Faculty of Medicine

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OUTCOME OF CLUBFOOT PATIENTS AFTER MANIPULATION AND CASTING USING PONSETI METHOD ATTENDED AT CRP

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

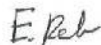## OUTCOME OF CLUBFOOT PATIENTS AFTER MANIPULATION AND CASTING USING PONSETI METHOD ATTENDED AT CRP

Submitted by **Aysha Akter** for partial fulfilment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

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Declaration

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of information of the study, I would be bound to take written consent from Department of Physiotherapy, Bangladesh Health Professions Institute (BHPI).

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Abbreviation

BHPI: Bangladesh Health Professions Institute

BMRC   Bangladesh Medical Research Council

CLB: Curved Lateral Border

CRP: Centre for the Rehabilitation of the Paralysed

CTEV: Congenital Talipes Equino Varus

HFCS: Hind Foot Contracture Score

IRB   Institutional Review Board

MFCS: Mid Foot Contracture Score

PSS: Pirani Severity Score

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organization

Abstract

Purpose: Idiopathic clubfoot or congenital talipes equinovarus is the commonest congenital foot deformities having 1 in every 1000 children born worldwide. Around 80% of the cases occur in developing nations. It remains the most difficult to treat. The most widely used treatment is the Ponseti method of manipulation and serial plaster. This method is effective in 90% of all cases The purpose of this study is to evaluate the outcome of clubfoot patients after manipulation and casting using Ponseti Method. *Objective:* To explore the outcome of Ponseti management among the clubfoot patients, to find out the current clinical practice in Ponseti method for clubfoot patients, to identify the Sociodemographic information of the clubfoot patients. *Methodology:* It was quazi experimental study. Total 20 samples were selected through hospital based randomization assigned to single group for pretest and posttest. The study was conducted at CRP outpatient department, Savar, the data were collected by questionnaires, Pirani severity Scoring was used to assess patients. Pre-test was performed before beginning the treatment. The same procedure was performed to take post-test at the end of 4 weeks of treatment. Confidentiality of information and voluntarily participation were ensured by the researcher. Data were numerically coded and captured in Microsoft Excel 16, using an SPSS 20.0 version program. *Result:* The finding of the study was carried out by using parametric related „t‟ test to compare the pretest and posttest single Group intervention and analyzed by interpreting the probability level of significance of „t' value. The results were found to be significant for „t' value at probability level 0.05. *Conclusion*: The study concluded as after the manipulation and casting, patient got significant improvement in reduction of Clubfoot deformity.

Keywords: Clubfoot, Congenital Talipes EquinoVarus, Ponseti

CHAPTER-I	INTRODUCTION

1.1 Background

Congenital talipes equinovarus or clubfoot is a complex congenital deformity that affects the foot (Bridgens & Kiely., 2010). It causes the feet of affected infants to point inward and downward that forces the child to walk on the sides of his or her feet. pain and disability occurs if clubfoot is not treated (Pirani et al., 2009).

The incidence of clubfoot varies country to country (Carroll, 2012). It is estimated that around 80% of all clubfoot cases being born in low- and middle-income countries each year (Jowett et al., 2011). Normally boys are more affected 2.5 times than girls. In half of the cases this condition is bilateral (Gibbons & Gray., 2013).

Clubfoot was first described in archeological studies in ancient Egyptian tombs on mummies by Smith & Warren (1924) reporting clubfoot on the Egyptian Pharaon Siptah, (XII century B.C.). This mummies and another drawing from an Egyptian temple show that the clubfoot deformity has been recognized for centuries and having a possibility to reach adulthood without correction of the deformity (Hernigou et al., 2017).

It is estimated that 150–200000 children born worldwide with congenital talipes equino varus each year where 80% of these live in low and middle-income countries (Owen et al., 2012). In Bangladesh total population is about 160 million. Approximate number of children born in this country with clubfoot is 437 per year (Globalclubfoot.com, 2019).

The incidence of clubfoot ranges from 0.9 – 6.8:1000 births globally. The incidence rate of clubfoot in Western Australia is 1.25 per 1000 (3.49 in the indigenous population) and in South Australia (SA) it is 1.1 per 1000 (Radler, 2013).

A higher birth prevalence of idiopathic clubfoot in males and in firstborn children is always found in epidemiological studies. In half of the cases this condition is bilateral. Smythe et al found that the birth prevalence of clubfoot among the Chinese populations is 0.39 per 1000 births, in Caucasian it is 1.1 per 1000 and 6.8 per 1000 in Polynesian populations (Smythe et al., 2017). In India a huge number of people live about 1.2 billion. Here 3000 children born with clubfoot every year (Globalclubfoot.com, 2019).

The clubfoot deformity is most commonly idiopathic that means the specific cause for this condition is not known. But secondary congenital talipes equino varus may also exist. The incidence of idiopathic club foot in North America and Europe is 1 per 1000 live births. Half of cases being bilateral. In the other parts of the world this rate is higher; a recent research has showed that in Malawi the incidence is 2/1000, which is one of the highest rates in world. This result brings a significant burden on its financial, social and medical services (Turner et al., 2018).

Clubfoot or congenital talipes equinovarus, is a foot deformity which is a complex, congenital and mostly idiopathic. If the condition is not properly treated, children who are affected in clubfoot walk on the sides and/or tops of their feet. As a result, formation of callus, potential infections in bone and skin, lack of ability to wear standard shoes may occur. Limitations in mobility and employment opportunities are also the consequences of clubfoot. Dr. Ignacio Ponseti developed a method for the correction of clubfoot by using manipulation and casting. Basically his method based on the fundamentals of kinematics and pathoanatomy of the deformity that realign the foot of affected children successfully realigns without extensive and major surgery. The Ponseti method is a successful method having a high success rate up to 92–100% worldwide that decrease surgical rate 7% per year after peaking in 2000–2001. To achieve a good functional outcome only 10% of cases requiring surgical intervention beyond a tenotomy (Malhotra et al., 2018).

The objective of the treatment of clubfoot is focused to achieve pain-free, functionally good and cosmetically acceptable foot. Since the days of Hippocrates various conservative and surgical treatment methods have been tried for the treatment of clubfoot. These methods having a various success rates. In 1950s Dr Ignacio Ponseti firstly introduced the Ponseti serial casting technique which is noninvasive method of treating clubfoot and involves serial manipulation and casting (Gao et al., 2014).

Clubfoot can, in up to 95% of cases, be treated successfully using a largely non-surgical technique known as the Ponseti method. Now-a-days the Ponseti method is considered to be the gold standard of treatment in the United Stated of America. This method has spread widely throughout high-income countries as well as low income countries that largely replace previously used surgical and conservative techniques. It is also less

invasive, more cost-effective and risks of complications are lower than surgical techniques. Moreover, this technique is an ideal solution for low-resource settings (Owen et al., 2018).

Ponseti method is an innovative, conservative and complete treatment for clubfoot involving a gentle manipulation of the child's foot and the application of toe-to-groin plaster casts that is followed by bracing and tenotomy (Matuszewski et al., 2011).

The Ponseti method is especially suited to these countries where there are a few number of orthopedic surgeons, as it can be learnt easily by allied health professionals such as physiotherapists and orthopedic assistants. (Jowett et al., 2011)

1.2 Research Question

What is the outcome of clubfoot patients after manipulation and casting using the Ponseti method attended at CRP?

1.3 Aims

To explore the outcome of clubfoot patients after manipulation and casting using the Ponseti method attended at CRP.

1.4 Objectives

1.4.1 General objective

To evaluate the outcome of clubfoot patients after manipulation and casting using the Ponseti method attended at CRP.

1.4.2 Specific objectives

1. To find out the sociodemographic information.

2. To find out related diseases condition

3. To find out an initial score and score after receiving manipulation and casting of Posterior Crease, Empty Heel and Rigid Equinus.

4. To find out an initial and score after receiving manipulation and casting of Medial Crease, Lateral Head of Talus and Curved Lateral Border.

1.5 Null hypothesis

Manipulation and casting using Ponseti method cannot change the outcome of post-test in the management clubfoot patients.

1.6 Hypothesis

Manipulation and casting using Ponseti method change the outcome of post-test in the management of clubfoot patients.

1.7 List of variables

Independent variables

Manipulation and casting

Dependent variable

Outcome and Clubfoot.

1.8 Rationale

In all developing and poorly developed countries in the world clubfoot becomes a common type of disabling condition at present. In Bangladesh this condition is increasing day by day for various reasons. Clubfeet causes physical disability and hampered psychological state that are important health problems in Bangladesh.

Untreated clubfoot makes the people losing their full mobility power and it can also make dependent on assistive device. The aim of Physiotherapy is to prevent the activity limitations and participation restrictions for children with inadequately treated or neglected clubfoot. It also works to improve the quality of life of children with clubfoot in developed and developing area.

The success rate of Ponseti method is high for the management of idiopathic clubfoot. success. It is a non-operative treatment which provides a lower complication rate, less pain, and higher function. The purpose of this article is not to analyze the long-term effect of clubfoot treatment but to judge initial success with the Ponseti technique by using casting and manipulation.

Clubfoot can be corrected within 2 months or less using manipulations and plaster cast application with minimal or no surgery for normal child without other congenital anomaly. For developing countries where there are a few number of orthopedic surgeons ponseti method is particularly suited. For the health professionals such as physiotherapist this technique is easy to learn. It is necessary to ensure the parents to follow the instructions for wearing foot abduction brace to prevent relapse this condition. The treatment is economically viable and easy to carry for the babies. If well implemented, it will greatly reduce the number of clubfoot cripples.

This study examines the outcome of manipulation and casting by using ponseti method for the correction of clubfoot. Outcome of this study is also help the other health professionals to understand about the standard of physiotherapy. As a result, they encourage to refer physiotherapy related problem specially club foot patients to the physiotherapist.

Research makes the profession strongest. So there is no alternative to do research a professional in order to develop a profession. For the fulfillment the 4th year of BSc in physiotherapy I have to carry out a research of my interest which accomplish the professional body of interest.

1.9 Operational definition

Outcome

Information, event, object or state of being produced as a result or consequences of a plan or process.

Ponseti

Ponseti method is an innovative, conservative and complete treatment for correcting of clubfoot deformity.

Clubfoot

Clubfoot or congenital talipes equinovarus (CTEV), is a deformity of the lower limb characterized by smaller calf muscles and adduction of the forefoot, Cavus (increased longitudinal arch), Varus of the heel (heel turned in) and Equinus of the foot (foot in plantar flexion).

Manipulation

Manipulation is the skillful handling, controlling or using of something or someone.

Treatment

This refers to all measures aimed at reducing the impact of disability for an individual, enabling him or her to achieve independence, social integration, a better quality of life and self-actualization. Treatment may include measures to provide and/or restore functions, or compensate for the loss or absence of a function or for a functional limitation.

Ponseti created a clubfoot manipulation method in 1950. Up to 95 percent of cases, the clinical correction achieved through this method was reported to produce a functional, plantgrade foot without the need for posteromedial release. The correction was noted to last for a long time, with some patients being followed up until their fourth or fifth century (Hegazy et al., 2009).

The Ponseti method is a manipulative technique that corrects congenital clubfoot without invasive surgery. It was developed by Dr. Ignacio V. Ponseti of the University of Iowa, USA in the 1950s, and was repopularized in 2000 by Dr. John Herzenberg in the USA and Europe and in Africa by NHS surgeon Steve Mannion. It is a standard for the treatment of club foot. The challenge in achieving a successful outcome with this method lies not in correcting deformity but in preventing relapse (Zionts & Dietz., 2010).

In Bangladesh total population is 160 million. Among them estimated number of children with clubfoot born per year 4373. India is a country with a huge number of Population about 1.2billion. The estimated number of children with clubfoot born per year is 30,000 (Globalclubfoot.com, 2019).

The pooled estimates for clubfoot birth prevalence for Africa is 1.11, in South-East Asia is 1.21. The prevalence of clubfoot in India and the Eastern Mediterranean region is similar and it is 1.19. The prevalence in low middle income countries within the Americas region is 1.74 and in Turkey that means in Europe region is 2.03. and in West Pacific country excluding 0.94. The birth prevalence is lowest in China and it is 0.51 (Smythe et al., 2017).

Epidemiological surveys regularly report greater idiopathic clubfoot birth incidence in men and firstborns. Typically, a tiny number of statistics are regularly quoted for clubfoot birth incidence with reports of 0.39 per 1000 births in Chinese populations, 1.1 per 1000 in Caucasian populations, and 6.8 per 1000 in Polynesian populations. Overall in low and middle income countries the children born with clubfoot is 80% per year (Smythe et al.,

2017). In Belgium the incidence of clubfoot is 1.6 per 1000 live births (Patron et al., 2010). In Bangladesh, in partnership with the Glencoe Foundation, the Prosthetics Outreach Foundation and Rotary Clubs around the globe, there is a domestic clubfoot therapy program run by the worldwide NGO Walk for Life. Within Bangladesh Walk for Life, Zero Clubfoot Chittagong, Lamb Hospital and CRP Bangladesh are working with local partners. The purpose of Walk for Life is that every kid born in Bangladesh with clubfoot should have the chance to be treated using the Ponseti approach within two years. Treatment is given free of charge and clinics are established throughout the nation so that no family should travel more than 60 kilometers to attain a clinic. (Globalclubfoot.com, 2019).

Clubfoot's etiology has not been explained yet. Genetics play a part as shown by ethnic variations in incidence, family pattern of inheritance. and 32.5 percent concordance between monozygotic twins. Deformity is more prevalent in boys and male and female ratio is 2:1. Impacted women are more likely to convey the disease to their kids and have clubfoot relatives than men. For instance, if there is a clubfoot family history, the adjusted odds ratio for the clubfoot baby is 6.52. If, during early pregnancy, the mom smoked cigarettes, the adjustment ratio for the child with clubfoot is 1.34. If there is a family history of clubfoot and the mother smoked cigarettes during early pregnancy, the adjusted odds ratio is 20.35 for the child with clubfoot. A probable explanation is a multifactorial and polygenic cause with more than one gene responsible for enhanced susceptibility to clubfoot growth, potentially in conjunction with certain environmental variables (Gibbons & Gray., 2013).

Male sex was strongly associated with the risk of clubfoot. Other infant factors showing a strong association with clubfoot risk included premature birth, low birth weight, and presentation of breech. Parity was moderately associated with clubfoot among maternal risk factors, with multiparous mothers having a reduced risk. Young maternal age whose age under 23 was weakly associated with increased risk compared to older maternal age that means the age range is 23 to 35. Several sociodemographic factors have been moderately associated with clubfoot, including marital status, education, and prenatal care. Clubfoot risk

declined as the level of maternal education increased. Moms with at least a high school education is a low risk of clubfoot (Parker et al., 2009).

Malformed bones, abnormalities of muscle, joint or vascular lesions and abnormal ligaments and tendons are responsible for causing clubfoot deformity according to some scientific investigators. Congenital clubfoot occurs when external forces put the foot or the feet in a faulty position while the fetus is developing according to another opinion. Neurogenic disorders such as neuromuscular balance or gene variations are also responsible for clubfoot deformity (Matuszewski et al.,2011).

Clubfoot deformity is also strongly associated with maternal diabetes. For pregestational diabetes mother clubfoot risk was increased more than the mother who are associated with gestational diabetes was modest (parker et al., 2009).

The corrective phase and the maintenance phase are the two phases of ponseti method for the management of clubfoot. Manipulation of the foot followed by casting with plaster of Paris is included in corrective phase. The cast holds the stretch that is achieved through manipulation of tight structures and allows time for soft tissue remodeling and correction of the position of the bones in the foot by the cast. Around the talus cavus, adducts and Varus are corrected sequentially (Smythe et al., 2016).

Before casting, short and gentle manipulation was suggested which is essential to extend the structures and also to get a sensation for the flexibility of the foot and the quantity of correction that can be accomplished with the cast. Serial casting is performed with casts above the knee as the abduction cannot be held by brief leg casts and would often slide off. The first one in the first cast. Pronation of the foot is strongly restricted. A simple abduction with counter pressure is conducted on the talus throat in the following casts. The talus is therefore stabilized and cannot rotate in the mortise of the ankle, while the remainder of the foot is removed below it. The calcaneus should not be touched because this could block the movement of the calcaneus, which must be free to swing from below the talus and thus abduct, everts and dorsiflexes. Before the subtalar joint is fully corrected and until after tenotomy active dorsiflexion must not be performed (Radler, 2013).

Usually a percutaneous tenotomy of Achilles is required to correct the residual equinus that means foot down position, followed by 3 weeks in a cast to assist with healing. The maintenance phase consists of a bracing regime to prevent recurrence. The foot abduction brace is worn for the first 3 months 23 hours a day and then for five years at night time in sleep. If the clubfoot has been completely corrected by manipulation, serial casting and possibly the heel cord tenotomy then only foot abductor of brace is applied. All braces that comply with Ponseti's recommendations of shoe rotation and bar length will provide appropriate maintenance of the clubfoot correction as long as the feet are held in the suggested abducted and dorsiflexed positions and the appropriate bracing schedule is followed. Bracing protocol needs to be fitted to the individual patient based on age, relapse rate associated with that age and when the correction was finished (Alves, 2019).

There are 26 bones in foot. For this congenital deformity Talus, Calcaneus and Navicular are most relevant. If clubfoot deformity is divided into four components the underlying cause is behind it, is easily understood. The acronym of this four components that means first letters make up the word is CAVE. These components are: Cavus, Adducts, Varus, and Equinus. In the midfoot the Cavus and Adducts deformities occur, while the Varus and Equinus deformities occur in the hind foot. The first part of the deformity of clubfoot is cavus. In Cavus the arch of the foot is higher than normal. As a result of the first metatarsal being plantar flexed in relation to the calcaneus and hind foot. Adducts is movement towards the midline. Adducts is the second part of the clubfoot deformity. The forefoot is adducted towards the midline. This is the second part of the deformity of clubfoot. The navicular moves medially and starts to dislocate off the talus. The calcaneus also rotates medially under the talus as part of the adducts deformity. Varus means movement towards the midline. The third part of the deformity of clubfoot is Varus. The heel is in Varus in relation to the tibia. In regards to the tibia, the heel is in Varus. Equinus signifies an increase in foot plantarflexion. In regards to the tibia, entire foot points down. Therefore, hind foot equinus is the fourth component of clubfoot deformity. The deformity comprises of in evaluating the seriousness of clubfoot, particularly at presentation and in tracking the progress of patients. The Pirani scoring system works by assessing six clinical signs of contracture, which may score 0 that means no deformity, 0.5 that means moderate

deformity or 1 means severe deformity. After every visit the total score is measured. For providing a good forecast about the potential treatment for an individual foot pirani severity scoring system is known to ankle equinus or plantarflexion coupled with subtalar, midtarsal and anterior tarsal joints adduction and inversion. Congenital talipes equine Varus also can be described as "congenital dislocation of the Talo-Calcaneal-Navicular Joint". The navicular passes in clubfoot on the talus as the calcaneum rotates in clubfoot under the talus. The foot is kept by ligaments and muscles in adduction and rotation. The contracting muscles are triceps surae, posterior tibialis, longus flexor digitorum and flexor halluces longus. The inverter-plantar flexor muscles and the everter-dorsiflexor also have an imbalance. In clubfoot deformity the calf and peroneal muscles are usually poorly developed. The foot is to be inverted if the peroneal muscles is weak. The ligaments of are thick and taut in posterior and medial aspect of ankle in clubfoot deformity (Anon, 2019).

The components of hind foot contracture are posterior crease, Empty heel and rigid Equinus. The midfoot contracture score is Medial crease, Curvature of lateral border and posterior head of talus. Each component may score 0, 0.5 or 1. There are many scoring system that are used for measuring the clubfoot scoring systems but among them Pirani scoring system has been found to be both valid and reliable. For predicting the treatment outcomes Pirani severity scoring system is also useful. Initially if the score is high on presentation that may indicate that a higher number of casts will be required for the treatment of clubfoot deformity. During the bracing phase Children with initial high Hind foot contracture score is more experience to relapse of deformity than children with low hind foot contracture score. Therefore, they should require special careful monitoring and special emphasis put on the importance of using the foot abductor brace when explaining to the parents(Globalclubfoot.com, 2019).

After achieving complete correction, a custom made brace with open-toe high top shoes attached to ends of a bar was given. The brace was set at 70° of external rotation on the affected side and 40° degrees of external rotation on the normal side. The bar was bent 10° with the convexity away from the child, to hold the feet in dorsiflexion. The size of the splint was taken prior to tenotomy so that brace could be applied immediately after cast removal. The brace was advised to be worn full time for the first three months and then for 12 hours at night and 2 to 4 hours in the day for a total of 14 to 16 hours during 24hour

period until the child is 3 to 4 years of age. CTEV shoes were given to facilitate walking during daytime. The parents were instructed to perform exercises on the foot at home. After the brace application the patient was followed up every month for the first three months and every two months for the next six months. During each follow-up the corrected foot was examined in detail, checked for any recurrence and exercises and bracing protocol were emphasized (Khazi et al., 2019).

Shafique Pirani MD intended a useful and simple tool known as the' Pirani Score' to efficiently evaluate the severity level of each of Clubfoot's parts. The Pirani score shows its significance be reliable and valid. A high number of casts is required if the presentation score is high to correct the deformity. By logical means it can be assumed that the Pirani score of six means the deformity is most severe and the Pirani score of zero means would be a corrected clubfoot or normal foot (Khan et al., 2017).

In Smythe et al, a total number of 218 children with 337 feet were suitable for inclusion. The median age was 8 months at treatment where 173 children with 268 feet completed casting treatment within the study period. The mean length of time for corrective treatment was 10.2 weeks where the range is 9.5–10.9 weeks. Among them 45 children did not complete treatment, 28 were under treatment and 17 were lost to follow up. In 85% of feet the Pirani score is 1 or less. At presentation the mean Pirani score was 3.80 where Standard deviation is 1.15 and in post-treatment the mean Pirani score is 0.80 and Standard deviation is 0.56. In this study P-value is less than 0.0001. A higher that means worse final Pirani score is highly associated with male gender and severity of deformity. The number of casts is depended on severity of deformity and age of the child more than two years. This case study shows that the majority of children in where the percentage is more than 80 with clubfoot can achieve a good outcome with the Ponseti manipulation and casting method (Smythe et al., 2016).

3.1 Study design

It was a quasi- experimental design of quantitative research. This study was a single group and provides an intervention during the experiment. This design did not have a control group to compare with the experimental group. Quasi experimental design differs from a true experimental design in that, although it contains an independent variable that is manipulated in order to look for an effect on a dependent variable, either control group or randomization is lacking. These designs are useful to researcher looking for validation of treatment method and techniques. In experimental design, all three of the components- manipulation, control and randomization-are required. But in this study all the three components were not present. Therefore, this study was a quasi-experimental research design. Here, manipliation and casting using ponseti method was applied to the patients who were suffering at clubfoot.

3.2 Study setting

The study was conducted at CRP outpatient department. In this department, they provide clubfeet treatment under a project named "walk for life''. This area is chosen by researcher because it is a referral tertiary level hospital for the province with a multidisciplinary rehabilitation unit. Patients that attend here are sent from other hospitals, health centers as well as clinics over the country. Centre for the Rehabilitation of the Paralysed (CRP) is a nongovernmental organization that works for cure and removing clubfeet from Bangladesh under a project and provides resources for management. This service is open every Sunday and Tuesday at Savar. The researcher observed and interacted with the individual in their own contexts.

3.3 Study population

A group of individuals or items that shared one or more characteristics from which data could be gathered and analyzed is known as population. In this study population was clubfeet patient who are getting service from CRP outpatient department Savar.

3.4 Sampling technique

Searching an appropriate number and kind of people who are a part of this study is called Sampling. In this study the sampling technique was Hospital Based Randomization. A total 20 sample with clubfoot patients were selected conveniently as sample group. The samples were regularly taking hospitals treatment. Establishes inclusion and exclusion criteria and selected those individuals who fit these factors. The samples had been collected on the basis of some inclusion and exclusion criteria. At first permission was sought from my research supervisor then Ethical review board and Head of CRP medical wings and had a discussion about the study was held with the responsible physiotherapist.

3.5 Inclusion criteria

1. Patients with club foot who had taken casting and manipulation for consecutive at least four treatment session.
2. Age of the child is less than 2 years (Kumar et al., 2017).
3. Both male and female were included.
4. All the child affected with bilateral clubfoot.
5. Willingness to take part in the study

3.6 Exclusion criteria

1. Patients who discontinue their treatment from Outdoor Unit, CRP, Savar.
2. The age of the child is more than 2 years (Kumar et al., 2017).
3. Patients who are medically unstable.
4. Recurrent clubfoot or Relapse after surgery.
5. Patients who are affected with unilateral clubfoot.
6. Unwillingness to take part in the study

3.7 Sample size

A sample is a smaller group that was taken from the population. Sample size may be big or small, depending on the population and the characteristics of the study. Total 20 participants from Savar CRP were finally selected for this study.

3.8 Data collection procedure

The study procedures were conducted through assessing the patient, find out initial score and score after receiving manipulation and casting through Pirani severity scoring. The patients were assessed by qualified physiotherapist. In CRP's, Pirani scoring system was used to assess the severity of clubfoot deformity. And analyze the functional progression of children with clubfoot. Four sessions of treatment were providing for every patient. 20 subjects were choosing for data collection according to the inclusion criteria. The qualified physiotherapist was providing manipulation and casting. Data was gathering through a pre-test, intervention and posttest and the data will collect by using a written questionnaire form which was formatted by the researcher. Pretest will perform before beginning the treatment and Post test result find after finishing the last session.

3.9 Data collection tools and material

To conduct the study, the researcher collected data by using different types of data collection tools. The researcher organized the materials to successfully complete the interview session. The organized material was questionnaires, consent forms, a pen & a pencil. SPSS (Statistical Package for the Social Sciences) software-20 version and Computer used to analyze data.

3.10 Duration of data collection

Data were collected from 10th June 2019 to 20th September 2019. Each participant provided time to collected data. Each interview took approximately 20-30 minutes to complete.

3.11 Data analysis

Statistical package of social science (SPSS) version 20 has been used to input, analyzed and interpreted data. The sociodemographic variable has been presented by descriptive statistics. Also represented through pie chart and bar chart. As the outcome of clubfoot treatment after manipulation and casting using the ponseti method has been measured repeatedly in pretest and posttest, the data has been analyzed by paired t -test. Severity of clubfoot has been measured by Pirani severity scoring system. All the data has been considered as parametric variable as continuous type of data.

Formula: test statistics t (Paired) is following:

$$t = \frac{\bar{d}}{SE(\bar{d})} = \frac{\bar{d}}{\frac{SD}{\sqrt{n}}}$$

Here

$\bar{d}$ =mean of difference between paired values,

SE($\bar{d}$) =Standard Error of the mean difference

SD = Standard deviation of the differences d and

n = number of paired observations

3.12 Ethical consideration

The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. The proposal of the dissertation including methodology were presented to the Institutional Review Board (IRB). Then the proposal of the dissertation including methodology were approved and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). Again before the beginning of the data collection, researcher had obtained the permission from the concerned authorities ensuring the safety of the participants. The researcher strictly maintained the confidentiality regarding participant's condition and treatments.

Here researcher was used an information sheet and consent form both in English and Bengali to take the participant"s consent. The researcher had obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor doctor if they think that the treatment is not enough to control the condition or if the condition become worsen. So all the participants were informed that they are completely free to decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study did not affect their treatment in the physiotherapy department and they still had got the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to them satisfy.

3.13 Informed Consent

Written consent (appendix) was given to all participants prior to completion of the questionnaire. The researcher explained to the participants about his or her role in this study. The researcher received a written consent form every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants that the study would not be harmful to them. The participants had the rights to withdraw consent and discontinue participation at any time without prejudice to present or future treatment at the pediatric unit of CRP.

3.14 Rigor

This study was conducted in systemic way. All the steps of research were followed by the researcher sequent. During data collection and analysis, the researcher avoided influencing the whole process by own perspectives values and biases. When conducting the study, the researcher took help from the supervisors and physiotherapists. The researcher never influenced the participants by her own perception during data collection. A trustful relationship with participants was always maintained and the documents were kept

confidential. Biasness was avoided during data analysis. strict secure and maintained confidentiality.

The researcher used the graph technique for analyzing data, calculated as percentages and presented this using bar, and pie charts. All these results gave a basic idea about the outcome of clubfoot treatment after manipulation and casting using ponseti method for clubfoot patients.

This study works to explore the outcome of clubfoot patients after manipulation and casting using Ponseti method attended at CRP. In this study the results which were found have been shown in different bar diagrams, pie charts and tables.

4.1 Socio-demographic information

4.1.1Age range

The mean age of the participants was 36.20 days, n= 2(10%) participants in between 11-20 days of age, n=4 (20%) in between 21-30 days of age, n=8(40%) in between 31-40 days, n=5(25%) in between 41-50 days of age and n=1(5%) in between 51-60 days of age. Result shows that 41-50 days are more common age those who had taken casting and manipulation using ponseti method from patient's outdoor department at CRP. The percentage of age group is shown below as a bar graph.
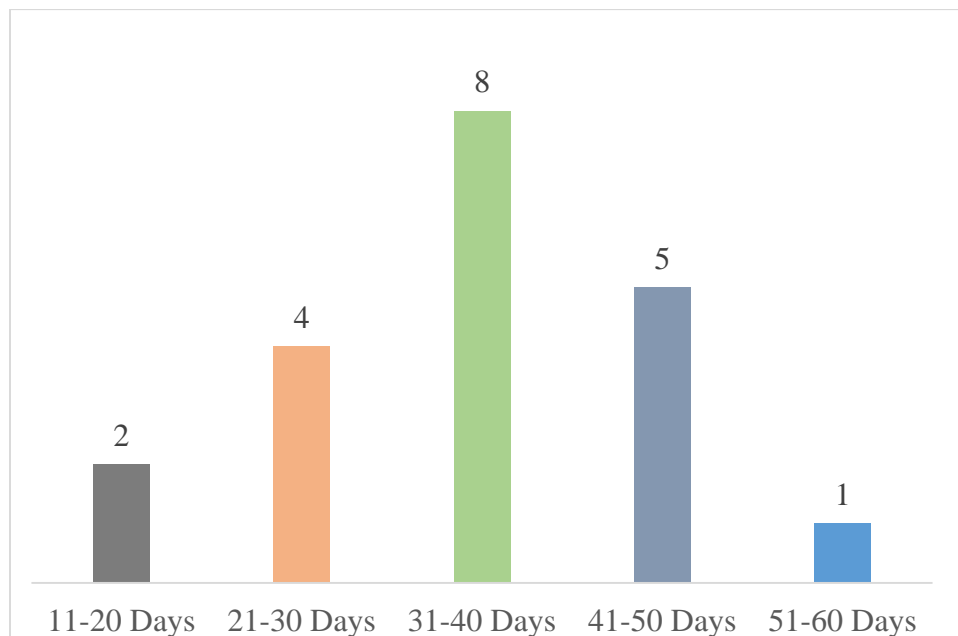
Figure 1: Age range of the participants

4.1.2 Gender

Among all the participants n=15(75%) were male and n=5(25%) was female.
Result shows that male was more affected than female.
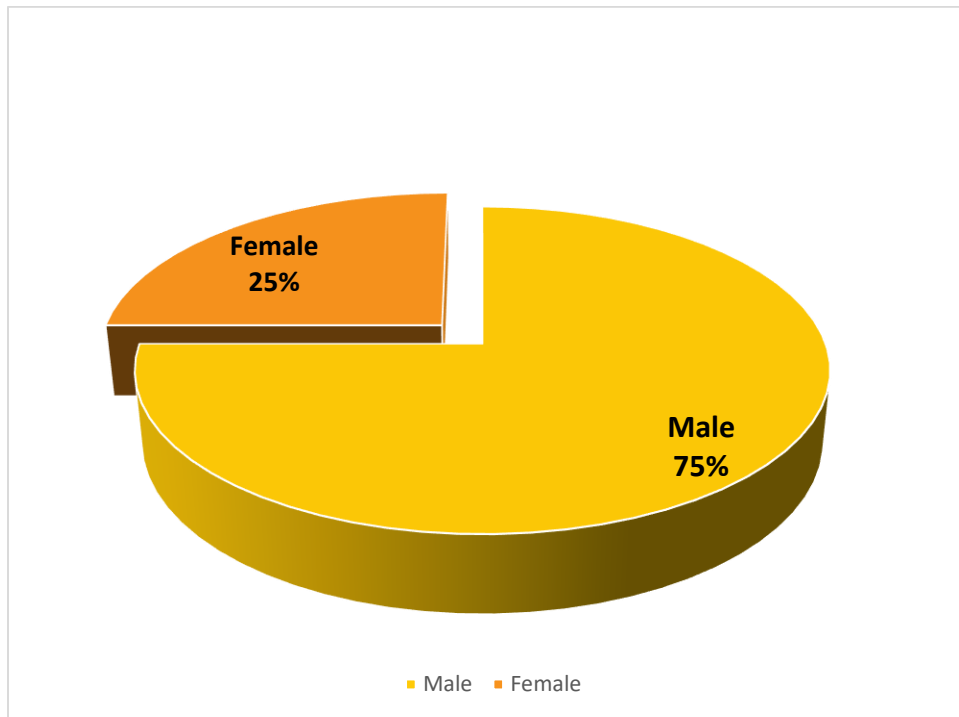
Figure 2: Gender of the participants

4.1.3 Religion

Analysis showed that among all the participants 90% (18 of 20) participants were Muslims and 10% (2 of 20) participants were Hindu.
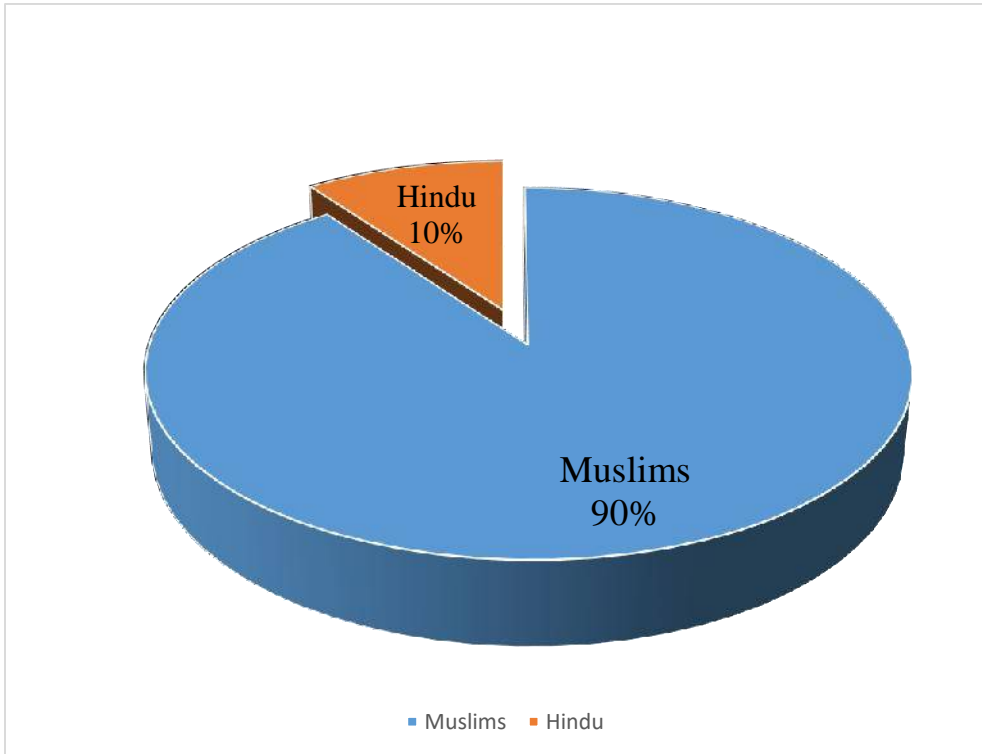
Figure 3: Participants of the religion

4.1.4 Living area of the participants

Among all the participant's researcher found that n=11(55%) were urban and n=9(45%) participants were rural.
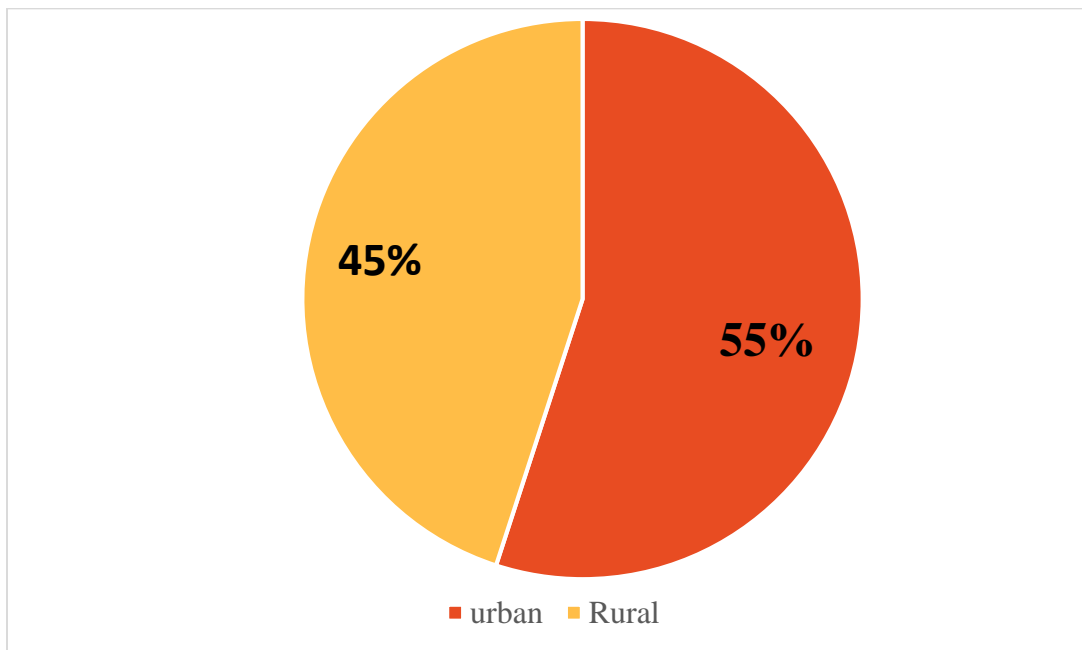
Figure 4: Living area of the participants

4.1.5 Family type of the participants

Result shows that among 20 of the participants n=13(65%) were from extended family and n=7(35%) participants were from nuclear family.
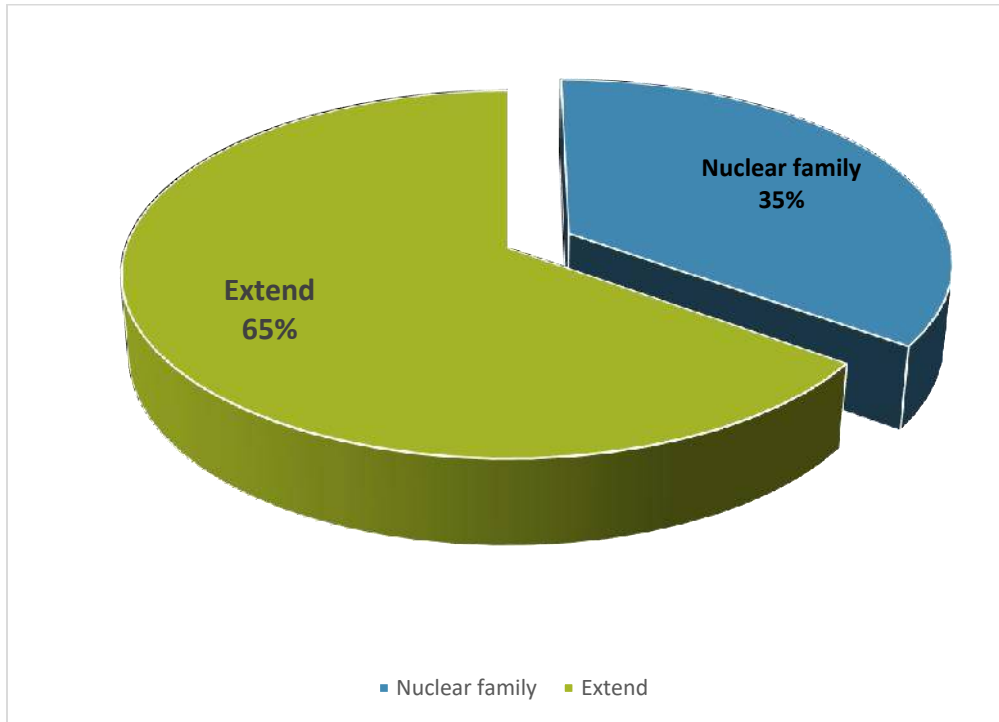
Figure 5: Family type of the participants

4.2.1 Birth history of the participants

Result shows that among all the participants approximately n=4(20%) were pre-term, n=16(80%) were term of the participants.
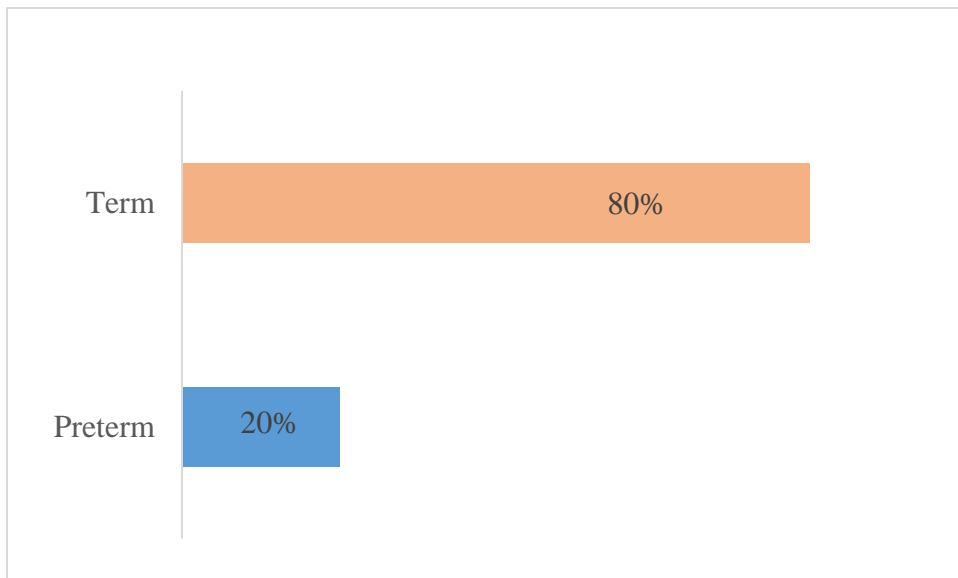
Figure 6: Birth history of the participants

4.2.2 Types of clubfoot of the participants

Result shows that among all the participants approximately 50% (10 out of 20) were rigid, 50% (10 out of 20) were non rigid.
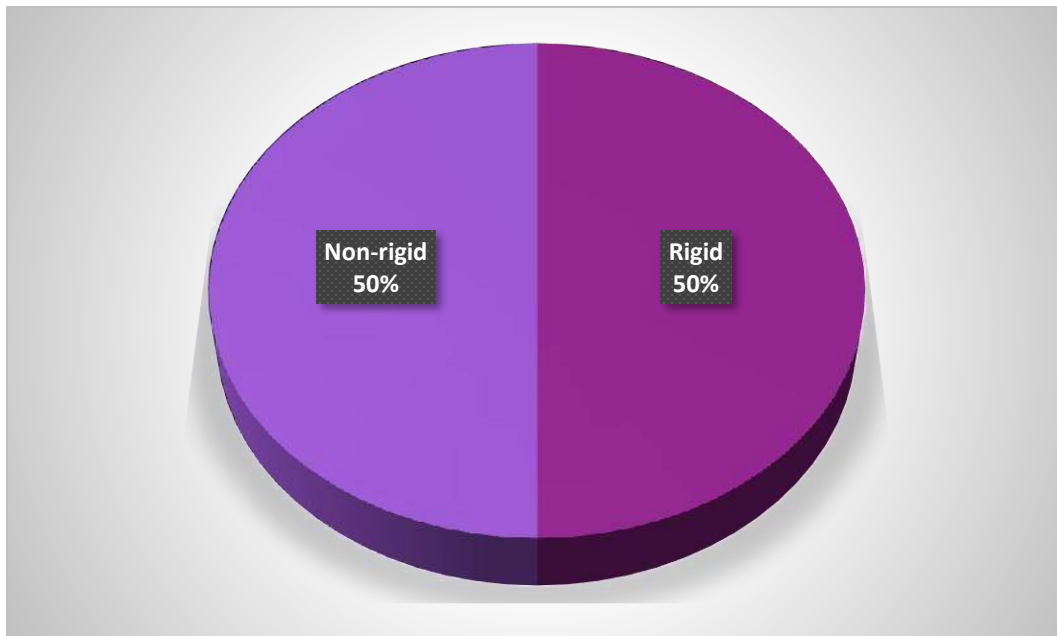
Figure 7: Types of clubfoot of the participants

4.2.3 Other congenital anomaly of the participants

Result shows that among all the participants approximately n=1(5%) had other congenital anomaly of the participants and n=19(95%) had no other congenital anomaly of the participants.
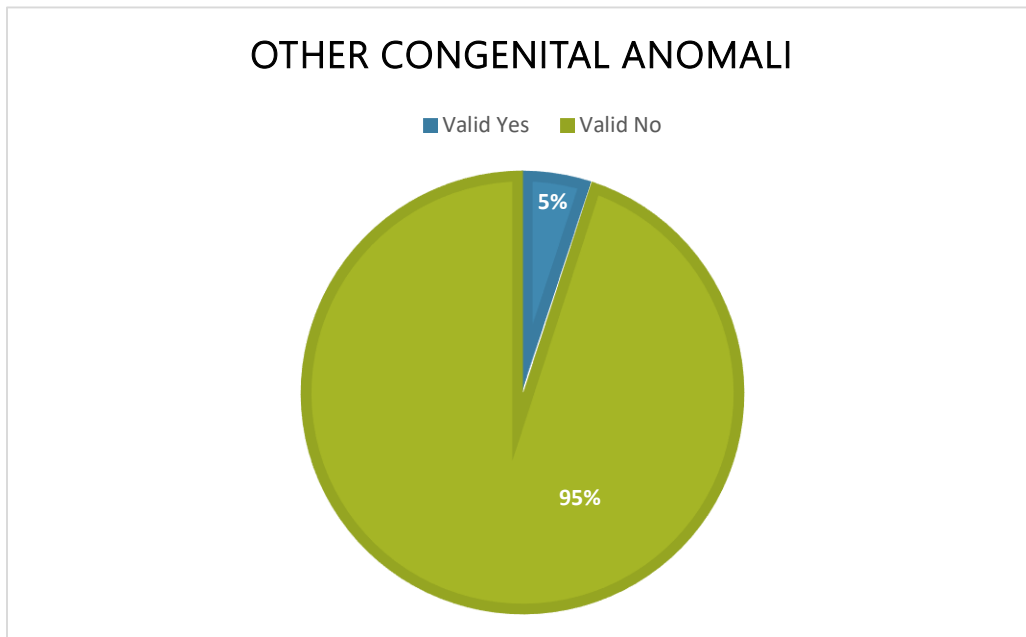
Figure 8: Other congenital anomaly of the participants

4.2.4 Referral sources of the participants

Result shows that among all the referral approximately n=5(25%) were publicity, doctors n=8(35%) were previous patients and n=7(40%) were others.
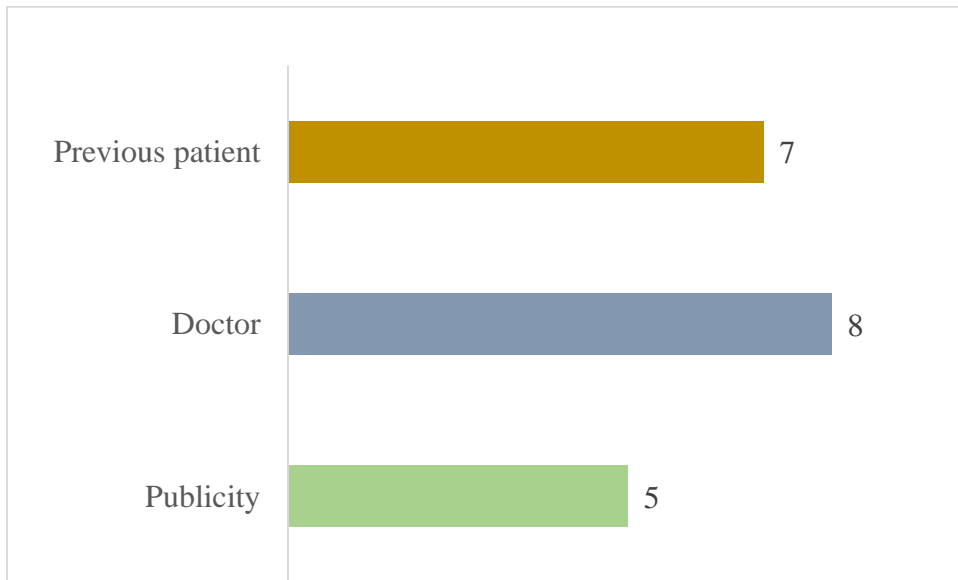
Figure 9: Referral sources of the participants

4.2.5 Past family history of clubfoot

Result shows that among all the participants approximately 15% (3 out of 20) had past family history of clubfoot and 85%(17 out of 20) had no past family history of club foot.

Past family history of clubfoot

15%

85%

Yes

No
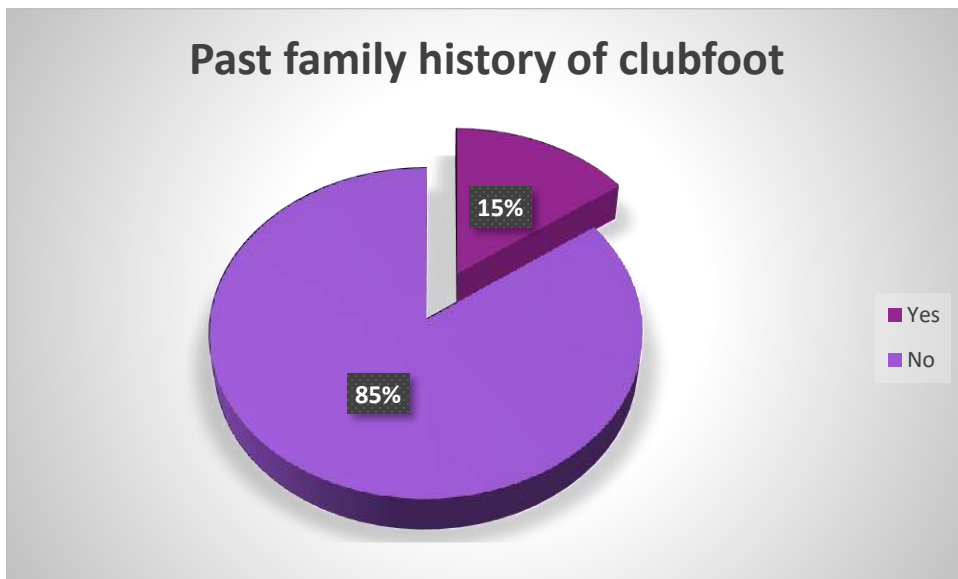
Figure 10: Past family history of clubfoot

4.3 Outcome of clubfoot treatment after manipulation and casting using Ponseti method

Pre-test & post-test score are showing that manipulation and casting using Ponseti Method for clubfoot patients is effective to improve functional ability for the children with club foot.

Table-1: Compare pre and posttest for Right Posterior Crease

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.875	± 0.222	0.771	0.979	17.616	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Posterior crease between pretest and posttest is (0.87500). Standard deviation is (±0.22213), t value is (17.616), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-2: Improvement of all participants of right Posterior Crease ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	19 person (95%)	1 person (5%)	0 person (0%)	
Post-test score	0 person (0%)	4 person (20%)	16 person (80%)	

According to Pirani severity scale 19 persons (95%) were severely abnormal in Right Posterior Crease function in pretest score where 16 persons (80%) were complete normal in post test score

Table-3: Compare pre and posttest for Left Posterior Crease

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.775	±0.302	0.633	0.917	11.461	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of left Posterior crease between pretest and posttest is (0.775). Standard deviation is (±0.302), t value is (11.461), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-4: Improvement of all participants of left Posterior Crease ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	14 person (70%)	5 person (25%)	1 person (5%)	
Post-test score	0 person (0%)	2 person (10%)	18 person (90%)	

According to Pirani severity scale 14 persons (70%) were severely abnormal in Left Posterior Crease function in pretest score where 18 persons (90%) were complete normal in post test score.

Table-5: Compare pre and posttest for right Empty Heel

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.850	±0.235	0.739	0.960	16.170	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Empty Heel between pretest and posttest is (0.85000). Standard deviation is (±0.23508), t value is (16.170), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-6: Improvement of all participants of right Empty Heel ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	18 person (90%)	2 person (10%)	0 person (0%)	
Post-test score	0 person (0%)	4 person (20%)	16 person (80%)	

According to Pirani severity scale 18 persons (90%) were severely abnormal in Right Empty Heel function in pretest score where 16 persons (80%) were complete normal in post test score.

Table-7: Compare pre and posttest for left Empty Heel

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.725	±0.343	0.564	0.886	9.448	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of left Empty Heel between pretest and posttest is (0.72500). Standard deviation is (±0.34317), t value is (9.448), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-8: Improvement of all participants of left Empty Heel ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	14 person (70%)	4 person (20%)	2 person (10%)	
Post-test score	0 person (0%)	3 person (15%)	17 person (85%)	

According to Pirani severity scale 14 persons (70%) were severely abnormal in Left Empty Heel function in pretest score where 17 persons (85%) were complete normal in post test score.

Table-9: Compare pre and posttest for right Rigid Equinus

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.800	±0.299	0.660	0.939	11.961	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Rigid Equinus between pretest and posttest is (0.8000). Standard deviation is (±0.29912), t value is (11.961), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-10: Improvement of all participants of right Rigid Equinus ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	18 person (90%)	2 person (10%)	0 person (0%)	
Post-test score	1 person (5%)	4 person (20%)	15 person (75%)	

According to Pirani severity scale 18 persons (90%) were severely abnormal in Right Rigid Equinus in pretest score where 15 persons (75%) were complete normal in post test score.

Table-11: Compare pre and posttest for left Rigid Equinus

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.825	±0.294	0.688	0.962	12.568	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of left Rigid Equinus between pretest and posttest is (0.82500). Standard deviation is (±0.29357), t value is (12.568), and p value is (0.000) [$p<0.05$]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-12: Improvement of all participants of left Rigid Equinus ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	16 person (80%)	4 person (20%)	0 person (0%)	
Post-test score	0 person (0%)	3 person (15%)	17 person (85%)	

According to Pirani severity scale 16 persons (80%) were severely abnormal in Left Rigid Equinus in pretest score where 17 persons (85%) were complete normal in post test score.

Table-13: Compare pre and posttest for right Medial Crease

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.900	±0.205	0.804	0.996	19.615	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Medial Crease between pretest and posttest is (0.90000). Standard deviation is (±0.20520), t value is (19.615), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table 14: Improvement of all participants of right Medial Crease ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	18 person (90%)	2 person (10%)	0 person (0%)	
Post-test score	0 person (0%)	2 person (10%)	18 person (90%)	

According to Pirani severity scale 18 persons (90%) were severely abnormal in Right Medial Crease in pretest score where 18 persons (90%) were complete normal in post test score.

Table-15: Compare pre and posttest for left Medial Crease

Paired Difference				t	df	Sig.(2-tailed)
Mean	SD	95% confidence interval of the difference				
		Lower	Upper			
0.650	±0.432	0.448	0.852	6.725	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of left Medial Crease between pretest and posttest is (0.65000). Standard deviation is (±0.43225), t value is (6.725), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-16: Improvement of all participants of left Medial Crease ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	13 person (65%)	2 person (10%)	5 person (25%)	
Post-test score	0 person (0%)	2 person (10%)	18 person (90%)	

According to Pirani severity scale 13 persons (65%) were severely abnormal in Left Medial Crease in pretest score where 18 persons (90%) were complete normal in post test score.

Table-17: Compare pre and posttest for right Lateral Head of Talus

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.900	±0.205	0.804	0.996	19.615	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Lateral Head of Talus between pretest and posttest is (0.90000). Standard deviation is (±0.20520), t value is (19.615), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-18: Improvement of all participants of right Lateral Head of Talus ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	19 person (95%)	1 person (5%)	0 person (0%)	
Post-test score	0 person (0%)	3 person (15%)	17 person (85%)	

According to Pirani severity scale 19 persons (95%) were severely abnormal in Right Lateral Head of Talus function in pretest score where 17 persons (85%) were complete normal in post test score.

Table-19: Compare pre and posttest for left Lateral Head of Talus

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.800	±0.251	0.682	0.918	14.236	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of Left Lateral Head of Talus between pretest and posttest is (0.80000). Standard deviation is (±0.25131), t value is (14.236), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-20: Improvement of all participants of left Lateral Head of Talus ability according to Pirani severity scale**.**

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	17 person (85%)	3 person (15%)	0 person (0%)	
Post-test score	0 person (0%)	5 person (25%)	15 person (75%)	

According to Pirani severity scale 17 persons (85%) were severely abnormal in Left Lateral Head of Talus function in pretest score where 15 persons (75%) were complete normal in post test score.

Table-21: Compare pre and posttest for Right Curved Lateral Border

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.800	±0.251	0.682	0.918	14.236	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of right Curved Lateral Border between pretest and posttest is (0.80000). Standard deviation is (±0.25131), t value is (14.236), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-22: Improvement of all participants of Right Curved Lateral Border ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	19 person (95%)	1 person (5%)	0 person (0%)	
Post-test score	0 person (0%)	7 person (35%)	13 person (65%)	

According to Pirani severity scale 19 persons (95%) were severely abnormal in Right Curved Lateral Border function in pretest score where 13 persons (65%) were complete normal in post test score.

Table-23: Compare pre and posttest for left Curved Lateral Border

Paired Difference				t	df	Sig.(2-tailed)
Mean	Std. Deviation	95% confidence interval of the difference				
		Lower	Upper			
0.750	±0.303	0.608	0.892	11.052	19	0.000

Table shows that, after completing 4 sessions (4-week) with manipulation and casting using Ponseti Method for clubfoot patients, the mean difference of left Curved Lateral Border between pretest and posttest is (0.75000). Standard deviation is (±0.30349), t value is (11.052), and p value is (0.000) [p<0.05]. By using parametric pair-t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti Method, patient got significant improvement in reduction of Clubfoot deformity.

Table-24: Improvement of all participants of left Curved Lateral Border ability according to Pirani severity scale.

	Scale Ranking			Total Number of participants
Pirani Severity Scale	**Level-1** Severely abnormal	**Level-2** Moderately abnormal	**Level-3** Normal	**20**
Right Posterior Crease				
Pre-test score	13 person (65%)	6 person (30%)	1 person (5%)	
Post-test score	0 person (0%)	2 person (10%)	18 person (90%)	

According to Pirani severity scale 13 persons (65%) were severely abnormal in Left Curved Lateral Border function in pretest score where 18 persons (90%) were complete normal in post test score.

CHAPTER V	DISSCUSSION

The study was indicated a process that could be continuing to establish the result. The purpose of this study is to evaluate the outcome of casting and manipulation using Ponseti method to improve functional ability among clubfoot children. To determine this, the researcher observed pre-test & post-test score in Pirani severity Scale among those children who had taken manipulation and casting.

The researcher found a statistical significant improvement in ability for the children with congenital clubfoot. The researcher observed 20 children's functional ability level by following Pirani severity scale before and after given manipulation and plaster cast. Their age range is 14days -6months. They have impaired functional ability.

In this study, there were 15 (75%) males 5 (25%) female cases. These findings are comparable to other studies while gender ratio in our study is more than Kumar et al. In Kumar et al. there were 31 (59.61%) males and 21 (40.38%) female cases (Kumar et al.,2017). Result shows that among all the participants approximately 15% (3 out of 20) had past family history of clubfoot and 85%(17 out of 20) had no past family history of club foot. In Tracey Smythe et al previous family history was present in 10.5% cases (Smythe et al.,2016).

In this study component of Hind foot score including score of posterior crease, Score of Empty Heel and score of Rigid Equinus were changed in posttest score after given manipulation and casting using Ponseti method. For these components the P value is (.000) [<0.05]. The component of Midfoot score is Score of Medial Crease, Score of Lateral Head of Talus and score of Curved Lateral Border were also changes significantly in posttest and P value is (.000) [<0.05]. By using parametric pair –t test on the data, the results were found to be significant. So, after manipulation and casting using Ponseti method, Patient got significant improvement in reduction of Clubfoot deformity.

The median Pirani score at the start of treatment was 5.5 (mean; 2 to 6). A Pirani score of > 5 predicted the need for tenotomy (p < 0.01). The 400 feet studied, 39 (97.5 %) achieved correction of deformity. (Shack N and Eastwood DM, 2006). The Ponseti method provides excellent results with an initial correction rate of around 90% in idiopathic feet. Noncompliance with a bracing is the most common cause of relapse. The current best practice for the treatment of CTEV is the original Ponseti method, with minimal adjustments being hyper adduction of the foot in the final cast and the need for longer term bracing up to four years (Jowett CR et al, 2011).

In another study the number of 218 children with 337 feet were suitable for inclusion. The median age was 8 months at treatment where 173 children with 268 feet completed casting treatment within the study period. The mean length of time for corrective treatment was 10.2 weeks where the range is 9.5–10.9 weeks. Among them 45 children did not complete treatment, 28 were under treatment and 17 were lost to follow up. In 85% of feet the Pirani score is 1 or less. At presentation the mean Pirani score was 3.80 where Standard deviation is 1.15 and in post-treatment the mean Pirani score is 0.80 and Standard deviation is 0.56. In this study P-value is less than 0.0001. A higher that means worse final Pirani score is highly associated with male gender and severity of deformity. The number of casts is depended on severity of deformity and age of the child more than two years. This case study shows that the majority of children in where the percentage is more than 80 with clubfoot can achieve a good outcome with the Ponseti manipulation and casting method (Smythe et al., 2016).

From over all discussion researcher can be said that Ponseti management is effective for clubfoot patients. Null hypothesis of this study is manipulation and casting using Ponseti method cannot change the outcome of post-test in the management clubfoot patients. But in this study it is proved that manipulation and casting using Ponseti method change the outcome of post-test in the management clubfoot patients. So null hypothesis is rejected in this study.

LIMITATION OF THE STUDY

100% accuracy was not possible in any research so that some limitation may exist. Regarding this study, there were some limitations or barrier to consider the result of the study. The first limitation of this study was sample size. It was taken only 20 samples. A very few researches have been done on a few of research among outcome of Ponseti management of clubfoot patients. So there was little evidence to support the result of this project study in the context of Bangladesh. Another major limitation was time. The period was very limited to conduct the research project on this topic. As the study period short so the adequate number of sample could not arrange for the study. As the study was conducted at Centre for the Rehabilitation of the paralysed (CRP) which may not represent the whole country.

As the study was quasi-experimental and one group data is used so there is no comparison group and so there is no comparison. This research project was a part of 4th year physiotherapy course and this type of work is first at this level, so there may have some problems in techniques and short out in term of practical aspect.

| CHAPTER: V | CONCLUSION & RECOMMENDATION |

6.1 CONCLUSION

Bangladesh is a very poor country in the world. Education, economy and other social aspects are very low level. People are not fully concerned about basic health care. Health services in Government and Non-Government sector are not sufficient, for that most of the people in our country not get proper treatment facilities. Some private clinic and hospitals are now trying to provide latest medical services, but nothing to be mentioned is about Ponseti method. People in our country think that Ponseti method is some form of plaster. But it plays great rules in medical sector and many children become disable due to lack of awareness of Ponseti method. Ponseti method is considered as an important treatment process in the develop countries. Clubfoot is the less major cause of disability, and there is need to identify the effective Ponseti caster interventions that will increase the functional activities of patients. Some Physiotherapy clinic and hospital provide Ponseti method for the treatment of clubfoot patients. Here is an important term that is Ponseti method. Besides the casting with tenotomy is very effective. It encourages the patients to willing participate in the treatment session and dramatically outcome can be observed. So the study was aiming to "Outcome of clubfoot treatment after casting and manipulation using Ponseti management for club foot patients at CRP." For the fulfillment of the study a quasi-experimental study was designed and collected 20 clubfoot patients as sample.

As a whole the clubfoot patients getting functional improvement after manipulation and casting and the result were significant. Last of all this study will try to represent the strong evidence of the "Outcome of Clubfoot patient after manipulation and casting using Ponseti method attended at CRP. By conducting the study, the researcher found effectiveness of Outcome of Ponseti management for club foot patients at CRP at patient's outdoor department at CRP. But it is not always possible to gain complete achievement.

6.2 RECOMMENDATION

The results of the study will be useful in improving service delivery of clubfoot at the outpatient department of CRP Savar. In addition, the results will be useful in developing effective interventions aimed at enhancing utilization of services. These results can be used by the hospital management to identify gaps in the delivery of health care services among health providers in the hospital, so that interventions are sought to improve the health care delivery, for instance improving the communication skills of health providers through refresher courses. It is recommended to do further research on large group of people from various districts and geographical areas in a quantitative approach. It is also recommended that there has a necessity to do a further research on condition and rehabilitation of the adult patients of clubfoot deformity.

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Informed consent
(Please read out to the participant)

Assalamualikum, I am Aysha Akter, 4th year student of BSc in Physiotherapy at Bangladesh Health Professions Institute (BHPI) under faculty of Medicine in University of Dhaka. To obtain my Bachelor degree, I shall have to conduct a thesis and it is a part of my study.

My thesis title is, "**Outcome of clubfoot patients after manipulation and casting using the Ponseti method attended at CRP**". To fulfill my research project, I need to collect data. So, you can be a respected participant of my research and I would like to request you as a subject of my study. I would like to know about some personal and other related information. This will take approximately 20 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. Your participation in the research will have no impact on your present or future treatment. I assure that all data will be kept confidential. Your participation will be voluntary. You have the right to withdraw consent and discontinue participation at any time of the experiment. If you have any query about the study or your right as a percipient, you may contact with me or my supervisor **Professor Md. Obaidul Haque**, Vice Principal of Bangladesh Health Professions Institute (BHPI) & Head of the Department of Physiotherapy, 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 interviewer………………………… Date……………………….

Signature of the researcher………………… Date………………………

আসসালামু আলাইকুম / নমস্কার,

আমি আয়শা আক্তার, আমি এই গবেষণা প্রকল্পটি বাংলাদেশ হেলথ প্রফেশন ইনস্টিটিউট (বিএইচপিআই)- এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপি কোর্সের অধিভুক্ত। আমার গবেষণার নাম হলো- "পনসিটি পদ্ধতিতে ম্যানিপুলেশন এবং কাস্টিং ব্যবহারে ক্লাবফুট চিকিৎসার ফলাফল।" এর মাধ্যমে আমি পনসিটি পদ্ধতিতে ম্যানিপুলেশন এবং কাস্টিং ব্যবহারে ক্লাবফুট চিকিৎসার ফলাফল সম্পর্কে জানতে চাচ্ছি। আমি আপনাকে অবগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না। এই গবেষণায় আপনার অংশগ্রহন বর্তমান জীবনে কোন প্রভাব ফেলবে না। আপনি যে সব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহন স্বেচ্ছাপ্রণোদীত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারেন। এই অধ্যয়নে অংশগ্রহণকারী হিসাবে যদি আপনার কোন প্রশ্ন থাকে তাহলে আপনি আমাকে অথবা আমার সুপারভাইজার, প্রফেসর এমডি ওবাইদুল হক, হেড অফ দি ডিপার্টমেন্ট অফ ফিজিওথেরাপি, ভাইস প্রিন্সিপাল অফ বাংলাদেশ হেলথ প্রফেশন ইনস্টিটিউট (বিএইচপিআই), সিআরপি, সাভার, ঢাকা- ১৩৪৩ তে যোগাযোগ করতে পারেন।

সাক্ষাৎকার শুরু করার আগে কি আপনার কোন প্রশ্ন আছে?

সুতরাং আমি আপনার অনুমতিতে এই সাক্ষাৎকার শুরু করতে পারি?

হ্যাঁ...........................   না............................

১। অংশগ্রহনকারীর স্বাক্ষর.....................   তারিখ.....................

২। উপাত্ত সংগ্রহকরীর স্বাক্ষর....................   তারিখ...................

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Questionnaire (English)

Title: Outcome of clubfoot patients after manipulation and casting using the ponseti method attended at CRP

Registration no:	
Date:	
Patient's name:	
Father's name:	
Mother's name	
Contact no:	
Address:	

Part-A: Socio-demographic information

Question no.	Questions	Response
01	Age of the patients	
02	Gender	1. Male 2. Female
03	Religion	1. Muslim 2. Hindu 3. Buddha 4. Christian
04	Living area	1. Urban 2. Rural
05	Family type	1. Nuclear family 2. Extended family

Part-B: Diseases condition

Question no	Questions	Response
01	**Birth history**	1. **Pre-term** 2. **Term**
02	**Types**	1. **Rigid** 2. **Non-rigid** 3. **Resistance rigid**
03	**Other congenital anomaly**	1. **Yes** 2. **No**
04	**Referral source**	1. **Publicity** 2. **Doctor** 3. **Previous patients** 4. **Others**
05	**Past family history of clubfoot**	1. **Yes** 2. **No**

Part-C: this part is designed to measurement the outcome of clubfoot patients after manipulation and casting using the Ponseti method attended at CRP.

Pirani severity scoring

0	Normal
0.5	Moderately abnormal
1	Severely abnormal

	Starting position	**Pirani severity scoring**			
				Discharge score	
		Right	Left	Right	Left
1	Score of Posterior Crease				
2	Score of Empty Heel				
3	Score of Rigid Equinus				
4	Total Hind Foot Score				
		Initial score		Discharge score	
		Right	Left	Right	Left
5	Score of Medial Crease				
6	Score of Lateral Head of Talus				
7	Score of Curved Lateral Border				
8	Total Mid Foot Score				
9	Total Score				

শিরোনাম: পনসিটি পদ্ধতিতে ম্যানিপুলেশন এবং কাস্টিং ব্যবহারে সিআরপিতে যোগদানকৃত ক্লাবফুট রোগীদের ফলাফল।

নিবন্ধন নম্বর:	
তারিখ:	
রোগীর নাম:	
বাবার নাম:	
মায়ের নাম:	
ফোন নম্বর:	
ঠিকানা:	

অংশ-A: সামাজিক জনসংখ্যা বিষয়ক তথ্য

প্রশ্ন নম্বর	প্রশ্ন	উত্তর
০১	বয়স	
০২	লিঙ্গ	1. ছেলে 2. মেয়ে
০৩	ধর্ম	1. মুসলিম 2. হিন্দু 3. বৌদ্ধ 4. খৃস্টান

প্রশ্ন নম্বর	প্রশ্ন	উত্তর
০৪	বসবাসের স্থান	1. শহর 2. গ্রাম
০৬	পরিবারের ধরণ	1. একক পরিবার 2. যৌথ পরিবার

অংশ-**B**: রোগের অবস্থা

প্রশ্ন নম্বর	প্রশ্ন	উত্তর
০১	জন্ম ইতিহাস	1. নির্ধারিত সময়ের পূর্বে 2. সঠিক সময়ে 3. নির্ধারিত সময়ের পরে
০২	ধরন	1. অনমনীয় 2. নমনীয় 3. প্রতিরোধে অনমনীয়
০৩	অন্যান্য জন্মগত অস্বাভাবিকতা	1. হ্যাঁ 2. না
০৪	নির্দেশনার মাধ্যম	1. প্রচার-প্রচারনা 2. ডাক্তার 3. পূর্বের রোগী 4. অন্যান্য
০৫	পূর্বে পরিবারের ক্লাব ফুটের ইতিহাস	1. হ্যাঁ 2. না

অংশ-C: এই অংশটি পনসিটি পদ্ধতিতে ম্যানিপুলেশন এবং কাস্টিং ব্যবহারে সিআরপিতে যোগদানকৃত ক্লাবফুট রোগীদের ফলাফল পরিমাপে ডিজাইনড করা হয়েছে।

পিরানি সিভিয়ারিটি স্কোরিং

০	স্বাভাবিক
০.৫	পরিমিতভাবে অস্বাভাবিক
০১	গুরুতরভাবে অস্বাভাবিক

	প্রারম্ভিক অংশ	পিরানি সিভিয়ারিটি স্কোরিং			
		প্রি টেস্ট		পোস্ট টেস্ট	
		ডান	বাম	ডান	বাম
০১	পোস্টিরিয়র ক্রিজের স্কোর				
০২	ইম্পটি হিলের স্কোর				
০৩	রিজিড ইকুইনাসের স্কোর				
০৪	মোট হাইন্ড ফুট স্কোর				
		প্রি টেস্ট		পোস্ট টেস্ট	
		ডান	বাম	ডান	বাম
০৫	মিডিয়াল ক্রিজের স্কোর				
০৬	লেটারাল হেড অফ টেলাসের স্কোর				
০৭	কার্ভব লেটারাল বর্ডারের স্কোর				
০৮	মোট মিড ফুটের স্কোর				
০৯	মোট স্কোর				

Permission Letter

May 30 , 2019

The Head of the Department
Department of Physiotherapy
CRP, Chapain, Savar, Dhaka-1343.

Through: The Head of the Department, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for research project.

Sir,

With due respect I state that I am a 4th year student of B. Sc. in Physiotherapy Department of BHPI, the academic Institute of CRP. I sincerely seeking your permission to collect the data for my research project as the partial fulfillment of the requirement for the degree of B.Sc. in Physiotherapy. The title of this research project is **"Outcome of clubfoot treatment after manipulation and casting using the ponseti method"** under the supervision of **Professor Md. Obaidul Haque,** Head of the Department of Physiotherapy & vice Principal of Bangladesh Health Professions Institute (BHPI), CRP, Savar, Dhaka-1343. I would like to assure you that anything of my research project will not be harmful for the participants.

So, I therefore, pray and hope that you would be kind enough to grant my application and permit me to collect data to accomplish this research project.

Sincerely yours,

Aysha Akter.

Aysha akter
4th Year, B. Sc. in Physiotherapy,
Roll no: 04, Session: 2014-15,
Bangladesh Health Professions Institute (BHPI),
(An academic institution of CRP)
CRP, Chapain, Savar, Dhaka-1343.

Approved

Mohammad Anwar Hossain
Associate Professor & Head
Physiotherapy Dept., CRP
CRP-Chapain, Savar, Dhaka-1343

Forwarded & Recommended

Prof. Md. Obaidul Haque
Head, Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Savar, Dhaka-1343

Ref: CRP-BHPI/IRB/09/19/1353

Date: 23/09/2019

To
Aysha Akter
B.Sc. in Physiotherapy
Session: 2014-15, Student ID: 112140235
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal **"Outcome of clubfoot treatment after manipulation and casting using Ponseti Method attended at CRP"** by ethics committee.
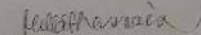
Dear Aysha Akter,

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

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

The study involves use of a questionnaire to explore outcome of clubfoot treatment after manipulation and casting using Ponseti Method for club foot patients attended at CRP that may take 15 to 20 minutes to answer the questionnaire and there is no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 11 AM on 18th August, 2018 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,

[signature]

Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh