ability for the children with cerebral palsy.

1.4 Objectives of the study

1.4.1 General objective

To explore the effectiveness of special seating to improve sitting ability for the children with cerebral palsy.

1.4.2 Specific objectives

- To evaluate the improvement of sitting ability of cerebral palsy children according to Chailey Sitting ability scale using pre-test and post-test assessment.
- To identify the improvement of every component of sitting ability level.

1.5 Research question

Is special seating is effective to improve sitting ability for the children with cerebral palsy?

1.6 List of variables

1.6.1 Independent variable

Special seating.

1.6.2 Dependent variable

Sitting ability.

1.7 Operational definition

The main key points of the research are the-Cerebral palsy, Special seating, Sitting ability, Chailey sitting ability scale.

Cerebral palsy is a term used to describe a broad spectrum of motor disability, which is non-progressive and is caused by damage to the brain at or around birth.

Special seating is any modifications to seating devices with the purpose of improving sitting ability and/or postural control in mobility-impaired individuals.

Sitting ability is a body position in which the weight of body is transferred to a supporting area mainly by ischial tuberosities of the pelvises and their surrounding soft tissues.

Or, in other word, the sitting posture is defined as one where the hips and knee are in flexed as right angles, the femora are horizontal and ankles are in plantigrade position.

Chailey sitting ability scale is developed by Chailey Rehabilitation service which provides a good indication of a child's sitting ability, balance, postural control & level of function in sitting position.

“Cerebral” means concerning the brain and “Palsy” means paralysis or inability to move, so cerebral palsy refers that it is a kind of paralysis that result from damage to the brain. 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 and joints in normal way (Behrman et al, 2000). According to Hincheliffe (2003) Cerebral palsy is a disorder of movement & posture due to a defect or lesion of immature brain.

Roxrough (1995) stated Cerebral palsy is a static encephalopathy and may be defined as a nonprogressive disorder of posture and movement, often associated with epilepsy and abnormalities of speech, vision, and intellect resulting from a defect or lesion of the developing brain.

“Cerebral palsy is a heterogeneous group of persistent disorder of movement and posture caused by non-progressive defects or lesions of immature brain, is the most common cause of childhood physical disability” (Aksu, 1990).

Cerebral palsy is a diagnostic term used to describe a group of motor syndromes from disorders of early brain development. Cerebral palsy is caused by a broad group of developmental, genetic, metabolic, ischemia, infectious, and other acquired etiologies that produce a common group of neurologic and musculoskeletal phenotypes. Cerebral palsy is the most common and chronic form of early disability that begins in childhood with a prevalence of 2/1000 (Majnemeer, 2004).

Cerebral palsy is caused by abnormal development or damage in one or more parts of the brain that control muscle tone & motor activity (Binder, 1989). The resulting impairments first appear early in life, usually in infancy or early childhood. Infants with cerebral palsy are usually slow to reach developmental milestones such as rolling over, sitting, crawling & walking (Bleck, 1987). The children with cerebral palsy usually survive in to adulthood, & the condition often poorly understood in adulthood, this is a long term condition (Marlyn et al, 2005).

Cerebral palsy (CP) is not a single condition or illness it is a broad term used to describe a group of non-progressive disorders of posture and movement (Kriger, 2006).

The majority of children with cerebral palsy are born with abnormalities in parts of the brain that control muscle movements, although it may not be detected until months or years later. The early signs of Cerebral palsy usually appear before a child reaches 3 years of age (Palisano et al, 1997).

The effects of cerebral palsy are different from individual to individual. At its mildest, CP may result in a slight awkwardness of movements or hand control. At its more severe, CP may result in virtually no muscle control profoundly affecting movement & speech (Albright, 1996). Depending on which areas of the brain have been damaged, one or more of the following may occur- muscle tightness or spasms, involuntary movement, difficulty with gross motor skills such as sitting, walking or running, difficulty with fine motor skills such as writing, or buttons, difficulty in perception & sensation (Binder, 1989). The damage that has been done to the CP child's brain can't cure. The damage cell of the brain die signals can no longer be sent to the muscle cells, this loss of muscle control results in the symptoms of CP. A number of factors can cause brain cell damage; these include lack of oxygen, infection, trauma, malnutrition, drugs or other chemicals or hemorrhage. In most cases it is impossible to discover the exact cause for any child of CP (Batshaw, 1998). Many patients can enjoy near-normal lives if their neurological problems are properly managed by physiotherapy & assistive device. There is no standard therapy that works for all patients. Instead the physician must work with a team of health care professionals first to identify a child's unique needs & impairments & then to create an individual treatment plan that addresses those (Banerjee et al, 1999).

A clinical presentation of Cerebral Palsy (CP) may result from an underlying structural abnormality of the brain, early prenatal, perinatal, or postnatal injury due to vascular insufficiency, toxins or infections; or the pathophysiologic risks of prematurity. Evidence suggests that prenatal factors result in 70-80% of cases of cerebral palsy (Forfar, 1998). Cerebral palsy is not an independent isolated disease. It includes many non-advancing movement dysfunction of nerve center type resulting

from brain injuries, when have many different causes (Kent et al, 2009). Due to damage of the brain cerebral palsy can occur early in life. Damage to the brain can occur for number of reasons. Theses include-Insufficient oxygen reaching the baby during pregnancy & birth, maternal infection during pregnancy (e.g. German measles), Mothers with thyroid abnormalities, mental retardation, or seizures, complicated labor or delivery, breech presentation, premature birth or low birth weight, blood group incompatibility between mother & baby, severe jaundice following birth (Roxborough, 1995).Until the 1980s, it was thought that most cases of CP resulted from birth trauma. It is now clear, however, that only a small fraction result from this cause (Nelson & Ellenberg, 1982). Prematurity & problems during intrauterine development account for the majority of known causes of CP (Mulchay et al, 1988). Epidemiological studies suggest that children who develop CP unrelated to post-natal infection or trauma tend to fall into one of two groups based on the circumstances of pregnancy & birth. The first group includes those born prematurely. Although the overall prevalence of CP has remained fairly constant for many years at 1.4-2.4per, 1,000 (Hagberg & Olow, 1993). The proportion of former premature infants among all children with CP have steadily increased to 40%-50% since the 1970s (Edger, 2001). As of 1997, this trend seems to be leveling off. Infants with birth weights of less than 1,500 grams are especially vulnerable, although it should be emphasized that the vast majority of low birth weight infants do not develop CP (Frankenburg et al, 1996).

Cerebral palsy may be classified by a description of the motor handicap in terms of physiologic, topographic, and etiologic categories and functional capacity. The physiologic classification identifies the major motor abnormality, whereas the topographic taxonomy indicates the involved extremities. CP is also commonly associated with a spectrum of developmental disabilities, including mental retardation, epilepsy, and visual, hearing, speech, cognitive, and behavioral abnormalities.

Functional classification-

Class1- no limitation of activity.

Class2- slight to moderate limitation.

Class3- moderate to great limitation.

Class4- no useful physical activity.

Cerebral palsy is an umbrella- term used to describe a group of group of chronic disorders impairing control of movement that appear in the first few years of life and generally do not worsen over time. Due to this condition there has not existing cause (Rosenbum, 2003).

Cerebral Palsy is often classified to the type of motor impairment (Blair & Stanley, 1985) cerebral palsy is classified into four categories according to type of disturbance in movement- Spastic cerebral palsy- is the most common type; about 70 to 80 percent of affected individuals have spastic cerebral palsy, in which muscles are stiff, making movement difficult. It is further categorized according to the distribution of limbs involve.

In spastic Hemiplegia- One side of the body is more affected than the other; usually, the arm is more affected than the leg. Because the motor neurons that control one side of the body are located in the opposite cerebral cortex, a right side Hemiplegia implies damage to or dysfunction of the left side of the brain (Brody, 2005).

When both legs are affected (spastic Diplegia), a child may have difficulty walking because tight muscles in the hips and legs cause legs to turn inward and cross at the knees (called scissoring) (Dietz, 1995).

Most severe is spastic quadriplegia, in which all four limbs and the trunk are affected, often along with the muscles controlling the mouth and tongue. Children with spastic quadriplegia often have mental retardation and other problems. (Paneth et al, 2006).

Athetoid cerebral palsy- about 10 to 20 percent of affected individuals have the athetoid form, which affects the entire body. It is characterized by fluctuations in muscle tone (varying from too tight to too loose) and sometimes is associated with uncontrolled movements (which can be slow and writhing or rapid and jerky). Children often have trouble learning to control their bodies well enough to sit and walk. Because muscles of the face and tongue can be affected, there can also be difficulties with sucking, swallowing and speech (Pabon & Piper, 1987).

Ataxic cerebral palsy- about 5 to 10 percent of affected individuals has the ataxic form, which affects balance and coordination. They may walk with an unsteady gait with feet far apart, and have difficulty with motions that require precise coordination, such as writing.

Mixed cerebral palsy- the term mixed cerebral palsy is used when more than one type of motor pattern is present & should be used only when one pattern does not clearly predominate over another. The term total body cerebral palsy is sometimes used to emphasize that certain types of cerebral palsy (dyskinetic, ataxic, mixed & spastic quadriplegia) involve the entire musculoskeletal system to a greater or lesser degree; other forms of spastic cerebral palsy (Diplegia, Hemiplegia) are localized to particular regions of the body. The terms pyramidal (i.e., spastic) & dyskinetic (i.e., nonspastic) cerebral palsy also are often applied, “pyramidal” implying abnormalities in the brain pathways originating in the cerebral gray matter, called the corticospinal (pyramidal) pathways (Werner, 1998).

According to degree of severity of cerebral palsy Forfar (1998) has described the following types of cerebral palsy- Mild CP- affects 20% children among total affected of cerebral palsy. Independent living, sitting, walking, intelligence ≥ 70 . Which means who are ambulatory. Spastic hemiplegic, diplegic and ataxia type of CP.

Moderate- affects 50% children among total affected of cerebral palsy. Spastic hemiplegic, diplegic and ataxia type of CP. Who requires self-help for assisting their impaired ambulation capacity may be treated at out patient level.

Severe- affects 30% children among total affected of cerebral palsy. Who completely in cap-cited and bed-ridden and custodial. Spastic hemiplegic, diplegic and ataxia type of CP and totally dependent, poor sitting ability and ≤ 50 .

Prognosis is most simply defined in terms of longevity. Most children with CP will live to adulthood; their projected life expectancy is somewhat less than that of the general population (Crichton et al, 1995). According to Ryan et al, (2009) prognosis may also be defined in terms of functional outcome & ability to participate in a variety of societal settings. The prognosis varies for each type of cerebral palsy. A

child with a mild left Hemiplegia probably will have a typical life expectancy, while a child with spastic quadriplegia may not live beyond age 40. If a children with cerebral palsy early diagnosed properly and assessing properly for her varying motor problem and getting proper treatment and assistive device he or she can lead a purposeful life. Sitting position is the relative orientation of the body parts. The best seating posture imposes the least postural stress on body. Muscles of the body work to provide counter force against the gravity and other forces as the body stands or moves through space. Postural strains provide adverse effect consequences of more than a few minutes of postural stress (Sheridan, 1980).

Biomechanics of sitting position depends on posture & total body weight is transferred to the floor proportionally via the seat pan & feet, armrests & backrests. Lumber region- is normally lordotic (concave, toward the stomach). This reduces the pressure between the vertebrae (Frankel, 1989). The region is normally lordotic for two reasons- the first one is thickness of vertebrae & discs are thicker anteriorly than posteriorly (Graff, 1997). Second is sacrum upper surface is at an angle to the horizontal plane. Pelvis- the sacrum is fixed to the pelvis, so rotational movement of the pelvis affects lumber vertebrae. Forward rotation of the pelvis leads to increased lordosis of the lumber spine, helping to maintain an upright trunk position.

Normal motor developments of Childs are- In 0-3 months- babies cannot assume posture & sit unsupported, head lag when pulled to sitting position & uncontrolled with a totally flexed posture when held in the sitting position decrease of flexion & development of vertical head control (Illingworth, 1987). In 3-6 months- babies cannot assume posture & sit unsupported can keep head up when held in a sitting position. In 6-9 months- can assumes posture from prone & sits unsupported. In 9-12 months- can assumes posture from supine, sits unsupported & pivots or turns body to play & in varies position, have good equilibrium reactions (Banerjee, 1996).

Hypo tonus children show a flexing sitting posture as a result of the lack of extensor tone against gravity. The trunk will fall forward due to gravity with the same time the head hanging back to compensate. In hypotonic children can show an excessive extension of the trunk & leg with planter flexion of the feet. Shows

a posture of leaning forward compensates the lack of pelvic control with widely abducted hips. Sometime they may demonstrate a compensatory flexion. To compensate for the strong extension pattern of the lower limbs the child flex of upper trunk, shoulder girdle & the arms (Vereecken, 1996). Sitting is the most functional position, which provides the pelvic stability to do something, rest and to communicate. All children develop socially by meeting other people. Initially, they are mainly with their mother & close family members. Later they become aware of other people & make friends. This is equally important for the child with CP. Sitting is the best position of human being in which they can communicate to other & can do any things easily. The main reasons that people sits are- to gain stability so that they can do things (such as eat, write). To relaxed, to socialize or to be part of a social group. Sitting is very useful position. Sitting-allows vertical orientation of head & trunk, is less works for the legs, is dynamic- people change positions often while sitting. Provides a stable base from which people can use their hands. Sitting up with good posture also- Helps children to breath more easily, to develop the strength in their bodies, to feel good about themselves (Zollars, 1999). The child with cerebral palsy who have poor sitting ability or child with motor disability needs to be maintained in a variety of position throughout day by external support these should aim to encourage motor control and prevent incorrect pattern of movement (McCarthy, 1992). A correct sitting posture is vital for that type of child. So they need supportive seating which provide external support for sitting which called special seating. Any modifications to seating devices with the purpose of improving sitting posture and/or postural control in mobility-impaired individuals (Assistive Technology Resources, 2004). Positioning and seating are important for cerebral palsy children with severe sitting ability problem (Reid, 1996). Special seat is kind of seat, which provide external support that is needed. Many children and adults with cerebral palsy and other physical disabilities are unable to sit without external support, or without a lot of concern or effort. These people need a special seat that provides more postural support than is provided by a standard chair or wheel chair. A special seat may or may not have wheels. Sitting is a crucial part of every child's normal development. But the child, who cannot sit and always be in a lying position, can observe nothing but only the ceiling that makes limitation to earn knowledge. That is why special seat helps those who are unable to sit (Zollars, 1999). But the parents helping the child to sit will not to provide the amount of the support according to the child's needs. A special seat

can help the child by giving proper support. When the child's can sit better, they will be able to play better and learn more.

Special seating plays an important role in sitting position which is the vital part of normal development- for children who cannot sit independently, Special seating is essential to prevent their physical disability from slowing the development of other skills.

Reid (1996) stated Sitting helps to maintain health & can prevent the development of secondary disabilities-Children who spend a lot of time lying in one position, or sitting in a poor position, may begin to develop secondary disabilities. Secondary disabilities may be muscle contractures & or postural deformities. Muscle contractures are muscles that have become tight & too short to allow full movement of a joint or limb. For example, muscle contractures may prevent a child from being able to fully straighten their arm, or to straighten their leg. Postural abnormalities are abnormal postures that have become fixed. The child is forced to always sit or lie in that position. For example, some children always sit slumped to one side for children with CP, these problems are caused by a combination of- Abnormal muscle tone. Lack of movement of the child's muscle & joint. The child sits or lies in poor positions repeatedly. The development of postural deformities can be slowed down or prevented by-Making sure the child's muscles & joints have regular exercise & massage to keep them supple, Encouraging good posture during the day & night when the child is lying, sitting & standing (if they can stand).Special seating provides stability for children to function- In normal development sitting ability is developed naturally, people do not think about controlling their posture & their movements. For children with CP & for some children with other physical disabilities, sitting may be much harder. The child may have to work very hard to be able to sit. They may not be able to do anything else at the same time. For these children the support of a chair can help to control their sitting posture which will help them to concentrate on other activities. For example- Fine motor skills- Special seating can help children to be Stable for activities which need fine motor skills & Mobility- for those children who have the ability to push, Special seating in their wheelchair helps to stabilize their body so that they can propel with the maximum efficiency. Even for those children who cannot push themselves, a supportive seat will help them to maintain their

position as their wheelchair is pushed along. This way they will be more able to see & experience the world around them as they move (Zollars, 1999).

Finnie (1997) state that in children with various types of cerebral palsy their bony changes may not occur as normal with growth because of their increasing, decreasing or fluctuating tone and delay or failure to accept weight through the joint as a result children have developed difficulty of sitting ability. In children with cerebral palsy who use one position for long time due to their poor sitting ability they have developed abnormal sitting posture and balance. For these types of cerebral palsy child needs special seating helps to maintain standard neutral posture, which allow the body to maintain normal alignment.

The standard neutral posture is-

- Pelvis upright & level or slightly tilted forward.
- Trunk upright, with the back following its natural curves.
- Hips flexed to 90 degrees & slightly abducted, with thighs separated (5-8 degrees from midline).
- Knees & ankle flexed 90 degrees.
- Feet resting flat on the floor (or foot support).
- Knees directly above the heels.
- Shoulders relaxed arms free to move & function

Everyone has a slightly different posture. There is however a standard neutral posture that is a reference point for special seating. (Zollars, 1999). A description of terms used for special seating such as posture- refers to where in space something is placed. For example the position of the Children in the seating unit in relation to the wheels. Position- refers to how body parts of a child or adult are aligned or arranged.

Difficulty of sitting ability the children with cerebral palsy who require special seating, the special seating must have appropriate design that is valuably useful the children's sitting ability so that the special seating are easily available for their sitting

ability problem. The special seat must- use current clinically approved special seating techniques, be completely safe for the user & helper, be of simple construction, keep production cost to a minimum, Use locally available materials & technologies,

Provide mobility, Emphasize the child before the equipment & be aesthetically pleasing.

A special seating team including a therapist & an engineer runs CRP special seating service. This team provides a full assessment, prescription, fitting & follow up service for children who need special seating. The team also provides parents & children with training on how to use special seating & how to look after it. Every child with a disability is different & will need a special seat or wheelchair, which has been adjusted to fit them correctly. The special seating service has three chairs that provide supportive seating which can be individually adjusted & modified for each child by CRP's special seating team. All of the special seats have a tray & have some room for growth. There are three types of special chair are given namely Mukta G1, Mukti G2, Meghna G3 depending on the condition of the children. CRP special seating Department has provided 1150 no. of chairs and contributing a lot to overcome childhood disability from 2000.

The mukta is designed for children who are still small enough to be easily carried. The chair provides good postural support & is suitable for use inside or outside the home or school. Features include- Active & resting tilt options, sits low on the ground for children to play with other children their age, light weight & portable.

The Mukti is designed for larger children & is designed to encourage children who can push themselves to be independently mobile. The meghna special is designed for teenagers & young adults. Features for both include- quick release 26"/28" rear wheels, adjustable rear wheel position, wide front wheels to go over rough ground, sand & mud. All the special seats were designed by British NGO Motivation & are produced at CRP using locally available materials & technology.

Approaches to special seating are sometimes divided into two categories. These are- posture accommodation, postural stabilization. The aim of postural accommodation is to- provide comfort, to protect the child from harm, to help slow down further development of postural deformity, to maintain the child's maximum functional ability.

Postural component of special seating- There are different parts of special seating that provide postural support. For example-Lateral pad, Head rest, Seat, Foot rest. These are all postural components of a special seating unit.

The services sequences of special seating unit are as follows-

- Patient Referral (Outpatient & Inpatient)
- Screening.
- Assessment.
- Prescription for special seat
- Assembling a seat
- Fitting
- Parents / Career training
- Six months Follow-up.

Assessment team of special seating- before providing special seating it is necessary to assess the child's condition because every CP children is different to another so their needs depend on their condition. To assess the child in other countries use a multidisciplinary team (MDT) approach which included- The child & their family, special seating therapist, special seating engineer, doctor, child's treating therapists child's teacher, ayah.

However CRP special seating department assess the child by involve one team which includes a reduced number of members the clients, parents or care giver, special seating therapist, engineer and technician.

Chailey Heritage is a residential school & assessment centre in the South of England which specializes in the treatment of children with cerebral palsy. Chailey Rehabilitation service has developed a scale of sitting ability levels which provide a good indication of a child's sitting ability, balance, postural control & level of function in sitting.

The levels are-

Sitting ability level 1

Even if the child cannot be placed in a sitting posture, this is still recorded as a positive level of ability because it defines a major need for treatment and postural support. At this ability

Level 2 a child cannot achieve or maintain a sitting posture that is he cannot anchor his pelvis or dissociate the movement of his trunk from his lower body. Prescriptive seating is required to provide postural fixation, especially stabilization of the pelvis. The biomechanical principles described above will achieve this.

Level 2- Placeable not able to maintain. The child can be placed in a sitting position in a sitting position but needs holding to stay in position. At best, the child can balance for a brief moment.

Level 3- Able to Maintain position, but not to move. The child can just keep his/her balance in a sitting position, as long as he/she does not move.

Level 4- Able to Maintain position, & move within base. The child can sit independently- once placed in a sitting position. He can Move his trunk forward over his sitting base-but cannot recover his Balance after reaching to one side.

Level 5- able to maintain position & move outside base.

Level 6- able to move outside of position.

Level 7- able to attain position (Zollars, 1999).

Children with cerebral palsy presents various kinds of problems, some children cannot sit without external support, some children can sit by themselves but they have to hold into something, some cannot maintain proper positioning which affect their functional performance (Roxborough, 1995). With these kinds of problems a basic wheelchair is not useful for the child. Thus physical therapists routinely prescribe special seating devices for them to promote their sitting balance, function and improve their developmental capabilities (Stavness, 2006). For that reason special seating clinics have appeared in rehabilitation facilities throughout Bangladesh by Centre for the

Rehabilitation of the Paralyzed (CRP) in collaboration with a British Non-government Organization (NGO) called Motivation. Special seating can be an important Rehabilitation technology if it helps a disabled child to sit in amore self controlled, more comfortable position, or if it enables to do more things or learn new skills (Chung et al, 2008).

Before providing special seat, team assesses the child in various areas and different sitting ability according to Chailey sitting scale. According to motivation assessment form there are various area including- general information, home environment, general health issues, child's abilities range of motion (trunk mobility, pelvic mobility, hop mobility, knee mobility, ankle mobility).

Postural assessment – level of sitting ability, there is widely used scale for measuring child's sitting ability that is Chaiely sitting abilities.

This research was a quantitative evaluation of the Special seating to improve sitting ability among cerebral palsy children. To identify the effectiveness of Special seating device, Chailey sitting ability scale was used as measurement tools for measuring the sitting ability.

3.1 Study design

Single group Pre- test & Post-test design was used for the study design; aims to find out the effectiveness of Special seating to improve sitting ability for the children with cerebral palsy.

Quantitative research was chosen by the researcher because it allowed the researcher to measure and counts the outcome. Here it was used the single group under the pre-test & post-test design because here the one group of patient was tested under one condition, improvement of sitting ability before (pre-test score) and after (post-test score) using Special seating. Thus two scores were compared to see if there were any differences between them. Before using Special seating the single group subjects sitting ability level was acts as pre-test score & after using Special seating children sitting ability level was acts as post-test score.

3.2 Study site

The researcher is a 4th year BSc in physiotherapy student of Bangladesh Health Professions Institute (BHPI) and the research was conducted as part of the course curriculum. For this reason the researcher had to collect data within short time to maintain the contrasts of the course module time. So Special seating Unit was chosen as the venue to collect data. Besides this in CRP patient come from all sectors of Bangladesh from all economical conditions so it reflexed the entire population.

3.3 Study population

The study populations were children diagnosed with Cerebral palsy and taken special for their impaired sitting ability and used for 6 month or more time.

3.4 Sampling procedure

A total twenty-six (26) samples with cerebral palsy children are selected conveniently as sample group. The samples are the children with cerebral palsy who were taken special seating for impaired their sitting ability and special seat used for minimum 6 month and regularly come their parent's special seating department for their follow-up. Convenience sampling, also referred to as accidental, volunteer, or opportunistic sampling, which involves the enrollment of available subjects as they enter the study until the desired sample size is reached. The investigator establishes inclusion and exclusion criteria and selects those individuals who fit these factors and volunteer to participate in the study.

The samples have been collected on the basis of some inclusion and exclusion criteria. Samples are collected by convenience sampling. In convenience sampling participants are chosen which can be studied more easily, cheaply, or quickly.

3.5 Sample size

26 participants with cerebral palsy were selected. The sample size (26) was selected due to limited time. The study has its own limitation constructed by limited limited time scale and as a result by the sample size.

3.6 Inclusion criteria

- Children's are selected for these studies that are properly diagnosed with cerebral palsy.
- Age range between 2-10 years, because before 2 years old less child come to have special seat, and after 10 years old with the children with cerebral palsy could have other complications that's why age range is specified.
- Both male and female are selected.
- Children who have poor sitting ability as defined by clinical therapist in special seating unit.
- Who have using clinically prescribed special seating for at least six months or more. Because without sufficient time sitting ability is not improve.
- Children are who use three group of special seating. Because sitting ability can improve in 3 group of Special seating.

- Those whose parents voluntarily agreed to participate in this research study.

3.7 Exclusion criteria

- Children with undiagnosed and other type of disability. Because if undiagnosed child will present in this study then other conditions child may mix up and influenced the study.
- Children whose ages are out of the age range 2-10 years.
- Children with cognitive and learning difficulties, as they might not be able to follow instructions.
- Children whose parents do not follow the rules of special seating using.
- Parents who do not regularly attend their child in follow up schedule.
- Children with severe complications.

3.8 Pilot study

Before the researcher could undertake final study, the researcher performed a pilot study because this helped the researcher to refine the data collection plan. The aim of this study was to find out the way to do this research, for example, selecting the type of cerebral palsy who mainly use the special seat, type of special seat that have been used, and the appropriate use of measurement tools. Researcher selected two weeks for pilot study and visited the special seat Unit of CRP and consulted with the relevant physiotherapist to identify the type of cerebral palsy children, the type of special seat which are most use in case CP children. After finishing the pilot study the researcher informed that all type of cerebral palsy children mostly use the special seat and 3 types of special seat is mostly prescribed by the physiotherapist. The importance of pilot study is the efficiency, validity and effectiveness of the intervention can be the evaluated.

3.9 Data collection tools

3.9.1 Chailey sitting ability scale

Level 1- Unplaceable	The child wriggles & slides on the assessment box, they can not be placed in a sitting position.
Level 2- Placeable not able to maintain	The child can be placed in a sitting position in a sitting position but needs holding to stay in position. At best, the child can balance for a brief moment.
Level 3- Able to Maintain position, But not to move	The child can just keep his/her balance in a sitting position, as long as he/she does not move.
Level 4- Able to Maintain position, & move within base	The child can sit independently- once placed in a sitting position. He can Move his trunk forward over his sitting base-but cannot recover his Balance after reaching to one side.
Level 5- Able to Maintain position, & move outside base	The child can sit independently & can use either hand freely to the side Of his body & can recover balance after leaning or falling to either side.
Level 6- Able to Move out of position	The child can sit independently & can transfer weight across the surface Of a sat but cannot regain a correct sitting position.
Level7-Able to attain position	The child can regain his sitting position after moving out of it.

Table-1 Chailey sitting ability Scale

3.9.2 Siting box

A sitting box was used to measure the children sitting ability. There are two boxes used by the researcher that had a seat with adjustable footrest. One of the box had 35 cm height & 30 cm seat depth that is used for bigger children and another for small children had 20 cm height with 15 cm seat depth.

3.10 Data collection procedure

Researcher formatted an assessment form for assessing the cerebral palsy children sitting ability according to Chailey sitting ability scale. Data collection was completed in two part one part was recorded information and pre-test score of children sitting ability second part was measurement or evaluate the post-test score according Chailey sitting ability scale. Pre-test score was not evaluated by researcher; pre-test score was measured by physiotherapist. The researcher did not give the Special seating device to the children. It was given by the physiotherapist.

3.11 Data analysis

In order to ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words the researcher has to make sense of the results. As the result came from an experiment in this research, data analysis was done with the statistical analysis. Statistical was concerned with the organization and interpretation of data according to well-defined, systemic and mathematical procedures and rules.

Data was analyzed with a pre-test and post-test design and score is calculated by statistically and Microsoft Excel worksheet 2010 was used to decorate the data by bar according Chailey sitting ability scale and verified frequency of every sitting ability. After observing pre-test and post-test score the study found that sitting ability is significantly improved by using Special seating. 27

3.12 Ethical considerations

The ethical guideline of WHO and BMRC was strictly followed. The research proposal was submitted to the ethical review committee of Bangladesh Health Professions Institute (BHPI) for approval and to CRP's ethical committee for getting permission for data collection. After the proposal was approved to carry on with the study the researcher had moved the study. Then the researcher has to collect the approval to carry out with the study from In-charge of Special seating Unit of CRP. To intervention of the participant, researcher took permission from participant's career, before that every participant's career were informed about the aim and objective of the study. The researcher has ensured the confidentiality of all participants like, it was ensured that, the actual name of participants will be hidden from others. Anonymity was ensured throughout, with the use of identification numbers for each participant (such as S-1, S-2.....). The major ethical concerns for the participant's career include loss of confidentiality and psychological distress due to the potentially sensitive nature of topic. It was being explained to all the participants that their personal identity will be kept confidential, their name and address would not be written except, for social number or a pseudonym. All the data was keep in a secured place. Only principle investigator had the access of that information. It was also explained that there would be no potential or any other risk to them resulting from participation in the research. The researcher was explained about participant's right to them. The raw data destroyed after the completion of the research and all the data on computer file were deleted. Considering all those ethical norms and values no ethical problems arise as there were some personal and sensitive questions. No compensation was provided for participating in this study. Verbal informed consent was taken under the conditions of confidentiality and voluntary withdrawal without consequence. Finally the study was reviewed and approved by the authorities.

3.13 Informed consent

The carers of the participant were informed verbally about the title, aims and purpose of the research project. They have received a clear description of the study and aware that the research is the part of the study process; they would take part as volunteer. Before participating in the study the researcher had provided them a written consent form to sign, responsible physiotherapist sign as a witness. The researcher had also signed in the consent form. The carer of the participant informed clearly that their information might be published but their personal identity would be kept confidential. In addition it was explained that there would be no direct benefit as a participant in the study but there might be some changes in service delivery system of physiotherapy & using of Special seating to the cerebral palsy children, which might be helpful for their children future. The carers of the participants were informed that they have the right to withdraw consent and discontinue participation at any time without any prejudice.

3.14 Limitations

There are some limitations in the study which was not possible to overcome, it was necessary to design the study within the situation. The limitations were-

- The amount of participants was very small in relation to other quantitative study because the researcher strictly followed the inclusion and exclusion criteria. There were only 26 participants involved in this study. Small number of samples inclusion may be affected the external validity of the study and the results might not be representative of the population.
- There were no available researches done in this area in Bangladesh. As a result, relevant information about impaired sitting ability in cerebral palsy children & Special seating is very limited. Time was limited & this had a great deal of impact for the study with special seating for the children with cerebral palsy.
- It is only the research ever in this field of practice of Physiotherapist in BHPI, CRP so local resources about documentation were not available for comparison.

- Although some international literatures were found in this field on the internet accessing this study was not always possible for comparison with the findings of this study.
- Time & resources were limited which have a great deal of impact on the study.
- The study was only conducted among cerebral palsy children at special seating unit at Center for the rehabilitation of the paralyzed.
- Special seating improved the sitting ability of cerebral palsy children, on the other hand cerebral palsy children who uses Special seating they also can taken Physiotherapy treatment, physiotherapy treatment can interfere the sitting ability, so this is one of my study limitation.
- The latest recent literature especially the recently issued journals were not accessible. So some of the latest information was not able to be included in the literature part.

Table-2 Presented at a glance of subject, who were used special seating more than six months for their diagnosing type of cerebral palsy who had poor sitting ability-

Children No.	Age (years)	Sex	Duration of using special seating	Type of cerebral palsy
1.	8	Male	2 years	Spastic type of CP
2.	2	M	1.5 years	Spastic quadriplegic type of CP
3.	9	F	2 years	Athetoid type of CP
4.	3	M	9 month	Spastic quadriplegic type of CP
5.	2	M	1.5 years	Spastic quadriplegic type of CP
6.	2	M	7 month	Athetoid type of CP
7.	3	M	1 years	Spastic quadriplegic type of CP
8.	5	M	1.5years	Spastic quadriplegic type of CP
9.	8	F	1 year	Athetoid type of CP
10.	3	M	1 year	Spastic type of CP
11.	4	F	2 year	Spastic type of CP
12.	6	M	2 year	Athetoid type of CP
13	9	M	3 year	Spastic quadriplegic type of CP
14	2	M	3 year	Athetoid type of CP
15	7	M	2 year	Spastic quadriplegic type of CP
16	7	F	2 year	Spastic quadriplegic type of CP
17	4	M	2 year	Spastic type of CP
18	3	F	7 year	Spastic type of CP
19	6	M	7 month	Athetoid type of CP
20	4	F	1 year	Spastic type of CP
21	6	F	2 year	Athetoid type of CP
22	9	M	1 year	Spastic type CP
23	4	F	1 year	Athetoid type of CP
24	7	F	2 year	Spastic type of CP
25	4	M	2 year	Athetoid type of CP
26	6	F	1 year	Athetoid type of CP

Table-3 children's pre-test score & post-test score

Children no:	Pre-test score (A)	Post-test score (B)
1	3	4
2	2	3
3	2	4
4	2	3
5	2	3
6	1	2
7	1	2
8	1	3
9	1	4
10	1	2
11	1	3
12	1	4
13	1	3
14	1	3
15	1	3
16	1	4
17	1	3
18	1	3
19	1	3
20	1	4
21	1	3
22	2	3
23	1	2
24	1	3
25	2	4
26	1	3

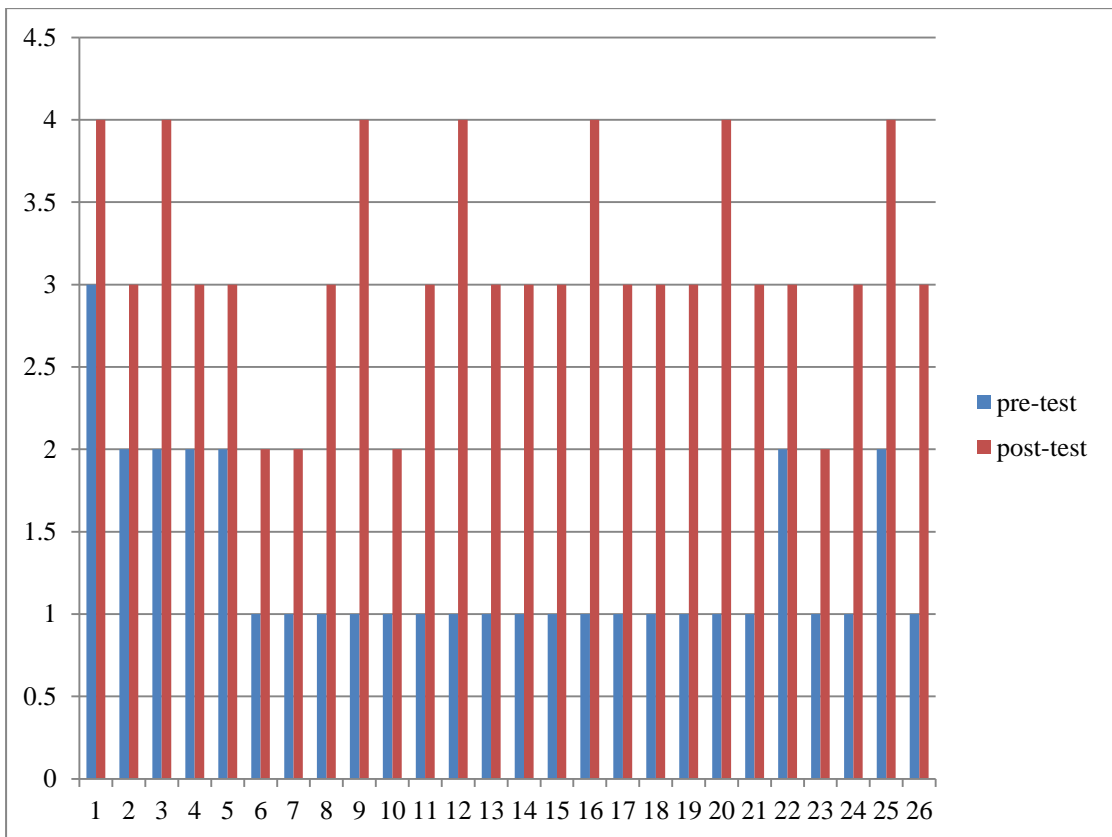
According to Chailey sitting ability scale 19 children or 73% children out of 26 children are observed in level-1 or unplaceable in pre-test score, but during post-test score those who have level-1, sitting ability have been improved to 4 children or 21% children in level-2, 11 or 58% in level-3, 4 or 21% in level-4. 6 children or 23% children are level-2 in pre-test score but during post-test score those who have level-2 sitting ability have been improved to 4 or 67% in level-3, 2 or 33% in level-4. 1 children or 4% children are level-3 in pre-test score, but in post-test score level-4 in that children.

Pre-test & post-test score are showing that special seating is effective to improve sitting ability for the children with cerebral palsy.

Table-4: Improvement of all participants sitting ability according to Chailey sitting ability scale

	Scale Ranking				Total Number of participants
	Level-1	Level-2	Level-3	Level-4	
Sitting ability scale	Unplaceable	Placeable Not able To maintain	Able to Maintain Position, But not To move	Able to Maintain Position,& move Within base	26
Sitting ability					
Pre-test score	19 person (73%)	6person (23%)	1 person (4%)	0 person	
Post-test score	0 person	4 person (17%)	15 person (57%)	7 person (27%)	

Comparative sitting ability



The graph showing the changes of sitting ability of children before and after using special seating.

Figure-1: Comparative sitting ability

4.2 Improvement of sitting ability from level-1

According to Chailey sitting ability scale 19 children or 73% children out of 26 children are observed in level-1 or unplaceable in pre-test score, but during post-test score those who have level-1, sitting ability have been improved to 4 children or 21% children in level-2, 11 or 58% in level-3, 4 or 21% in level-4.

	Scale ranking				Total number of participants
Sitting ability scale	Level -1	Level -2	Level -3	Level-4	26
Sitting ability					
Pre-test score	19 person (73%)				
Post-test score		4 person (21%)	11 person (58%)	4 person (21%)	

Table-5: Improvement of sitting ability from level-1

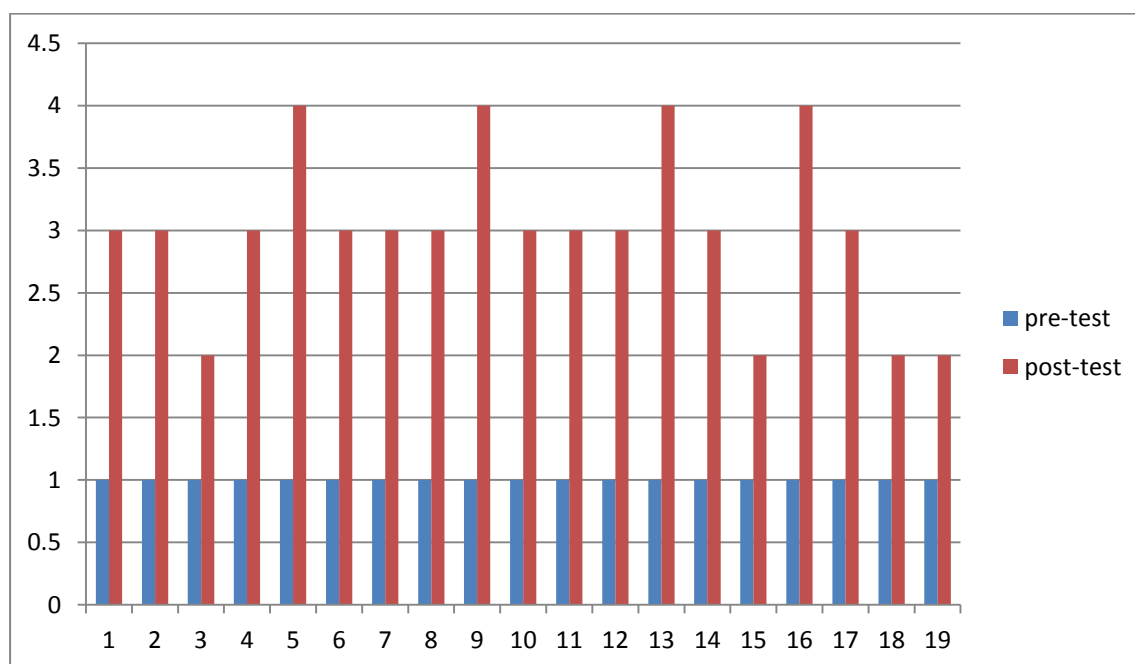


Figure-2: Improvement of sitting ability from level-1

4.3 Improvement of sitting ability from level-2

6 children or 23% children are level-2 in pre-test score but during post-test score those who have level-2 sitting ability have been improved to 4 or 67% in level-3, 2 or 33% in level-4

Sitting ability scale	Scale ranking			Total Number of participants
	Level -2	Level -3	Level -4	
Sitting ability				26
Pre-test score	6 person (23%)			
Post-test score		4 person (67%)	2 person (33%)	

Table-6: Improvement of sitting ability from level-2

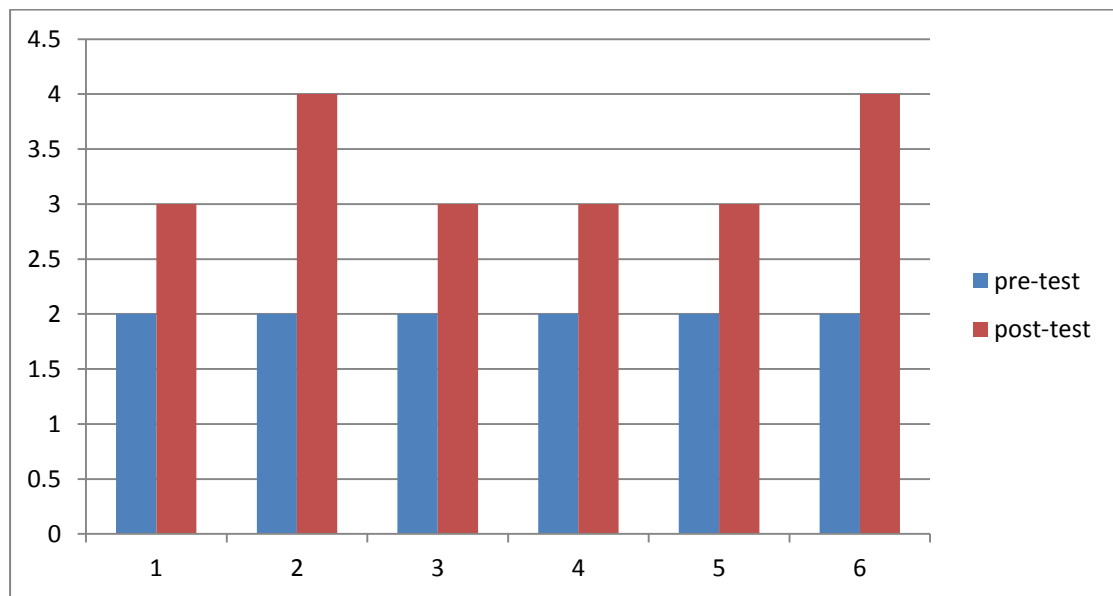


Figure-3: Improvement of sitting ability from level-2

4.4 Improvement of sitting ability from level-3

1 children or 4% children are level-3 in pre-test score, but in post-test score level-4 in that children

	Scale ranking		Total number of participants
	Level -3	Level -4	
Sitting ability scale			26
Sitting ability			
Pre-test score	1 person (4%)		
Post-test score		1 person (100%)	

Table-7: Improvement of sitting ability from level-3

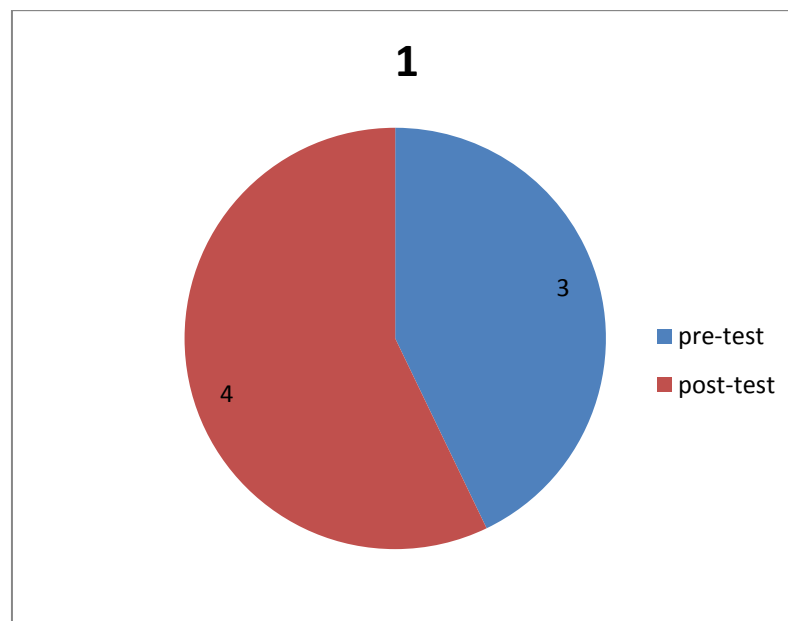


Figure-4: Improvement of sitting ability from level-3

The study was indicated a process that could be continuing to establish the result. The purpose of this study is to evaluate the effect of special seating to improve sitting ability among cerebral palsy children. To determine this, the researcher observed pre-test & post-test score in Chailey sitting ability Scale among those children who were using Special seating.

The researcher found a statistical significant improvement in sitting ability for the children with cerebral palsy. The researcher observed 26 children's sitting ability level by following Chailey sitting ability scale before and after using Special seating. Their age range is 2-9 they have used 3 types of special seat more than 6 months & they have impaired sitting ability.

According to Chailey sitting ability scale 19 children or 73% children out of 26 children are observed in level-1 or unplaceable in pre-test score, but during post-test score those who have level-1, sitting ability have been improved to 4 children or 21% children to level-2, 11 or 58% to level-3, 4 or 21% to level-4.

Sitting ability level 1 means the children cannot be placed in a sitting posture; this is still recorded as a positive level of ability because it defines a major need for special seating and postural support. At this ability level a child cannot achieve or maintain a sitting posture that is he or she cannot anchor his pelvis or dissociate the movement of his or her trunk from his lower body. In this case Special seating is required to provide postural fixation, especially stabilization of the pelvis. In Special seating chair cerebral palsy children introduced to upright position which reduce the de-stabilizing effect of a posteriorly tilted posture. If the child remains at this low level of ability, he or she will become increasingly difficult to handle particularly as he approaches adolescence. When increased tone and primitive reflexes compound the postural instability in the tilted position, the child may become "unmanageable". It is therefore important that the child experiences frequent handling and changes of position if he is going to be able to improve his sitting ability. Posture is dynamic, and consideration of alternative ways of introducing upright posture with symmetrical weight bearing

should be undertaken. In Level 2- children is placeable but not able to maintain the child can be placed in a sitting position in a sitting position but needs holding to stay in position. At best, the child can balance for a brief moment. In level 3- children able to maintain position but not move, the child can just keep his/her balance in a sitting position, as long as he/she does not move. In level 4- able to maintain position, & move within base, the child can sit independently- once placed in a sitting position. He can move his trunk forward over his sitting base-but cannot recover his balance after reaching to one side.

6 children or 23% children are level-2 in pre-test score but during post-test score those who have level-2 sitting ability have been improved to 4 or 67% in level-3, 2 or 33% in level-4. 1 children or 4% children are level-3 in pre-test score, but in post-test score level-4 in that children.

Mulchay et al.(1988) done a study at Chailey Heritage Hospital stud selected 58 subjects who had diagnosis of cerebral palsy and impaired sitting ability they all were clinically prescribed Special seating they found that 14 children According to Chailey sitting ability scale are improved to level 2, from level-1, 28 children's sitting ability level improved into level 3 from level-2 and 16 children improved into level 4.

Roxborough, 1995 had done a research on the efficacy and effectiveness of special seating for children with cerebral palsy, the result found that about 30 children out of 50 improved level-1 to level 2. Another 20 children are improved level-2 to level-3.

Chung et al, 2008 did a study where sitting ability is markedly improved about 13 children out of 20 children from level-1 to level-2, 7 children are observed from level-3 to level- 4.

The result of the study identified the effectiveness of special seating to improve sitting ability for the children with cerebral palsy which was a single group pre-test post-test design. In this study, the total participants were 26 both male & female children.

Cerebral palsy is the most common condition that is responsible for child disability & impaired sitting ability. Special seating device are commonly prescribed for non-ambulatory children with CP as a treatment modality to improve sitting ability and related limitation in physical mobility and also acts on cerebral palsy children's muscular flexibility, tone, balance and postural control in sitting, postural support, correction, prevention delaying of contracture develop facilitation of functional as well as the effectiveness of the therapeutic programme.

Special seating are typically prescribed to improve children's breathing pattern, improve sensation, improve digestion & prevent mainly any type of hip joint & pelvic region complication. Special seating also prevents deformity, provides support, normal alignment mechanics and maintains child's joint ROM, improves trunk mobility, pelvic mobility, hip mobility, knee mobility, ankle mobility. Special seating maintains child's spinal curve and prevent any type of spinal deformity. When using special seating statistically significant increase in sitting ability from level-1 to level-2, level-3, level-4 & level-2 to level-3,4 & level-3 to level-4. This single group pre-test & post-test study demonstrates that Special seating in disability children provide clinical improvements in sitting ability which is the vital portion of human body function.

Ryan et al. (2009) illustrated that sitting is the best position the way to communicate in case of cerebral palsy children if sitting ability will increase the way to communication will be increases. They also theorize that for children who cannot sit independently Special seating is essential to prevent their physical disability from slowing the development of other skills.

Heaton & Bamford, (2001) discusses that Special seating which helps to maximize child function, adapt limitation in life as much as possible allow them to participate

fully in his or her schooling programme & activity of daily living. Special seating contributes actively to encourage a child's postural development. The Special seating must continue to complement treatment principles and the child's overall management programme. From this research the researcher wished to explore the effectiveness of Special seating to improve sitting ability for the children with cerebral palsy so that their functional activity will perform properly.

Recommendations are many organization of Bangladesh working with cerebral palsy children & they provide special seating for their client. In this study participants are not selected from the other organization. If researcher include the study participants from the other organization those are provide special seating, then it will be easy to generalize the result. So further study is recommended to identify the study population not only the CRP. In this study children with cerebral palsy are selected. Researcher also recommended, conducting study selecting participants from different condition such as- GBS, DMD. The amount of participant is very small in relation to other quantitative study. There were only 26 participants involved in this study. So further study should conduct with increase number of participants so that the external validity of the study can generalize the wider population of cerebral palsy.

REFERENCES

- Aksu F, 1990, Nature and prognosis of seizures in patients with cerebral palsy, *Developmental Medicine and Child Neurology*, 32: 661-668.
- Akter S, and Rahman M, 2006, cerebral palsy-clinic profile and predisposing factors, *Bangladesh journal of neuroscience*, 20(1): 9-15.
- Albright AL, 1996, Intrathecal baclofen in cerebral palsy movement disorder, *Journal of child neurology*, 11(1): 29-35.
- Assistive Technology: Resources and links, 2004, available: <http://www.rehabtool.com> [accessed on 28 July 2012].
- Baily, DM 1997, *Research for the health professional-a practical guide*, 2nd ed, F.A .Davis Company, Philadelphia.
- Banerjee A, 1996, *Infant Assessment*, Indian Institute of cerebral palsy, Calcutta.
- Banerjee R, Kundu M, and Basu R, 1999, *Cleanliness for the children with cerebral palsy*, 2nd edn, Indian Institute of Cerebral palsy, Calcutta.
- Barbotte E, Guillemin F, and Chau N, 2001, Prevalence of impairments, disabilities, handicaps and quality of life in the general population: a review of recent literature, *Bull World Health Organization* , 79: 1049.
- Batshaw ML, 1998, *Children with disabilities*, Paul Harcherds Brookes Publishing Company, London.
- Behrman RE, Kliegman RM, and Jenson HB, 2000, *Textbook of Pediatrics*, 17th ed, Elsevier, India.
- Binder H , 1989, Rehabilitation management of children with spastic diplegic cerebral palsy, *Archives of physical Medicine & Rehabilitation*, 70:482-489.
- Blair, T and Stanley B, 1985, Assessment of muscle tone, available: [http:// cerebral palsy. Oxfordjournals.org/cgi/reprint/29/5/385](http://cerebralpalsy.Oxfordjournals.org/cgi/reprint/29/5/385), [accessed on 29 August 2012].
- Bleck EE, 1987, *orthopedic management of cerebral palsy*, J.B. Lippincott, Philadelphia.
- Brody, J 2005, Spastic cerebral palsy, available: http://www.cerebralpalsy source.com/Types- of CP-/spastic_cp/index.html, [accessed on 21 July 2012].
- Campbell AGM, and Notson MC, 1998, *Text book pediatric*, 5th ed., Churchill Livingstone, Boston.

- Cerebral palsy statistics, 2010, available: http://www.marchofdimes.com/pnhec/4439_120asp, [accessed on 21 July 2012].
- Chatterjee N, 1998, Health care utilization by disabled people; a survey in rural Bangladesh, *Disabled Rehabilitation*, 20:337-34.
- Chung J, Evans J, and Lee C, 2008, Effectiveness of Adaptive Seating on Sitting Posture and Postural Control in Children with Cerebral Palsy, *Pediatric Physical Therapy*, 20:317.
- Crichton JU, Mackinnon M, and White CP, 1995, The life expectancy of persons with cerebral palsy, *Developmental Medicine and child Neurology*, 37: 567-577.
- Dietz A, 1995, Spastic diplegia, available:<http://www.cerebralpalsyinformation.com/spastic-diplegia>, [viewed 22 July 2012].
- Ebrahim GJ, 1993, *Paediatric practice in developing countries*, Macmillan publishers limited, Malaysia.
- Edger TS, 2001, clinical utility of botulinum toxin in the treatment of cerebral palsy: comprehensive review, *Journal of child Neurology*, 16: 38.
- Finnie NR, 1997, *Handling the young child with Cerebral Palsy at home*, 3rd ed. Butterworth-Heinemann, Jordan Hill.
- Forfar G, 1998, *Textbook of pediatrics*, 5th ed, Churchill Livingstone, New York.
- Frankel N, 1989, *Basic Biomechanics of the musculoskeletal system*, Lea & Febiger, Philadelphia.
- Frankenburg WK, Dodd's J, Archer P, and Ferguson RL, 1996, The Denver 2-A major revision & restandardization of the denver developmental screening test, *Pediatrics development journal*, 89:91-97.
- Gierals E, 1998, *Children with cerebral palsy* 2nd ed. Woodbine house, USA.
- Graff DV, 1997, *Human anatomy*, 5th ed, Library of congress cataloging publication, Boston.
- Green EM, 1987, The effect of seating position on cognitive function in children with cerebral palsy, *Journal of Annual British Pediatric*, 42:108.
- Hagberg B and Olow I, 1993, The changing panorama of cerebral palsy in Sweden: 6 prevalence & origin during the birth year period *Acta paediatrica*, 82:387-393.
- Heaton J, and Bamford C, 2001, Assessing the outcomes of equipment and adaptations: issues and approaches, *Developmental Journal of Occupational Therapy*, 64: 346-56.

- Hinchcliffe A, 2003, Children with cerebral palsy, Vistaar publications, London.
- Hosain GMM, Atkinson D, and Underwood P, 2002, Impact of Disability on Quality of Life of Rural Disabled People in Bangladesh, Journal of health population & nutrition, 20(4):305.
- Illingworth RS, 1987, The development of the infant and young child, Churchill Livingstone, New York.
- Kafiluddin AKN, 2001, Population research environmental conservation and economic development, Padma printers & Color Limited, Dhaka, Bangladesh.
- Kent A, Stephen E, and Patrica J, 2009, Effect of Adaptive Seating Devices on the Activity Performance of Children With Cerebral Palsy, Archives Physical Medicine Rehabilitation, 90:1389-1394.
- Khan MR, and Rahman ME , 2000, Essence of pediatrics, Anwar Khan Ltd, Dhaka.
- Krigger KW, 2006, Cerebral palsy: an overview, American Children development, 73:91–100.
- Majnemer A, and Mazer B, 2004 New directions in the outcome evaluation of children with cerebral palsy, Semin Pediatric Neurology, 2004, 11: 7.
- Marlyn F, Seif T, and Workings L, 2005, cerebral palsy resource guide, Thomson dealmer learning, Australia.
- McCarthy GT, 1992, Physical disability in childhood, Churchill Livingstone, London.
- McClenaghan BA, Thombs L, and Milner M, 2000, Effects of seat surface inclination in postural stability and function of the upper extremities of children with cerebral palsy, Devidson Medicine Child Neurology, 34: 40–48.
- Mulcahy CM, Pountney TE, and Nelham RL, 1988, Adaptive Seating for motor handicap : problems, a solution, assessment and prescription, British journal of occupational therapy, 51(10):351.
- Nelson KB, and Ellenberg JH, 1982, Childern who outgrew cerebral palsy, Pediatrics development, 69:529-536.
- Pabon M, and Piper MC, 1987, Early pediatrics of one year neurodevelopmental outcome for at risk in infants, Physical & Occupational therapy in pediatrics,7:17-34.
- Palisano RD, Rosenbaum P, and Walter S, 1997, Development and reliability of a system to classify gross motor function in children with cerebral palsy, Devidsone Medicine Child Neurology, 39:214-23.

- Paneth N, Hong T, and Korzeniewski S, 2006, The descriptive epidemiology of cerebral, *Clinics in Perinatology*, 33(2): 251–267.
- Reid DT, 1996, The effects of the saddle seat on seated postural control and Upper-extremity movement in children with cerebral palsy, *Davidson Medicine Child Neurology*, 38:815.
- Rosenbaum P, 2003, Cerebral palsy: what parents and doctors want to know, *British Medical Journal*, 326: 970-974.
- Roxborough L, 1995, Review of the efficacy and effectiveness of adaptive seating for children with cerebral palsy, *Assistive Technology*, 7:17-25.
- Ryan SE, Campbell KA, and Rigby PJ, 2009, The impact of adaptive seating devices on children with cerebral palsy, *Archives Physical Medicine Rehabilitation*, 90:27-33.
- Sheridan D 1980, from birth to the 5 years children developmental progress, Nefer publishing company Ltd., London.
- Stavness C, 2006, The effect of positioning for children with cerebral palsy on upper-extremity function: a review of the evidence, *physical occupational therapy pediatrics*, 26:39-53.
- Vereecken MJW, 1996, Abnormal development in cerebral palsy children in Africa, Tool publication, Netherlands.
- Werner S, 1998, Disabled village children, Hesperian Foundation, United States of America.
- Zollars JA, 1999, Special seating: an illustrated guide, Otto Bock Orthopedic Industry. Inc, Minneapolis.

মৌখিক সম্মতিপত্র/অনুমতিপত্র

আসসালামুআলাইকুম/নমস্কার

আমি উম্মে কুলসুম, বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট এর বি.এস.সি ইন ফিজিওথেরাপী কোর্সের ৪র্থ বর্ষের একজন ছাত্রী। এই প্রতিষ্ঠানটি ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা বিভাগের অন্তর্ভুক্ত। অধ্যয়নের অংশ হিসেবে আমাকে একটি গবেষণা সম্পাদন করতে হবে। “সেরিব্রাল পালসি শিশুদের বসার সামর্থ্য উন্নতিতে স্পেশাল সিটিং এর কার্যকারিতার প্রভাব” সম্পর্কিত গবেষণা।

এই অধ্যয়ন এর লক্ষ হল সেরিব্রাল পালসি শিশুদের বসার সামর্থ্য উন্নতিতে স্পেশাল সিটিং কার্যকর কিনা তা খুঁজে বের করা। সেরিব্রাল পালসি শিশু যাদের বসার সামর্থ্য কম এবং যারা ন্যূনতম ৬ মাস স্পেশাল সিটিং ব্যবহার করেছে সেসব শিশু হবে এই গবেষণার অংশগ্রহনকারী। যেহেতু আপনারা এই রোগীর পিতা-মাতা এই জন্য আমি আপনাদের বাচ্চাকে গবেষণায় অন্তর্ভুক্ত করতে ইচ্ছুক এবং আমি আপনার বাচ্চার বসার সামর্থ্য সম্পর্কিত তথ্য সংগ্রহ করে এই গবেষণায় অন্তর্ভুক্ত করতে আগ্রহী যে স্পেশাল সিটিং দীর্ঘ সময় ব্যবহার করবে। আপনি যদি সদয় আনুমতি দেন আমি পর্যবেক্ষণ করব আপনার বাচ্চার বসার সামর্থ্য সম্পর্কিত প্রথম এসেসমেন্ট। তারপর আমি নির্ণয় করব আপনার বাচ্চার বর্তমান সামর্থ্য। এই গবেষণা অধ্যয়নের জন্য আপনাকে কিছু প্রশ্ন করা হবে আপনি এর উত্তর করবেন এবং এতে প্রায় ২০-৩০ মিনিট সময় লাগবে। প্রশ্ন-উত্তর পর্বের যেকোন মুহূর্তে আপনি সম্মতি প্রত্যাহার এবং কোন প্রশ্নের উত্তর প্রদানের অপারগতা প্রকাশের ব্যাপারে আপনার সম্পূর্ণ অধিকার রয়েছে। এই গবেষণায় প্রাপ্ত তথ্য সম্পূর্ণভাবে গোপনীয় থাকবে এবং অংশগ্রহনকারিকে ব্যক্তিগতভাবে গবেষণার ফল প্রকাশের সময় চিহ্নিত করা হবে না।

এই গবেষণা সম্পর্কে কোন প্রশ্ন থাকলে বা কোন কিছু জানার থাকলে আপনি গবেষক উম্মে কুলসুম অথবা নাসিরুল ইসলাম, সহকারী অধ্যাপক, ফিজিওথেরাপি বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩ এই ঠিকানায় যোগাযোগ করবেন।

এটা শুরু করার আগে আপনার কোন প্রশ্ন আছে?

আপনি কি এই অধ্যয়নে অংশগ্রহনে সম্মতি প্রদান করছেন?

অভিভাবকের স্বাক্ষর..... তারিখ.....

স্বাক্ষীর স্বাক্ষর..... তারিখ.....

গবেষকের স্বাক্ষর..... তারিখ.....

VERBAL CONSENT STATEMENT

(Please read out to the participant)

Assalamualaikum/Namasker.

I am Umma kulsum, a student of 4th Year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). BHPI is the affiliated by the University of Dhaka. To obtain my Bachelor degree, I shall have to conduct a research. Therefore, I am going to conduct a research on “Effectiveness of Special seating to improve sitting ability for the children with cerebral palsy”. Through this research, I will explore the efficacy of special seat particularly in improving seating ability for the children with Cerebral palsy. To implement my research project, I need to collect data for the cases whose have been using special seat for minimum six months. Therefore, you could be one of my valuable subjects as being the parent of the patient and I would like to collect information related to your child’s balance as he/she has been using special seat for quite a long time.

If you give your kind consent, I will review the initial Assessment of your child particularly the section in which level of sitting balanced is monitored. After that, I will check present balance of your child. Besides these, I may require to ask you few questions as per developed questionnaire. It would take maximum 20 minutes. Your participation in this study is voluntary & you may withdraw yourself at any time during this study without any negative consequences.

You also have the right not to answer a particular question that you don’t like or do not want to answer during interview.

If you have any query about the study or your right as a participant, you may contact with Umma kulsum, researcher and/or Nasirul Islam, Assistant 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?

Signature of the participant..... Date.....

Signature of the witness..... Date.....

Signature of the researcher..... Date.....

Sitting ability assessment in Chailey sitting ability scale:

ID:

Patient's name:

Age:

Sex:

Address:

Date of assessment:

Duration of using special seating:

Type of cerebral palsy:

Type of Special seating:

Children no.	Pre-test score	Post-test score

Permission Letter

June 19, 2012

The In-charge,
Special Seating Unit,
Center for the Rehabilitation of the Paralyzed,
Savar, Dhaka-1343.

Subject: Prayer for seeking permission to collect data to conduct a research study.

Sir,

With due respect & humble submission to state that I am a student of 4th professional, B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (B.H.P.I). According to course curriculum, we have to conduct a research project for the partial fulfillment of the requirements for the degree of B.Sc in Physiotherapy. My dissertation title is "Effectiveness of Special seating to improve sitting ability for the children with cerebral palsy". The aim of the study is to find out the effectiveness of Special seating to improve sitting ability for the children with cerebral palsy. It is a quantitative quasi-experimental research. I have chosen Special seating unit to collect required data. Now I am looking forward for your kind approval to start my data collection.

So, I therefore pray & hope that you would be kind enough to grant me the permission to collect the data & will help me to conduct this study.

Yours faithfully

Umma Kulsum

19.06.12

Umma Kulsum

4th year B.Sc in Physiotherapy

Session: 2006-2007.

BHPI, CRP, Savar, Dhaka-1343.

M. Kulsum has given the permission to collect the data from Special Seating.
Umma Kulsum
19/06/12

Imrat Rahman
Physiotherapist
In-charge, Special Seating & Rehabilitation
CRP-Chapaini, Savar, Dhaka-1343