



**M.Sc. in Rehabilitation Science**



**Bangladesh Health Professions Institute (BHPI)**

**Faculty of Medicine  
UNIVERSITY OF DHAKA**

# **Satisfaction Level of the Primary Caregiver of Children using Lower Limb Orthotic Device and Services at a Selected Rehabilitation Centre's in Dhaka**

**By  
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**Faculty of Medicine  
University of Dhaka**



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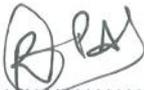
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## LIST OF ACRONYMS

<b>AFO</b>	:	Ankle Foot Orthosis
<b>ADL</b>	:	Activity of Daily Living
<b>ADR</b>	:	Adjustable Dynamic Response
<b>CRP</b>	:	Centre for the Rehabilitation of the Paralysed
<b>CP</b>	:	Cerebral palsy
<b>CRPD</b>	:	Convention on the Rights of Person with Disabilities
<b>CoPP</b>	:	Co-polypropylene
<b>DALY</b>	:	Disabled Adjusted Life Year
<b>EMF</b>	:	Electromyography
<b>EVA</b>	:	Ethylene vinyl acetate
<b>FO</b>	:	Foot orthosis
<b>GBS</b>	:	Guillain Barre Syndrome
<b>GR</b>	:	Genus recurvatum
<b>ICRC</b>	:	International Committee of the Red Cross
<b>KAFO</b>	:	Knee Ankle Foot Orthosis
<b>KO</b>	:	Knee Orthosis
<b>LLO</b>	:	Lower Limb Orthosis
<b>P&amp;O</b>	:	Prosthetics and Orthotics
<b>SB</b>	:	Spina bifida
<b>TKR</b>	:	Total Knee Replacement
<b>WHO</b>	:	World Health Organization
<b>SLS</b>	:	Step Length Symmetry
<b>ANOVA</b>	:	Analysis of Variance

## ABSTRACT

**Background:** Physical disabilities are the main cause of deformity in the children's and world incidence between 2% to 3% per thousand live births. Around 80% of children with disability live in developing countries and state only fewer no of children are getting rehabilitation services. Caregiver is the ultimate need of lifelong requirement for physical disabled children to maintaining their quality of life.

**Objective:** The objective of this study was to find out satisfaction level of the primary caregiver of children using lower limb orthotics device and services as well as identify level of comfort, appearance, effective outcome of the orthotics devices and services facilities. The main important objective was to investigate the quality of professional service about the orthosis.

**Methodology:** The study has been designed using a cross-sectional design. QUEST 2.0 was used to satisfaction level of the primary caregiver of children using lower limb orthotic device and services provision at a selected Rehabilitation centres in Bangladesh.

**Results:** The subjects recruited in the present study were a group of children aged 1-18 years. The number of Sample size was 253. The mean of the total satisfaction of the primary caregiver was more or less satisfied (3.61 out of 5 in QUEST 2). The satisfaction of the primary caregiver of comfort, appearance and effective outcome is (3.68) more or less satisfied. Sixty-five percent were below knee assistive device and above knee fifteen percent. Patient had difficulty to walk on stair or walking without device; difficulty (40.2%), Walking without device (40.7%). The quality of professional services was quite satisfied. There was no significant difference between gender and services.

**Conclusion:** The Study revealed that no statistically significant difference regarding satisfactions level of the primary caregiver of children using lower limb assistive device and services but in complimentary services were found slightly higher score than assistive devices and services. Even though the result was more or less satisfied but they experience pain and difficulties walking on challenging surface.

**Keywords:** CP, LLO, Stroke

# Chapter I

## INTRODUCTION

### 1.1. Background

The dissemination of disability in Bangladesh is considering being peak for reasons related to poverty, illiteracy, shortage of awareness, insufficient of treatment, medicines, medical care. Disability is a great social and economic phenomenon in Bangladesh. In Bangladesh, disability rate in the rural and urban areas. The highest number of males are affected than women (Md. Ismail , Sharifa , & Yasuhiko , 2014).

The prevalence of adult and children is near around 16.41% among total disability in Bangladesh. According to worldwide data more than 13 million people are suffering from at least one types of disability. Cerebral palsy is one of the bangladeshi's major causes of disability and world incidence between 2% to 3% per thousand live births. Around 80% of children with disability live in developing countries and state only fewer numbers of children are getting rehabilitation services (Gulam, et al., 2015).

Cerebral palsy is the disorders of movement and posture which cause activity limitation. It is non-progressive disturbance occurring in the development fetal or infant brain. Motor disorders of cerebral palsy are often accompanied by the disturbance in cognition, sensation, communication, perception and behavior by a seizure disorder. The primary deficiency includes muscle tone abnormalities influenced by position and movement, impairment of balance and coordination, decrease strength and loss of motor control. The secondary musculoskeletal problems are muscles contracture and bone deformities. The further motor dysfunction and develop progressively in the primary deficits. There is no therapy for brain injury leading to the motor problems and that characterize cerebral palsy. In normally, the rehabilitation of these types of patient needs physiotherapy techniques repeatedly to the range of motion or status of patients. The main goals of these interventions are: to decrease the development of another disease, work on muscle tone, provide stretching of muscles, increasing range of motion, to provide strength the weak muscles, improve mobility and acquire functional motor skills and independence walking (Mariusz, Wojciech, Magdalena, Joanna, & Sławomir, 2010).

Moreover, among the disabled people 22.5% are suffering from physical disabled. In Bangladesh, stroke is the nearly third-largest cause of death worldwide. Hypertensions are the principle cause of ischemic and hemorrhage. The largest number of disability-adjusted life years (DALY) lost due to stroke (485 per 10000 people) show that stroke has serious impact on the economy of Bangladesh. The smaller percentage of patients with stroke history last year (9percent) or temporary ischemic attack (3percent). 54 percent and 46 percent lived in urban and rural areas based on demographic data. Hypertension (63percent) is the primary risk factor for accompanied by heart diseases (24 percent) and diabetes mellitus (63percent). All Risk percentage for stroke was larger than 100% because of some patient have multiple problems. Another problem is also the main factor road trauma accident. The percent of road traffic accident is increasing day by day in Bangladesh. The orthosis satisfactions around 60% of the participants were satisfied; 16.7% were satisfied 11% mentioned that they felt partially satisfied and another were dissatisfied. The ultimate goal of the patient is reintegration into the activity of daily living activities. The goal of the orthosis is to achieve daily functional orthosis use with good stability, balance and appropriate weight shifting (Mohammed , et al., 2013).

In stroke, AFO improve the bio-mechanics and efficient by clog the passive and active planter flexion in swing and stance phase. In the use of AFO, there is less chance of hip and knee flexion & pelvic elevation to gain foot clearance. AFO will improve the knee extension and improve stance stability during the period of decrease muscle tone. In cerebral palsy, AFO plays an important role in gait pattern efficient and improve the ambulation of children with cerebral palsy. The main important part is quality of healthcare system. The ease in which the patients and consumer can collect information together and put some pressure on the quality of care provided by the professions (Abbaskhanian, Vahid, Ataollah, Roshanak, & Masoud, 2015).

One study conducted in USA regarding” User satisfaction with orthotic devices and services satisfaction. In that research patients waiting more than 30 months for new orthosis and first orthosis were less satisfied with orthotic comfort, fit and appearance. Result based on the agree or strongly agree to the statement. Orthotist did not discuss issues that should be discussed and around 17 percent agree to orthotist appeared to be in hurry. Sometimes professional don’t have time to

discussed the issues. The results suggested that a focus should be on improving communication between patient and orthotist in order to improve the quality of care. In one of the studies conducted in Malawi, they shared some information about half of the aid equipment. They were in use needed repaired, 39% patient felt pain from the assistive devices and 79% experienced wound or skin irritation in the summer time. The technical correction of the device, manufacturing of the device, comfort, cosmetic appearance, and durability & its function of the device all plays vital role for the patient. (Ya- Ling , Chiung-ling, Shu-Zon, Chung-Hui , Fen-Fen , & Kwok-Tak, 2014).

Most of the factors influencing patient satisfaction with healthcare services include competence of providers, providing emotional support, efficiency and structure of facilities and being treated with respect (Bowling, 2014). The main work of orthotist is patient assessment, formulation a new idea to make innovative orthosis according to their deformity. The implementation of an appropriate treatment and evaluation will provide to the patient. To support the orthotist and prosthetist paradigms, current efforts must be apply on patient access and improve the effectiveness of orthotics & prosthetics (O & P) treatment (Halsne, Hafner, Peaco , & Brian J, 2011).

Measurement and quantifying the achievement of orthotic user of result measures, standardized tools or design new assistive devices for different treatment. The uses of orthotic devices user outcome measures allow practitioner to monitor orthotic and prosthetic treatment of plans and patient outcome. The most vital relevant and informative data about treatment and improvement in prosthetics and orthotic. It may be collected from using all standard tools in health care system. Orthosis are indicated for the different kind of reasons. It maintains the range of motion of the joint, support feeble musculature problems and corrects deformity. With the help of prosthetic device, patient can achieve any desire activity. Orthotic patient doesn't have another option to use device and still function although optimally. Most of the orthotic patient have problem in hill climbing that's why they abandon a device and dissatisfied with the function. If you will compare both orthotic and prosthetic devices so orthotic are temporary intervention where else prosthetic device are permanently or sometime lifetime. Orthotic device wearing time table is very less as per as financial satisfactory outcome (Peaco, Halsne, & Hafner, 2011).

Ankle foot orthosis are usually molded from plastic like thermoplastic sheet (copolypropylene (CoPP) and polypropylene sheet (PP). Mostly for the cerebral palsy

children, professionals prefer rigid and articulated ankle foot orthosis with the help dorsiflexion and Plantar-flexion stops. The main important role of AFO is to determine the effect such as reducing push-off force therefore the AFO prohibit planter flexion. In the initial phase, biomechanics will increase ambulation speed. Some multi-national companies provide additional and different type of devices for example Dynamic AFOs (DAFO) and adjustable dynamic response (ADR) AFOs. It allows more flexibility than solid AFOs. Different type of sheets has elastomer components that produce changeable resistance to dorsiflexion and planter flexion on the basis of problems in children with CP, crouch gait and Equinus. In this research article, that researcher was comparing dynamic AFO (Ankle foot orthosis) and solid AF (Ankle foot orthosis). Parent satisfaction with the lower limb orthosis was higher for the dynamic ankle foot Orthosis as compare to solid ankle foot orthosis. The main reason behind this satisfaction is fitting, weight, comfort/pain, ease of using and cosmesis. They were found no difference in term of the services, function and quality of life. Participant had recorded walking time period with two different devices. They compare both ambulation time between the DAFO style brace and adjustable dynamic response AFOs. Dynamic Ankle foot orthosis is far better than other AFOs in terms of correction deformity, to stop unwanted motion, to allow further motion of the joint (Tishya A. , James , Nicole M, Sandra, Bitte, & Susan, 2015).

Orthotic device process includes patient assessment, casting, modification, fitting of the orthotic devices. All these orthotics devices used for treatment purpose e.g. impairment in movement, multiple sclerosis patients, spinal cord injury patients and cerebral palsy and neurological and musculoskeletal disorders patients. Another problem like Duchenne muscular dystrophy, patellofemoral pain, rheumatoid arthritis, orthopaedic and crush injuries. (E.g. knee osteoarthritis and anterior cruciate ligament reconstruction. Participant's satisfaction is believed on the frequency of wear orthotic devices as well as long term use of the orthotic devices. User satisfaction is not defined by the use of orthotic devices but it is also depending on the cost of the devices and support services. In generally, patient satisfaction is accepted to be in the whole supervision or management of assistive orthotic devices. Till now, professional has developed little improvement in patient reported outcome measures concerning orthotic devices. Professionals, clinicians and researchers can improve the orthotic device on the basis of satisfaction data and the dissatisfaction

report of the users. Such as cosmetics, appearance, pain, proper fit of the device, poor level of function and Interference of activities. Knowing user preferences enhances the use and effectiveness of orthotic device and thus creates greater patient compliance, making it easier for patients to continue engaging in their social environment or other activities (Eva, Christophe, Johan, Stephan, David, & Eric, 2015).

## **1.2. Justification**

Orthosis is important external part of the body for improve the gait, reduce the pain, restrict motion, to stabilized the joint and improve the function of the joint. In the world-wide few countries of people are not satisfied to the orthotics devices. People faced lots of problem while doing activity of daily living (ADL). In the starting phase, using orthosis patient faced lots of problem like heavy weight, donning and doffing problems, uncomfortable, durability etc. Lots of research already done on level of satisfaction of caregiver with lower limb orthotic devices in other countries. According to previous research lots of patients have problem in comfort, appearance and durability. Some professional's behavior very rudely towards the patient while during the treatment and especially in the follow up. People are suffering from skin allergy due to defective quality of material. There is no study conducted in Bangladesh regarding level of satisfaction of the primary caregiver of children using lower limb orthotic device and my study will contribute to improve the services of CRP though experience, knowledge and problems. Clinical facility and quality of product will improve then patient get more benefits and improve the quality of life. According to research, those patients who have job or income around (40%). They replied that while using orthotic device cause frequently pain than who have temporary job or income. It is crucial study for patient satisfaction with the assistive devices and what has been done for him to achieve maximum function, comfort and cosmesis appearance. The purpose of this research which would helpful in evaluating various services delivered to stroke, heart, fracture, cerebral patients and to determine whether the patients felt that these sufficient to them. It is important to know the level of satisfaction of primary caregiver and dissatisfaction of the patients for the effective's services. It will be possible to minimized envisage issues by using an effective and intervention. By these ways patient and parents easily understand the

main idea and be motivated to be continuing prosthetic and orthotic services. Prosthetics and orthotics service play a vital role in the community rehabilitation and reintegration. It is initiative to be beneficial for sibling, family members, care providers, professionals and community when orthotic patient are continuing the PO services. For the developing an effective role delivery system. It is important to know the level of satisfaction of primary caregiver of children using lower limb orthotic devices and services at CRP. This study has not done in the bangladesh. After this study, researcher will collect & share the data and information and results from the DPO unit. By adding more information to easily understand the important variables that are basis of the patient's service satisfaction. This research may be helpful for the service provider to continue good understanding with the siblings and family /caregivers by sharing and understanding possible current problem before, during and later receiving orthotic services. My research will focus on the devices, services including durability, ease of use, effectiveness, weight and services, comfort, cosmesis, dimension, professional services, follow up services etc.

### **1.3. Research Question**

- To identify the satisfaction level of the primary caregiver of children using lower limb orthotic device and services facilities at a selected Rehabilitation centre's?

### **1.4. Operational Definitions**

**Satisfaction level:** Satisfaction is the perceived level of pleasure and contentment from the product or service. An act of satisfying of the fulfillment, gratification or confidence of orthosis of the selectively choice is most effectively substituted for lost muscles or lost nervous control of muscles.

**Primary caregiver:** The primary caregiver is the individual person primarily responsible for the care and upbringing of the child or patient.

**Lower limb:** It is a part of the body extending from the gluteal region to the foot Lower limb includes the hip, knee and ankle joints and the bones of the thigh, leg and foot.

**Orthotics:** It is a branch of medicine that deals with the principle and artificial device. It is an externally applied device commonly used to maintain skeletal system and neuromuscular system & its functional features. Orthosis is a medical treatment for physical handicapped and disable person to improve, support the conditional of the problem.

**Orthosis:** It is used to immobilize a particular extremity, support, control, manage deformities, compensate the abnormalities of segment shape and length, provide posture feedback, prevent excessive range of joint motion, and stop unwanted movement of the body segment for individual reasons.

Restrict unwanted movement, assist movement gradually, Fewer weight bearing forces on selected joint, influence muscle tone, maintain correction of the deformity or joint replacement after surgery to relieve pain by reducing forces around joints, assist locomotion and provide easier movement capability to the body, to restrict further deformity and improve the function of the hand.

**Rehabilitation centre:** The Rehabilitation centre is the center where person can take aliment, injury treatment and therapies or any kind of treatment. The aim of the rehabilitation following orthosis patient is to restore significant level of functioning that allow the patients to potentially achieve their expected target, to enhance the person health and improve their participation in society and provide a better quality of life while using an orthosis than without orthosis.

## **Chapter II**

### **LITERATURE REVIEW**

An orthosis is defined as an external device applied to the body's surface to enhance physical movement of the affected body part, restrict unwanted movement and provide support for a portion of the body. Orthosis indicated to assist ambulation, reduce pain, decline weight-bearing, control unwanted movement and improve the correction of the deformity. Non-ambulatory patient can also assist lower limb orthosis with transfer and mobility skills and try to make or assist ambulatory patient towards safe walker. Ambulation aids should be used with the lower limb orthosis to provide more stable ambulation during training. (Hasan, N., & Yunus, 2018).

Foot orthosis is used for recently injury and partial fracture. Foot orthosis plays an important role in post-management and to accommodate, correct, prevent from further injury. CPO also provides custom shoes and fracture boot and other types of a custom-made foot orthosis. Orthosis have some responsibility to achieve patient goals. Orthotist has to give all the information regarding the wearing the orthosis. There is huge no of deformities pes cavus, pes planus, hammertoes, hallux valgus (bunion), diabetic foot, plantar fasciitis or heel spur, recurrent ankle sprains etc. Most of the foot orthosis plays a crucial role in any type of foot deformity or problem. Knee orthosis are the best option for knee instability, joint contracture and tightness, moderate to severe ACL (anterior cruciate ligament), MCL (medial collateral ligament),and LCL(lateral collateral ligament) instabilities, Uni-compartmental knee osteoarthritis(OA), ligament instability, post – operative knee instability and various knee disorder and deformities. Our CPO expert will guide you and custom fit you with an orthosis that is tailored to your need to help lower your pain. Knee ankle foot orthosis has many uses for stabilizing the joint. KAFO is prescribed for those patients who have a problem in the knee joint, other muscular weakness in the knee instability, genu recurvatum, genu valgum / varum, spinal cord injury, MS (Multiple Sclerosis), spina bifida, cerebral palsy, Guillain barre syndrome, total knee replacement and trauma. Clinic of prosthetic and orthotic provides custom fabricated KAFO that would assist you while walking and lesser your discomfort. There are different types of KAFO for particular patient that

increase the patient walking pattern of the patient. (Elisa, Giorgio, Hadeel, Elisabetta, Giuseppe, & Franco, 2014).

One study was conducted on the use of orthosis in children with cerebral palsy about perception of caregivers. The most caregiver imagine that satisfaction when using the orthosis was related to the time of use of the orthosis was not long 77.8%, professional evaluation by the professional 100%, child adaptation of the orthosis 61.1%, there is no interfere between culture and religion 100%, receiving knowledge on the uses of the orthosis 77.8%, feeling safe while using orthosis 83.3%. Another factor was that influence the caregiver satisfaction about perception of improvement with the use of the orthosis. 77.8% caregiver replied that improvement in the wrist flexion and finger pattern and greater confidence and balance of the child when walking. The appearance of the device recorded positively by 77.8% of the caregiver, reporting that there are several options of models in the market with different design and prints. This might be attractive for children. They also shared children have opportunity to choose the pattern to customize the orthosis especially in the lower limb. Some of caregiver replied that the use of Velcro for its fixation is not long lasting and while washing time, it creates cumbersome to clean the orthosis. Few children used upper and lower limb orthosis and four children used only lower limb orthosis the caregiver replied that they had the feeling of this fact by the children crying during placing the orthosis, to remove in front of caregiver or even when they remove it alone. In the perception was discomfort, weight of the orthosis, pain, especially of the lower limb orthosis and heat produce by the orthosis. Dissatisfaction was 50% orthosis impairs the performance of the activities. With the orthotic device, playing activities is very arduous. They replied that orthosis create limited movement especially in upper extremity orthosis (ventral static for resting and thumb abductor (Janaína, Nadia, Mariana, & Luciana , 2019). Magnusson researcher said that more focus should be given on orthotic patient as well as the design of orthotic devices. Female patients were unsatisfied and moveable with the assistive devices whereas males were strongly satisfied. They had reported that fewer opportunities for possibilities to access Prosthetic & Orthotics, less capable of moving inside the house and unable to walk on uneven challenges. Caregiver of patient's percentage about concerning satisfaction was very low and it was arduous to clean the device. A large number of patients had paraplegia, after using orthotic

devices result fluctuated. Women had fewer education opportunities regarding devices and previous studies estimate that that 50% of females compare to 34% of males were had never attended school because of disabilities. Orthotic Patients reported significantly more difficulties while moving and walking with exceptional of the hills walking. Patient using orthosis had faced more problem or were unable to stand from a chair around 45%, move to their home 37%, walk on uneven ground 78%, walk on stairs 86%, the orthotic group replied they felt some problem to use four-wheeler vehicle. The patient satisfaction in sierra- Leone was quite satisfied with orthotic devices. Polio and violence constituted the most common causes of disability. The patient was using their device nine to ten hours. Majority number of the patients used orthotic devices. (Magnusson, Ramstrand, Fransson, & Ahlström, 2014).

One study was conducted in turkey on “Actual use and satisfaction of lower limb extremity orthosis in neurological disorder. The data was collected from the patients where male (109) and female (84). They were using the orthotic devices e.g. AFO (54.5%), KAFO (18.2%) and Orthopedic shoes (27.3%). Out of 231 prescriptions, patients revealed that the main issue was not buying the orthosis. According to the data 16.7% patients were purchased the orthotic device but he didn't use. 22.7% participants were irregular and quitted and remaining 60.6 % were used on a daily basis. The most of participants were suffered from post stroke hemiplegic syndrome, cerebral palsy, spinal cord injury and other disorders and neuromuscular diseases same diagnosis who never used their orthosis. The overall satisfaction of the neurological patients on the basis of regular and irregular usages of the orthosis and they revealed no statistical difference in the degree of satisfaction ( $2.7\pm 0.9$  vs.  $1.8\pm 1.1$ ). They had analyzed separately between AFO and OS, thoroughly for each orthosis group and they found a significant difference among the regular and irregular ( $p=0.0$  vs.  $p=0.03$ ). However, the degree of satisfaction was quite similar between the regular and irregular device KAFO users (0.75). (Sibel, İlke, Pembe, Neslihan, & Rengin, 2016).

Malawi and Sierra Leone research said the items of the questionnaires were comprised of questions related to patient's mobility and satisfaction, the use of their assistive device & services. Result of Malawi conducted by Magnusson et al showed that 50 per-cent of the assistive device that was repaired. Thirty-nine % of patient pain experienced from the assistive devices and approximately seventy-five percentages experienced from wounds and skin irritation. The study conducted in Malawi and also demonstrated that the developing country was needed to immediately focus on implementation of the CRPD regarding access to rehabilitation services and personal mobility. (Lina & Gerd , 2017).

Quantification satisfying plays a unique challenging because of lots of option of care that can check the caregiver satisfaction level. Satisfaction in P&O almost depends on patient expectation according to their experience about devices and services provided by senior or junior practitioners & facilities. Prosthetist & orthotist professional services are differed from related rehabilitation disciplines like (occupation, physical) in that clinician provide tangible devices orthosis and prosthesis) as per the part of standard treatment. The achievement of treatment and result based on the patient's satisfaction with their care whereas both are interlinked with the services and the uses of the device. As such, the use of satisfaction outcome measures that are developed to address services may not be appropriate for measuring satisfaction with devices or vice versa. Furthermore, specific aspects of patient satisfaction may be varying in different types of orthosis devices they received from professionals. The different orthotic device has different types of biomechanics, mechanism but result is same. Its whenever you wear an orthotic device you will face a different environmental problem; pathology problem and others definitely result will be vary.

One study conducted towards satisfaction of orthopedic and medical devices. According to research, result was the same but population problem definitely dissimilar. The research was conducted regarding the satisfaction with OMPD rated the key factors weight, fit, appearance, patient was highly dissatisfied regarding all the benefits. Patient and caregiver were completely strongly agreed in terms of weight 63.2%, fit 53.4%, free of abrasiveness 53.4%, free of abrasiveness 53.4% but dissatisfied and comfortable were 23.3% of the OPMD (Ivona, Daniela, & Viliam,

2015).

One patient was completely satisfied (strongly agree and agree) regarding weight 99.5%, fit 92.8%, durability 93.3%, pain-free 94.8%, free of abrasiveness 93.8%, and ease of application 95.8%. The total number of dissatisfactions in comfort 22.8% and appearance 12.4%, the total satisfaction is strongly agreeing 99.5% and agree 77.2% in all evaluated factors. One of the studies conducted in Iran in a single clinical regarding user satisfaction in orthotics and prosthesis. The most and least percentage of people were satisfied from orthotic fitted device and services and another upper-limb prosthesis. The percentage was more orthotic than prosthesis. The device satisfaction with the largest number of patients was for well-fitting of devices and the fewer number was unsatisfied from the appearance of the device. The level of service satisfaction was moderate and respect of staffs but the Coordination was less between the professional staffs and the user therapist and doctors. In a recent study the patient shared their problem regarding the quality of the devices was low and they were unsatisfied with the damage of the clothes while donning and doffing. All the orthosis was fabricated by local material and limited equipment, so the quality of product was not standard. In Iran market, they are selling all high quality of product but for professional it is not a difficult task. The price of device was high because they were making all the orthosis through handmade fabrication process and lack of financial governmental support and insurance for P& O devices and services (Kamiar & Hooman, 2011).

Another study conducted in the United Kingdom on the foot deformity and uses of ankle orthotic for adult. Approximate fifty-percent patient were more than 60-year-old or older and one fifth percentage were aged less than 40 years. Around two-third numbers of patients were using a foot and ankle orthosis in the past, one thousand two hundred two patients had received this treatment from the same hospital Artificial Limb Centre department. Foot orthosis and ankle foot orthosis were prescribed for 2312 patient in one year of the study. The most common material, they preferred EVA foam for foot orthosis with various density and EVA sheet for foot orthosis and another orthosis. The caregiver said that orthosis would be helpful for correction, compared with features of the patients agreed very helpful. The strong association amid regarding an orthosis as 'very fairly' and the extent to use trusted

that they would use it in the upcoming future. 91% percent were very satisfied with the orthotic service received from the department. The high degrees of satisfaction and funding the orthosis both have some strong relationship. Some caregiver said that they were satisfied but did not describe their orthosis as fairly helpful and 8% of people who were very disappointed regarding the orthotic devices (Kathleen, et al., 2010).

In the study of foot orthosis, participant with caregiver was around 9 to 40 with most of the male and female. The experimental based on prefabricated and customized foot orthosis like heel cup, wedging, medial and lateral and heel lifts, external ankle support. Researcher assists most of the patients in the walking condition and another study based on the running and walking conditions. The number of four patients were involved in customized foot orthosis. This orthosis based on the semi-rigid polypropylene sheet or the level of medial wedging. One study also conducted on foot orthosis manufactured from ethylene-vinyl acetate without wedging or with wedging. They were observing electromyography (EMG).

Amplitude on peroneus longus and tibialis anterior. They found biceps femoris muscles amplitude significantly decreased by 11% with customizing foot orthosis in during running, whereas with the uses of wavelet analyses, they demonstrated the biceps femoris global EMG amplitude rapidly rose with several types of customized foot orthosis. The second study conducted on custom made external made external ankle supports compared to no ankle support during running and walking (George, Karl, Hylton, & Adam, 2009).

Human walking design to maintain ankle foot orthosis function in Guillain-Barre patients with drop foot without force mobility and sufficient muscles action are the constitutes. An irregular ambulation gait can be caused by any injury, accident, illness, pain or motor problems, due to any injury, accident, diseases, pain or problems of the motor. The main ability of orthosis to moderate the deformity or abnormality determines how much of the retained functionality. Foot drop is caused by injury of peroneal nerve, sciatic nerve, lumbosacral plexus, L5 nerve root, spinal cord (rarely caused isolated foot drop). Steppage gait affects the patient's ability to raise their foot at the ankle, is significant by an inability to point the toes towards the body or shake the foot at the ankle inversion or eversion. Guillain-Barrie is a

disorder of peripheral nerve, which is amalgam grouping of immune-mediated process. The clinic features weakness of muscles, paralysis and hypo-reflexes with or without sensory or automatic signs and symptoms. Foot drop patients usually used ankle foot orthosis, brace, or splint to stabilize the ankle foot. An ankle-foot orthosis is a device that applied externally to the calf band of the patient to improve the function of the muscular and neuro-skeletal system. The previous research focused on the design of the orthosis, the brace was a sample and the whole evaluation was based on the kinetics and kinematics effects of the gait cycle. Previous research indicated that the design of the ankle foot orthotics was based on the prototype sample and that the assessment was consistent with the kinetic and kinematic effects during walking (Jamshidi, Rostami, Najarian, Menhaj, Saadatnia, & Firooz, 2009).

One study conducted in Netherland on the user and satisfaction with ankle foot orthosis. The total number of patients was 123 both female (87%) and male (58%). The main diagnosis up-leading to the ankle foot orthosis prescription were broad ranging and included cerebrovascular trauma, multiple sclerosis, spinal disc herniation, osteophytes, cerebral palsy etc. They found the satisfaction score of 3.82 (include 1 from complete dissatisfaction-5 completely satisfied. In normally, dissatisfaction reason for AFO design and process of delivery, use, maintenance processes) were 26% and 20% respectively. Female were selected under the age of 18 and those people who were living alone score 30% and 33% systematically on dissatisfaction towards the AFO as a whole. They were found the level of dissatisfaction, statistically significant union between sex and dimension, sex and comfort. Females were dissatisfied over dimensions (18%) and comfort (48%). Some people have shown a statistical association for the items regarding safety and effectiveness. Those people were living with their family members, were more dissatisfied over the weight of the AFO (Holtkamp, Wouters, van, & Verkerk, 2015).

In one study, they prescribed ankle foot orthosis for children in foot deformities. In general, in shoe orthosis are indicating those patients who are suffering from pes cavus deformity, foot pain and mild balance impairments. We are prescribing ankle foot orthosis for children who suffer from pes cavus, foot drop, foot and ankle muscles weakness and ankle Equinus, mild to severe balance impairments, trouble in walking and abnormal gait deviation. There is a different type of orthosis for foot

deformities like pes cavus with poor balance (corrected by UCBL), Pes cavus (corrected by hinged AFO with SMO), foot drop with poor walking (Posterior Leaf Spring AFO), Pes cavus, poor walking, poor balance and foot drop (Hinged AFO with PF stop), global weakness of foot / ankle muscles and poor walking /with or without pes cavus, foot drop (Hemi spiral AFO) (Scheffers, Hiller, Refshauge, & Burns, 2012).

The knee ankle foot orthosis (KAFO) is used for genu recurvatum to treating posterior knee pain. The researcher checked the efficiency, patient tolerance and satisfaction. Genu recurvatum is the hypertension of the knee joint and the angle of knee joint greater than  $5^{\circ}$  in which the line of ground reaction force is anterior to the knee joint. These types of deformity are usually in stroke, cerebral palsy, multiple sclerosis, lower motor neuron and poliomyelitis. Genu recurvatum can occur in different neuromuscular and musculoskeletal disease. They collected 216 data on KAFO patients and 104 patient data on genu recurvatum treated by KAFO. Fewer numbers of patients denied to participate in the study, mostly patient got KAFO with offset knee joint. Fifty-seven numbers of patients were comfortable to the KAFO. They were free from pain, wound and other things. Thirty-three number of patients were suffering from genu recurvatum but 2 patients was lost from the follow up and 4 Patient used the KAFO less than 1 month. They analyzed data on the left 27 patient (Requier, Bensoussan, Mancini, Delarque, Viton, & Kerzoncuf, 2018).

One research was conducted about acceptance and satisfaction of neurological patient and their lower limb orthotics. The majority of the parents were satisfied or very satisfied, the general satisfaction was 76% and participants were 25. The greater satisfaction was found for safety 85%, weight 82%, effectiveness 82%, and dimensions 76%. The minority participants were unsatisfied about orthotic devices, and the large number of peoples for (n= 5) Comfort. For medical services 88%, service delivery 73%, and follow-up care. The majority of patients answered quite happy. Few participants didn't reply anything (49% and 18% respectively). These both services were not available at that time. Most participants 91percent consider their orthotic device to be inexpensive and solid either good or really good. Visual aspects and ability to hide with 67 % were indicated the lowest satisfaction and 64 percent patients responded very well. In total, 21 patients wearing their wearable on

a daily basis 64% while 12 patients (36 percent) were wearing several times but not every day. Approximately 70% of participants wore orthotic devices during the day with four patients (12%) part-day and six patients (18%) were able to put their device on the independently, 11 patients (33 percent) the nurse or physical therapist put on the device and four patients were able to use their orthosis device but for which they needed help. In patient with central neurological movement disorders for example multiple sclerosis (MS), stroke or cerebral palsy orthotic devices of the lower limb are often used. A huge number of patients were suffered from foot drop or knee hyperextension, leading to an uneven gait pattern, which was converted into higher energy cost during walking. Several positive points were mentioned in the literature regarding orthotic device. It was shown that wearing an ankle foot orthosis (AFO) decrease the energy expenditure and increase the walking speed. In the management of orthotic devices, however not only the functionality of an orthotic devices also important, but also the opinion of the patient. For example, patients' satisfaction about their OD could have an influence on the compliance, which is in turn influenced by both physical and psychological aspects as well as the perception of the family and environment. According to all patients 64% wore their device every day. Other numbers of patients didn't wear on a daily basis but they wear several times a day. The rest of the patients needed their device from nurses; therapist and four patients could use their orthotic device to do so. When Asked about general satisfaction 76percent of patients were satisfied and very satisfied. The peak number of patients replied, they felt safety 76%, weight 82%, effectiveness 82% and 76% dimension. One to five participants were not satisfied regarding their orthotic device, with the supreme patient for comfort. For Professionals services, service delivery and follow up services, most of the patients answered being very satisfied. For some patients, one of the 'Repair and servicing' and 'follow up' was required. (Eva Swine, Christophe, Johan, Stephan, David, & Eric, 2015).

In cerebral palsy and spina bifida, the main function of AFO in crouch gait to stop excessive knee flexion. It may also improve sagittal knee alignment during ambulation as well as coronal alignment. Some literature and kinematic data give such information about carbon fiber and polypropylene material sheets when using an AFO to increase the rigidity of the AFO. AFO posterior trim line is near approximately 3.8 cm or 1 1/2inch distal to the head of the fibula and it should be

explicit to the peroneal nerve. The proximal trimline should be covered around 3/4 of the calf muscles. The anterior AFO trimline should be located at the distal end of the Velcro strap and the orthosis to the midpoint of the shank. The ankle trimline location definitely affects the rigidity of the ankle joint rather than other factors. The foot trimline should be near to navicular bone higher or slightly above from the medial side of the foot. On the lateral side of the foot trimline extend slightly up to the metatarsal shaft. All the trimline should be smooth and properly finished. All the trimline should be just slightly below than the bony prominence. It prevents forward tibial movement and stop forward tibial motion (carbon fiber spring AFO) (N. & Yunus, 2018).

Management of hyper foot pronation of the foot, AFO had been prescribed in various studies but the effects of function and alignment shown vague. The impact of the ankle foot orthosis on cases of spina bifida to decrease the hyper pronation was immeasurable but correction is link to biomechanics based on the three-point system of pressure. Medial and lateral wall should be proper contour. Sustentaculum Tali plays a significant part in preventing abduction of the forefoot and forefoot valgus by lateral wall of the foot. Several studies performed on AFO, this orthosis may reduce valgus force at the knee and provide an exact AFO for disabled children. Before prescribing the orthosis, you should evaluate and assess, understand the functional deficiency associated with each lesion level. This is evidence that AFO should prescribe for specific deformities and it also improves the gait walking pattern. (Bryan, 2011).

Kamiar & Hooman researcher had done on research on user satisfaction with orthotic & prosthetic devices and single service in Iran. The total numbers of patients were 293 users (172 women, 121 men). Lower limb orthosis 60.7 % and upper limb prosthesis percent were the larger and fewer devices. Systemically, the highest score in device satisfaction was from proper fitting of the device. The best result of the lower score of user satisfaction was shown on the devices appearance and from the service satisfaction side, highest rating was seen on the staff's actions and appreciation and the lowest quality outcome was focused on the company departments product and services forms of the company departments. The most frequently uses of the device and services were insole, lumbosacral orthosis, cock-up

splint, below knee prosthesis and cosmetic hand & finger prosthesis. The number of upper limb prosthesis was fewer as compare to spinal and lower limb prosthesis.

Of the 124 enrolled students, 69 (55.65%) were males, and 55 (44.3%) children were aged less than 4 years, 45 (36.30%) were 4 -6.9 years 27(21.77%) were 7-12.9years, and 15 (12.10%) children were 13-17years. The main diagnosis was cerebral palsy (n=106.85%), 3(2.42%) had myelomeningocele, 2(1.61%) had multiple arthrogyrosis, 13(10.48%) and a further diagnosis. Four children unable to fulfill the autism criteria 10(8.06%) have minor condition and 24(19.35%) have severe disabilities. One hundred (80.64%) children required local health services, nine (7.26%) children required day care instruction and four (3.23%) received special education. In addition, the function improvements of assistive device of 103 children's (83percent) were achieved postural or functional change with the help of similar assistive devices. Few children's, twenty two out of twenty five (84.63%) Among them, 22 out of 25(84.63%) children who used assistive devices for communication, reading or controlling the environment achieved functional improvement, 19 out of 25(76%) children who used assistive devices for daily living or playing activity achieved functional improvement and 103 out of 118(87.29%) children who used assistive devices to improvement their mobility.

The Nordic help classification system for disabled person has been updated to classify the assistive device in this study. Here we divide ten types of assistive device for e.g. orthosis (Ankle foot orthosis) antispastic splint, 2) Personal mobility equipment like walker, wheel chair 3) therapy aids and training aids such as standing tables, positional wedges 4) communication aids such as boards 5) Daily living aids equipment such as curved spoons, semi-circle shape cup 6) learning mobility aids such as extended modified education materials, special computer interfaces 7) safety equipment e.g. helmets 8) environment control 9) play and recreation aids, such as modified toys. Professionals suggested some assistive device and the parent did not buy. They included orthosis (n=14,19.72%), assistive device for communication (n=2, 2.82%), Personal mobility aids (n=1,18.31%), Assistive devices for physiotherapy or occupation therapy and training (n=14, 19.72%), learning about Aids (N=3, 4.23%), safety equipment (n=1.41%), assistive devices for play and recreational (n=7,9.86%) and assistive devices for other reason (n=3,4.23%). The

explanations why parents did not purchase the suggested assistive device were as follows the price was too high (n=28, 81.85%); the assistive devices were not available at a local retailer (n=9, 16.67%). There was no room to storing the assistive device (n=9, 16.67%) and the parents felt that the assistive device was not suitable for the needs of their child (n=8, 14.81%) when the questionnaires were completed, 124 children had 224 assistive devices in use (179 assistive devices per child). Sixty-six (53.23%) used one assistive device, 35 kids (28.23%) used two, nine children's (7.26%) used play and recreation assistive devices, 4(3.23%) used learning assistive device, 3 (2.42%) used daily living assistive activity, 2 (1.61%) used assistive devices for learning purposes (Jen , Yee , Wen , Chau-Peng , & Yiu-Chung , 2007, 2017).

In one of study, they prescribed three types of orthotic devices an AFO (n=38,78%), KAFO (n=6, 12%) and knee brace (n=5,10%). Almost 35 were custom made (71%) the duration of uses of orthotic devices, defined as the length of duration from the prescription time to the last time. In addition, twelve participate had prescribed another orthotic device. All the responses to the questionnaire were depending on the current orthotic devices. The three most main important reasons for not using the orthotic devices anymore were for the females “not safe (n=23,100%), “not effective” (n=21, 91%), and “discomfort” (n=18, 78%), and the males “not effective” (n=22, 85%), “discomfort” (n=17, 65%), and “not safe” (n= 17, 65%). The esthetics dimension is not often as a justification not to use their orthotic device (n=6, 12%), just as the affected by others dimension “not interested in decision and society biases between 6% and 10% in total are not stated. Some participants wanted to change fourteen participant's (29%) did not want to change anything about the orthotic device. Four participants (8%, 1 male, 3 female) mentioned that they need more compatible device with their shoes. They wanted used that orthotic device with all kind of shoes, sandal and boots. Moreover, eight participants (16%, 4 males and 4 females) wanted to change the fixation material, due to too much tight and less durable. Other aspects that they would like to change were: the weight (8%, 2 twenty nine percent participate did not want to males and 2 females), ease of use (8%, 3 males and 1 female), aesthetical aspects (4%, all females), the dimensions (2%, 1 male) and the effectiveness (4%, all males). All parents and user's satisfaction closely related to process of providing the orthotic device. 23% males (88.5%) and

21 females (91%) were satisfied with the whole process of orthotic devices. No significant difference was found between males and females. No significant differences were found between the answers of the males and the females (Eva Swinnen, et al., 2018).

In another study were conducted in Netherland regarding use of and satisfaction with ankle foot orthosis. This survey shown that 1 out of 15 AFOs were not used at all. Approximately, three quarter of the AFO user was satisfied and one quarter was dissatisfied. Some females and users were living alone reported high level of dissatisfaction, especially dimensions, comfort, weight, safety and effectiveness. In general, dissatisfactions were about the AFO design and use and process of delivery and maintenance around 26% and 20%. The female those who were comes under age of 18 and living alone scored 30%, 33% and 30% respectively on dissatisfaction regarding the AFO. One of the studies conducted on effects of implantable peroneal nerve stimulation on gait quality, energy expenditure and participation and user satisfaction in patients with post-stroke drop foot using an ankle foot orthosis. Ten participants were included but data of two persons were not involved in this analysis. One patient suffered from a peroneal neuropathy immediately after surgery due to excessive tension on knee extension movement with lead wire upon on the joint, pulling the cuff in the bifurcation of the common peroneal nerve with lateral sural nerve EMG and magnetic resonance diagnosis. Another participant did not attend 28% of the assessment due to personal reasons unrelated to the intervention. In another point of view, one out of eight patients suffered from deep venous thrombosis of operated leg 11 days after surgery, participated in all assessments and were used for statistical analysis. Participants revealed that they used their orthotic device every day. In another group of six participants used their functional stimulation system (FES) system every day. In above two cases, out of three participants one participant used one to three days a week. Two participants used it four to six days a week. FES system patients were more satisfaction than ankle foot orthosis. Three of the nine items 33% revealed higher score for FES; one out of five around 20% gait - related items and two out of five around 50% non-gait-related items. They have found AFO patients scored on average neutral whereas in FES, they were only satisfied. Ambulation with FES achieved highest paretic ankle plantar flexion (FES: -0.12; AFO: -4.79, higher paretic ankle power (FES: 1.46;

AFO: 0.98 and improve step length symmetry (FES: 14.90; AFO: 21.45%. User and caregiver satisfaction were higher for FES, but was unlinked to objective gait further improvement. Energy expenditure and participation were similar. (Sven , et al., 2015).

Another study conducted on patient tolerance and satisfaction about Knee Ankle foot Ankle orthosis for treatment posterior knee pain resulting from genu recurvatum. They had collected 104 KAFO patient's data to treat genu recurvatum. In this study, 33 had a KAFO because of painful genu recurvatum, 4 patients gave up wearing the KAFO and 2 patients declined to involve in this study. In the initial process, pain was the main problem before and after being fitted with the KAFO. All patient's response was positive, because they felt some improvement with the VNRS pain score improving from a median of 85/100 first quartile=75; third quartile=90; range 50-100) to 25/100 (first quartile =10; third quartile=35; range 0-75). Caregiver participants reported that they used their device properly every day from morning to night around 9 -10 hours in their activity. They should be doffing the KAFO to wash themselves and sometimes when using bathroom, because overall size of the orthosis and it damage their trousers. Six patients out of 33 did not fit KAFO: 2 participants did not reply any emails or phone calls and four participants discontinued using the KAFO and three participants denied to fit the orthosis due to its discomfort weight and difficulty of use of them. Knee ankle foot orthosis was creating instability during walking. The frequently fallers were 67% before using the KAFO and 37% after getting orthosis (Benoit , Laurent , Julien , Alain , Jean , & Marjorie , 2018).

## **Chapter III**

### **RESEARCH METHODOLOGY**

#### **3.1. Objectives of Study**

##### **3.1.1. General objective**

- To find out the satisfaction level of the primary caregiver of children using lower- limb orthotic device and services at a selected Rehabilitation centre's.

##### **3.1.2. Specific objectives**

- To identify the satisfaction level of the primary caregiver service delivery at P&O department of CRP.
- To identify level of comfort, appearance, effective outcome of the orthotic device.
- To investigate the quality of professional services you received from prosthetics and orthotics department.
- To identify the socio-demographic characteristics of the participants.

### 3.2. Conceptual Framework

Table 3.1: Conceptual Framework

Independent variable	Dependent variable
Age	Satisfaction level of the primary caregiver of children using orthotic device
Sex	
Level of device	
Type of devices	
Orthotist spends reasonable amount of time for service	
Satisfaction with the training	
Professional services	
Repair and servicing	
Orthosis fitting	
Weight	
Comfort	
Ease of use	
Appearance	
Durability	
Affordability	
Follow up care and service	
Time is reasonable to get appointment	

### **3.3. Study Design**

The cross-sectional descriptive study with quantitative method was used to find out the satisfaction level of the primary caregiver of children using about lower limb orthotic device and services at selected Rehabilitation centre in Dhaka. It was effective design to collect quantitative information about the lower limb orthotic device and services.

### **3.4. Study Population**

This study was conducted for lower limb orthosis patient. Those patients who were came from different district of Bangladesh for follow up in CRP, P&O department which is located in different branch of CRP, in Bangladesh.

### **3.5. Study Area/Site**

The study was undertaken in the Department of Prosthetics and Orthotics CRP, Savar, Dhaka, Bangladesh.

### **3.6. Study Period**

Data collection was conducted from September 2019 to February 2019.

### **3.7. Sample Size**

The total sample required to conduct this study was 384 but during this time period. The sample size was collected 253 patients including all ages. The samples were those patients who came to follow-up in the prosthetic and orthotic department. So, the sample size was determined according to the following formula.

$$n = \frac{Z^2 p(1-p)}{d^2}$$

Here, sample proportion or percentage of incidence or prevalence,  $p=50\% = 0.50$

The value of the standard normal variant at a 95% confidence level,  $z=1.96$

Precision,

$$d = 5\% = 0.05$$

Therefore,

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

### **3.8. Inclusion Criteria**

- Caregiver of lower limb orthosis children who have completed the gait training at least one month follow up patient from P&O department of CRP.
- Children those who received orthotic device from CRP at the age group (1-18 year)
- The Main caregiver could be parents, grand-parents and paid caregiver.

### **3.9. Exclusion Criteria**

- Caregiver who were suffered from communication, hearing and psychiatric disorder
- Those patients who were upper limb congenital deformity and amputation.

### **3.10. Sampling Technique**

Convenience sampling is a non-probability sampling technique has been utilized in this study to identify satisfaction level of the primary caregiver of children using lower limb orthosis of whole population. Here selection of lower extremity orthosis patient was chosen for the satisfaction of the devices and services.

### **3.11. Data collection tool/Materials**

The data collection tool was QUEST 2. All the data collection collected by standard questionnaire or data collection form. All the information collected by the patient face to face. This quest 2.0 was develop by Louise Demers, Rhoda Weiss-Lambrou and Bernadette in 22Oct 2010. This tool was used for the measure the user and parent's satisfaction lower limb orthosis. Those patients who were suffering with cerebral palsy, foot deformity, spinal cord patient, stroke and other skeletal & neuromuscular problems. All the questions based on satisfaction of the assistive device, services and complementary question. Each question has five response scales, 1- not satisfied at all, 2- not very satisfied, 3- more or less satisfied, 4- quite satisfied, 5- very satisfied.

### **3.12. Data Analysis**

After the completion of data collection, the computerized statistical package of social science was used for entering, analysis and interpretation the data using descriptive statistical and inferential statistical. Demographic data, satisfaction level with devices services, complimentary services were described in frequency, percentage, mean, range and standard deviation and presented with descriptive statistical. Anova and T-test were used to describe the level of satisfaction of primary caregiver of children using with device and services.

### **3.13. Quality control and quality assurance**

Quality control and quality assurance was maintained by selecting participants a strictly adherence to the proposed criteria, converting all questioners in to Bangla language with the support of expert professionals. In addition to that, the entire question was asked in front of her children with the help of professionals.

### **3.14. Ethical Consideration**

Ethical clearance will be obtained from ethical review committee of Bangladesh health professions institute. Parents were informed that their participation in the study will fully optional and that were free to leave the study at any time and skip any question with no given reason. There were informed about the aim of the study and how it would be presented. Written individual informed consent was obtained were to be withheld from them. They will be informed that no personal information would be obtained apart from age, gender and types of device. With the help of the P & O facilities at hand, any potential cultural or non-culture issues that would arise and discussed and taken into considered.

## Chapter IV

### RESULTS

#### 4.1. Demographics

Exploratory data analysis

Table 4.1: distribution of socio-demographic data

Indication	Frequency (n)	Percentage (%)	Ratio
<b>Gender</b>			
Male	163	64.4	1.81: 1(M-F)
Female	90	35.5	
<b>Area</b>			
Rural	155	61.3	8.4: 4.4: 1
Urban	80	31.6	
Semi-urban	18	7.1	
<b>Religion</b>			
Muslim	230	90.6	115:10.5:1
Hinduism	21	8.3	
Others	2	0.8	

The given table represents information on socio-demographic data. The total numbers of patients were (253). In gender, the number of male patients (163) and female patients were (90) and Range (66, Min -1, Max-67). Male patients (64.4%) have more than female patients (35.6). The male - female ratio was 1:1.81. This indicates that male was superior to female. The vast majority of patients were 61.3% percent from rural areas compared with urban (31.6 % percent) and semi-urban. In rural areas, the vast number of male patients suffered from deformity, illness and physical disability. Religious evidence indicates that, relative to Hinduism and other, the Muslim number of patients (90.9 percent) was mostly affected.

## 4.2 Analysis of type of assistive devices

Table 4.2: Type of assistive devices

Device	Frequency (n)	Percentage (%)
FO	19	7.5
AFO	165	65.5
KO	6	2.4
KAFO	33	13
OTHER	30	11.9

The given table depicts the number of different type of devices users (foot orthosis, knee ankle foot orthosis, knee orthosis, and knee ankle foot orthosis). In this graph, the percentage of AFO has the highest (65.2%) and lowest (2.4%) knee orthosis. KAFO user has slightly higher number of patient than foot orthosis and others. All devices are for the purpose of treatment but mostly the ankle foot orthosis is used. Knee ankle foot orthosis (KAFO) is the second highest percentage whereas foot orthosis (7.5%) and KO (2.40%). FO has fewer than KAFO While both AFO and KAFO have an extremely high percentage in above type of assistive device. KO has the lowest percentage in above all types of orthosis. Knee ankle-foot orthosis and others are quite low as compared to AFO.

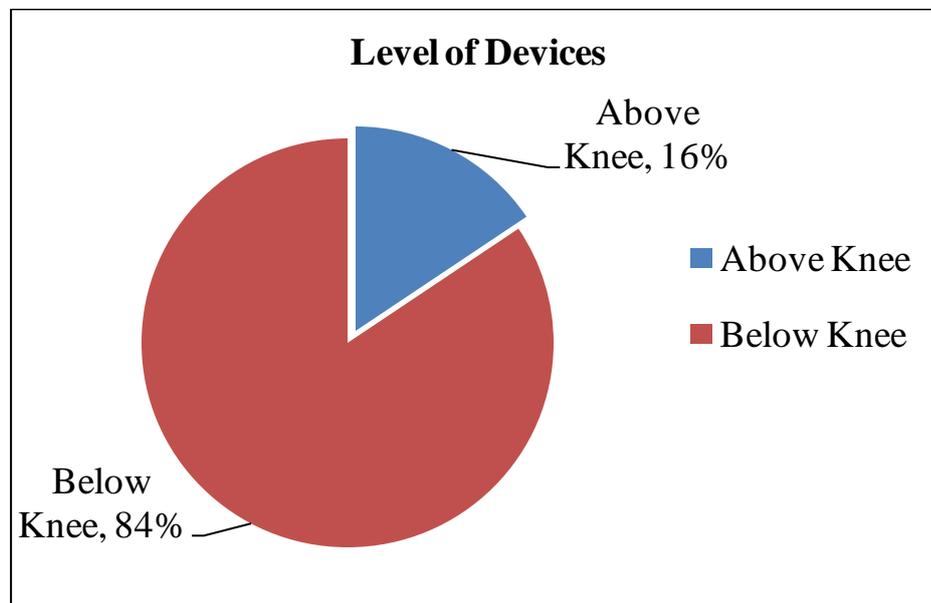


Figure 4.2: Level of device

The pie chart shows data information on below knee and above knee devices. The Below knee assistive devices are depicted by blue color and the above knee assistive devices have shown by green color. The number of devices users below the knee is 84.6% as compared to above the knee 15.4%. More percentage of benefitted users in below-knee devices.

**4.3. Analysis of walk on stair and walking without device**

Table 4.3: Ability to walk on stair and Walking without device

<b>Indicator</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Ability to walk on stair</b>		
Yes, without difficulty	50	20.2
Yes, with difficulty	102	40.2
No, not at all	101	39.6
<b>Walking without device</b>		
Not at all	103	40.7
Few minute	150	59.3

In this frequency, the table represents that walking distance without device and ability to walk on stair. In the ability to walk on staircase, 40.2% of the patient can walk but they felt some difficulty. Some patients cannot walk at all and the percentage is slightly lower than those who felt difficulty. The fewer patients didn't feel any difficulty in walking whereas in walking without device cases, 59.3% no of patients were walked properly on stair but 40.7% were unable to walk.

#### 4.4. Analysis of types of devices

Table 4.4: Relation between Types of device and device cause pain

Type of devices	Always	Often	Seldom	Never	Total
FO	1	7	1	10	19
AFO	21	66	6	72	165
KO	1	2	1	2	6
KAFO	4	18	2	19	33
Other	0	3	1	26	30
Total	27	96	11	119	253

In this given frequency table shows the types of device verse device cause pain. There are five types of lower extremity devices like foot orthosis, ankle foot orthosis and others. Ankle foot orthosis devices was only one orthosis where 21 number of patients felt pain whereas 72 patients doesn't feel any pain. In other devices, 26 numbers of patients never feel any pain. AFO and KAFO are the two devices where 66 & 18 no of patient felt often pain.

#### 4.5. Analysis of wheelchair and crutches user

Table 4.5: Wheelchair and Crutches user

Indicator	Frequency(n)	Percentage (%)
<b>Wheelchair</b>		
Yes, instead of device	11	4.3
Yes, together with devices	35	13.8
No	207	81.8
<b>Crutches</b>		
Yes, instead of device	2	0.8
Yes, together with device	9	3.6
No	242	95.7

In the above 4.5 Table V shows that wheelchair and crutches user. The number of non-users is more in a wheelchair, around 81.8% of people didn't use wheelchair they were using another walking aids. 13.8% patient used wheelchair together with devices. 4.3% of user use wheel instead of device.

In crutches, 95.7% users didn't used crutches whereas 3.6% patients used crutches together with the device and .8% patients instead with device. 95% users were using another walking aid.

#### 4.6. Average score for orthosis on satisfaction with assistive

Table 4.6: Average score for different orthosis on satisfaction with assistive device

Orthosis	Average	Standard deviation	P-value
FO	28.52ab	4.29	(.029)
AFO	28.36ab	3.88	
KO	26.50a	5.16	
KAFO	26.78a	3.94	
Other	29.83b	3.41	

**Note:** symbol a and b indicate groups, Significant average are really equal. Ankle foot orthosis and foot orthosis are common in both groups. F-test was used for satisfaction level with assistive device. Another device has higher average as compare to another orthosis. All orthosis is not equal therefore P value is less than 0.05 it means the null hypothesis is rejected associated between assistive device and score. They are not equal.

#### 4.7. Average score of orthosis on satisfaction services

Table 4.7: Average score of different orthosis on satisfaction services

Orthosis	Average	Standard deviation	P- value
FO	13.8a	2 .63	(0.01)
AFO	14.5ab	2.29	
KO	15.1ab	2.92	
KAFO	13.6a	2.82	
Other	15.9	0.96	

In Table VII, shows score of different devices on services. Symbol a and b indicate groups significant average are almost equal. Knee orthosis and other devices have a higher value as compare to others. f- Test was used in above table for average score on different orthosis. In above orthosis, knee orthosis average score and standard deviation were (15.1) & (2.92). The lowest one with the standard deviation was (13.6) & (2.82). P value was lesser than 0.05. It means hypothesis was rejected associated between devices service and score. There was no relation between different orthosis and services.

#### 4.8. Analysis score on satisfaction with assistive devices

Table 4.8: Average score of gender, area and religion with satisfaction with assistive device.

	n	%	Satisfaction	P- value
<b>Gender</b>				
Male	163	64.4	28.37	(0.68)
Female	90	35.5	28.16	
<b>Residence area</b>				
Rural	155	28.23	28.23	(.029)
Urban	80	28.73	28.73	
Semi-urban	18	26.94	26.94	
<b>Religion</b>				
Muslim	230	90.6	14.66	(.032)
Hinduism	21	8.3	13.66	
Others	7	0.8	11.50	

The Table VIII represents that the satisfaction score between gender, area and religion. The satisfaction score was almost similar in male and female. In gender category revealed that male 64.4% and females were 35.5% even though around similar satisfaction score. T test was used in gender groups. P-value was greater than 0.05 its means, data shows that no statistically significance difference between genders. Urban area patients are highly satisfied as compared to other areas. Satisfaction with the assistive device was divided between the three groups but satisfaction with the assistive device was slightly higher or lower in urban, rural and semi-urban. According to religion data, the satisfaction level of religion in Muslim (14.66%), Hinduism (13.66%) and others (0.8%). Here  $p < 0.05$  there was no significant difference exists between satisfaction and area.

#### 4.9. Analysis score on satisfaction services & complimentary service

Table 4.9: Average score of gender, area and religion with satisfaction services and complementary service

Gender	N	%	Satisfaction Services	P value	Complementary service	P-value
Male	163	64.4	14.6	0.30	15.01	0.77
Female	90	35.5	14.3		15.08	
<b>Area</b>						
Rural	155	61	14.79	0.13	15.0	0.86
Urban	80	31.6	14.17		15.1	
Semi-urban	18	35.5	14.22		14.9	
<b>Religion</b>						
Muslim	230	90.6	14.66	.032	15.08	0.44
Hinduism	21	8.3	13.66		14.61	
Others	2	0.8	11.50		14	

In given table represents that average score of gender, area and religion with satisfaction service & complimentary services. In the gender category, males 64.4% and females were 35.5% even though satisfaction with services was almost the same difference is 0.3. T-test was used in the gender group. P-value was higher than 0.05 it means we cannot conclude that significant difference of satisfaction level among male and female participants whereas in areas, the largest number of peoples received better services as compared to urban and semi-urban areas but in the semi-rural, percentage of satisfactory services was slightly higher than urban areas. In rural, residence people have more satisfaction with services as compare to urban and rural areas. Here  $p > 0.05$  there was no significant difference in the satisfaction level between areas.

According to religion data, the satisfaction level of service was (14.66) where as in Hinduism (13.66) and others (11.50). Here,  $p > 0.05$  it indicates there was no significant difference between religion and satisfaction level with services.

#### 4.10. Overall satisfaction score on assistive device and services

Table X Average means value of total satisfaction level about assistive device, services and complementary services.

<b>Satisfaction</b>	<b>Average Mean value</b>
Assistive device	3.53
Services	3.63
Complementary services	3.75
Overall score	3.61

The given table X shows that satisfaction level was more or less satisfied. Here, all individual score has given about satisfaction level with assistive device, services & complimentary services. According to response scale, satisfaction with assistive device was more or less satisfied whereas satisfaction with services and complimentary are quite satisfied. The respondents were more satisfied with the services rather than assistive devices. The mean difference of assistive device was (.077) whereas satisfaction services and complimentary service means was negative (-.024) & (- 0.144). The average mean of assistive device was slightly lower than satisfaction service.

## **Chapter V**

### **DISCUSSION**

The study intended to identify the satisfaction level of the primary caregiver of children using lower- limb orthosis devices and services. The findings show that satisfaction level was more or less satisfied regarding assistive devices, services and complimentary services. These findings of the study are similar than other study but in this research number of participants were 253, females were lesser than males.. There was no difference found between genders. The Demographic finding of the study revealed that participants of the study population were (1-67) year but the majority was (1-18) year-old. The study revealed that look, appearance, and training about complementary were quite satisfied. The average mean of the complementary services is 3.75. The average means of assistive device and services is 3.53 and 3.63. It means that assistive device more or less or satisfied whereas service is quite satisfied. It means 75% of the total participant is satisfied. The quality of professional service regarding assistive devices is quite satisfied. Satisfaction with assistive device about comfortable and effective of your assistive device is almost more or less satisfied. The mean value of both comfortable and effective is 3.36 and 3.38. The satisfaction with the assistive devices is lower than satisfaction of services. According to respondents, the professional was taking too much time to follow up cases. Even though the mean of satisfaction is 3.75 but most parents and users mentioned their weak points. The findings revealed that satisfaction level is quite satisfied regarding the assistive devices, services and complementary services although the level of satisfaction reported has been more or less than observed in other countries (Van Brakel, et al., 2010). The polypropylene technology material developed by the international committee of the Red Cross is used in the manufacture and fabrication of the assistive device in above studies. According to research, respondent shown that they were quite satisfied with the device, the participant reported that their devices need repair and 66.5% of the devices in use were reported to be better condition, 12.8% reported that they were not currently using devices, and some participants did not use their lower extremity device. Additionally, as the two most vital factors in the use of the device, comfort and effectiveness were the most general reason for dissatisfaction. Therefore, some

attention is needed in the score of high satisfaction other factors that contribute to satisfaction include the lack of alternate service and the free provision of equipment and services, including travel and meal cost while at the facility.

(Chen, Teng, Lou, Lin, Chen, & Yeung, 2014) In another research, Lower limb devices sometime it is quite difficult to achieve client expectation in functions need. It has been reported that the device was not flexible that's why patient felt some difficulties in walking on uneven surface, incline and decline ground. It has been recorded in other low- resources contexts as a growing complaint (Magnusson et al., 2013). Moreover, professionals were asked to some suggestion about the importance about the orthosis devices (e.g., training, the cosmetic appearance of the revealed about the device) in addition the device. The result showed that two-thirds of the participants were quite satisfied or very satisfied. The mean satisfaction score was 3.74 for the devices and the 3.56 for services. The score values were lower compared to obtain from other research in different western countries.

The durability of polypropylene technology assertive is important particularly in low resources context, sustainability considerations must be balanced with efficiency and comfort priorities for consumers. We should increase focus on the design of the device in relation to the user environment. Improve pay attention to patient gait training, it will make assertive devices more comfortable and satisfied. Longer training in this study was associated with longer use of the devices. Gait training should be appropriate and understandable for the client of the optimal use of the device as well as professional should be shared regarding the uses of other mobility devices (e.g. canes, crutches). The important point is to manage the client expectation in such a way that they are aware of the advantage and limitation of the devices.

The Malawi study (Magnusson et al, 2013) but the same study conducted in Sierra Leone (Magnusson et al, 2014), the present study showed a significant difference male and patients in the level of satisfaction with the assistive device. The present study has shown statistical evidence significant difference between the level of satisfaction with assistive device between male and female patients. The uses of assistive devices the majority of respondents reported that they could not walk more than 100 meters and some of the respondents reported that they could not face any problem in walking inside the house. The most dangerous areas for the patients

regarding mobility were walking on uneven terrain (70%), walking on the stair. These types of result also showed in other developing countries where the majority of the patients also reported difficulties in waking up, walking on uneven ground, and walking on stairs. This suggests a need for a better understanding of the needs of women in relation to their assistive devices, although a great deal of research suggests that socio-demographic features such as religious gender are a predictor of satisfaction Chen et al., 2014. None of the respondents expressed unhappiness with the cosmetic aspects of the assistive device.

Respondent replied in similar study that the devices quality was less. They were dissatisfied with damage to clothing while they were wearing their appliance. The complete manufacturing process for orthosis device was hand-made in small scale mini installations appropriate equipment. There was no standard quality for these products. They said to all people to use international and high-quality materials for manufacturing the device. The expensive price of these items for the Iranian market causes clinicians to use internal and to some extent less qualified materials. The two main factors of the expensive of device were firstly the manufacturing process by hand and secondly the shortage of government insurance support for the P & O services and devices.

In another study, (Goertzen et al.) reported that there is no link between overall user satisfaction with gender and type of device but the comparison of mean satisfaction. In the study showed that, in one-way females were happier with their device while males were more pleased with the service and other side patients were more dissatisfied with lower limb orthosis ( $45.4 \pm 16.5$ ). They shared some major causes of dissatisfaction poor design, cumbersome orthosis, unsuitable materials, and components. Although the study was conducted in Iran at an individual private O&P facility. If we generalize, its findings into high-level strategies to improve devices and services in the developing countries. Few researchers conducted a systematic literature review study on orthosis devices and services satisfaction assessments. One of the researches conducted a study on systematic literature review on assessing satisfaction with orthosis devices and services. They shared the difficulty associated with evaluating the perspectives of the respondent in orthotics and prosthetics (O&P). It is said that satisfaction depends on the quality of the equipment and the services given. The object of this review was defined as the domain and sub domain of satisfaction with the system and services. Sub domains such as comfort, cosmesis

and ease of use have been reported more frequently than others in the outcome measures examined (Peaco.etal,2011).

One study was conducted in turkey on actual use and satisfaction of lower extremity in neurological disorder. They had discussed lots of thing on the orthosis patients about regular and irregular device. Few patients were unwilling to wear the orthotic device. Among 210 orthosis and orthopedic shoe users, all were reported to ever use, while 91% used them device on the daily basis. In the study, 83.3% of the patients were mentioned to ever use and 60.6% were reported to use the device regularly. They found that the main reasons for not using the prescribed device were mainly device related concerns and patient's recovery. Another study was conducted on assessing the effect of an anterior AFO improves walking economy in Charcot–Marie-Tooth type 1 patients. They had measure the walking speed, step length and step frequencies during the walking in different stages (slow, comfortable and fast) But they did not get any significant effect of condition with shoes. Anterior elastic ankle foot orthosis whereas walking energy cost per unit of distance at normal or convenient speed was less in patients using anterior elastic ankle foot orthosis with respect to shoe. (Federica, Luca, Antonello, Teresa, & Andrea, 2013).

Goertzen et al and Bosman's et al. Modified SERVQUAL, it can be an alternate choice to evaluate patient satisfaction with orthotic and prosthetic service. Acknowledging that it is not intended to measure product satisfaction. There were no orthotic unique orthotic consumer issues (e.g. cosmesis, comfort, reliability is included in both measures. Patient may be an alternative option for the assessment of patient satisfaction with O&P services, with the recognition that it is not intended to measure satisfaction with devices. Although no instrument are orthotic specific issues of the orthotic users (e.g. comfort, durability cosmesis are included in both of these measures.

One study conducted in Netherland regarding user satisfaction regarding orthotics and prosthetics facilities. They found that the relationship between orthosis and prosthesis did not exist between consumers. So, we can assume that there was some relationship between receiver and the faculty staff could be greater therefore of the reciprocal dependence between the user and personal of the facility. Some perception was present regarding high score perhaps due to modern facilities of prosthetics and orthotics. In some cases, waiting room had low score. An important

difference was found between two variables, Overall satisfaction and the user equipped with orthopaedic shoes and other devices. In this research, the mean difference in overall satisfaction was only 0.3. The clinically significant revealed that we should discuss on this score. There was no relationship between the means satisfaction rating and the type of assistive device that the consumer uses was found. The Receiver could be expected to be higher except that heavier the device, the consumer depends on Prosthesis and orthosis rating facilities given by user. That can be higher or lower. Facility and that rating given by consumer could be expected to be higher. Prosthetic and orthotic facility of the OIM-group got 12 percent of orthotics and prosthetics and orthopaedic shoes in Netherland market. In P&O market, north part of Netherland is the largest OMI group. It was the first user satisfaction report on the Netherland prosthetic and orthotic the researcher said that now a day, P and O facilities have an important role to play in their wishes and interests. Kerfoot and LeClair conducted surveys on the use of satisfaction. They assisted strategic and financial planners in strengthening areas of healthcare improvement based on user strength. The Study said that, P&O facilities installed display and model of their product and other equipment. After that, they immediately changed the whole furniture with modern chair and reading tables. The main facility was installed about complaint committee. The study results showed extreme high patients' satisfaction, all the health practitioners should be distinguishing their own belief and interest. They should focus on enhance the product quality and services. They will concentrate on user satisfaction.

Research on patient satisfaction had been conducted in the health care system. It was largely related to rehabilitation in the primary and short-term care settings. It related to medical rehabilitation; some aspects of rehabilitation were quite different from special care. Restore physical function over a long period of time, requiring procedures and ultimate goals different from many of the healthcare needs. We have to give first priority to the physical activity rather than cure of diseases. In-patient setting with a multidisciplinary team, professional should be interactions with the patients and a variety of professionals. Team members are also demanding although they supported but concerning with the comfort of the patients. Self-care training, chronic diseases management method mobility training in self-care, method of managing chronic diseases, mobility, remunerated strategies for cognitive deficits. The treatment involves a degree of active participation in much of the health care

that is not necessary. All methods of measuring satisfaction have to reflect from the experience of the patients. In acute care, satisfaction with the patient's improvement discharge is rarely sampled. Its main consideration in rehabilitation, though it has been ignored by most restorative service research. The family of patient should acquire in rehabilitation skills and their level of independence in different settings. Along with their outcome, they should be able to give the entire question about their satisfaction. Out of thirty, one fourth of the patient replied that about their progress did not match with their expectation. This pilot study had the objective in two phases. First, to assess neurological patient's satisfaction with an orthotic device for the lower extremity. Second, to assess the most significant reason for an orthotic device being accepted. The most patients in the study were satisfied with their orthotic device. (Swinnen et al.).

One similar study conducted on the effect of dynamic AFO on the regulation of the standing in bilateral spastic cerebral palsy. They reported that regarding the time using the orthosis, 77.8% participants agreed and they didn't consider this aspect as a problem. Another factor was time delimited to use the device is not a factor that negatively affects their adherence and acceptance. Some caregiver replied that, they faced some difficulty in handing the orthosis for its original placement and removal. Two caregivers claimed such difficulty to the spasticity that the children have due to sever spastic quadriplegia. A similar justification was seen in a study by Radtka, Skinner and Johanson, they found that, the main reason muscular rigidity, spasticity, and shortening presented by children with cerebral palsy decreases joint (Dongwook, Dong, & Eun, 2010).

One study conducted on assistive device used on children with disabilities in southern Taiwan. They investigated assistive device user children with physical disabilities as well as the types of device and improvement of children with the assistive devices from functional aspects. In this study, at the time questionnaire were collected, one twenty-four children used two twenty-four assistive devices. For children in Finland, the usage rate is significantly lower than that. In Norway study determined that 1497 environment modification devices were provided to 86 children with cerebral palsy, 1075 aids for activities of daily living daily, trainer and therapist 299 and 123 orthopedic devices. In another study, fifty children were given assistive devices that their parents did not buy approximately 58 percent of parents opted deny the assistive device for financial reasons. Another possible factor

contributing to the study's low rate of use of assistive devices was lack of awareness of the availability of assistive devices most parents received information on assistive device from recovery providers and parents generally did not look for the information themselves. In order to increase the effectiveness of the assistive devices it is necessary to assess the abilities and needs of person with disabled children before buying the assistive aids. When applying for financial support for some specific device, local social welfare departments require evaluation reports from professional therapists. In this study, ninety-four children 75 percent were evaluated before buying assistive devices.

Just few numbers of families revealed that inadequate instruction were given from Canadian survey about the uses of technical aids for children with disabilities. Twenty-one children also need after purchasing assistive device, repair and maintenance service were considering around 32 percent parents satisfied with the vendor services. Some parents were faced financial assistance and public financial support was not involved problematic for the parents. All kind of assistive device offer opportunities for physically disabled children's who have difficulty playing toys or can't play at all. In another study, about 25percent of children with cerebral palsy used switches to monitor games, tape recorder and computers powered by battery. Nine kids used modified toys and additional electronic access. The low utilization rate of modified toys and additional electronic access. The low utilization rate of modified toys and other computer device due to the fact that parents did not understand very well the effects of play or computer technology on the development of their children. On exploratory research on effect of implant peroneal nerve stimulation on gait quality in the phase of foot drop. It was hypothesized that functional stimulation system will helpful for peroneal would improve their gait quality, participation, energy expenditure as compare to user compare to ankle foot orthosis. The main reason due to ankle kinematics and kinetics would not be hampered by the mechanical pressure by the ankle foot orthosis. The study revealed that gradually improvement with function electrical stimulation with consider to full maximum planter flexion angle, peak ankle planter flexion and peak strength and power in ankle and the main step length symmetry. According to study, they didn't show any changes in the walking speed and energy expenditure at certain level but there was only one fluctuation shown energy expenditure, walking speed and ankle strength. Patient's satisfaction was really better FES than with AFO. They didn't

achieve any significant association between participant's satisfaction with improvement in objective gait parameters.

Several studies revealed that SLS associated with paretic stroke hemiparetic subject's impairment in post hemi stroke. It is the interrelation combination of forward foot position and trunk progression is because of gait propulsion. Step length asymmetry due to step length. Consequently, greater achievement in step length symmetry with peroneal FES compared to an ankle foot orthosis. May be the better results use of residual paretic ankle planter flexion strength in late stance; improve trunk progression during uneven steps. Still, step length with FES was asymmetric as the symmetric index was above the 7.6% cut- off for the normal gait due to the high planter flexion power between paretic and non-paretic leg in some patients (Sven , et al, 2015).

In another study conducted in France on patient tolerance and satisfaction on knee ankle foot orthosis for treating posterior knee pain in genu recurvatum. Participants reported that they used their device every day and removing them out only for sleeping, bathing and getting dressed and they wore them up to 9 hours which was quite long. In two patients had recurvatum only 5°, The VNRS knee pain score was decreasing from 85/100 to 60 and 20/100, normally, it shows the intensity of the pain does not necessarily depend on severity of the genu recurvatum. It must be mentioned that included participants worn the orthosis for more than three months till last correction of the deformity. The effect of the study revealed that when orthosis is accepted then definitely it will be efficient and effective (Benoit , Laurent , Julien , Alain , Jean , & Marjorie , 2018).

## **Chapter VI**

### **CONCLUSION**

#### **6.1. Conclusion**

The study intended to explore level of satisfaction about lower limb orthotics device and services. In this study, satisfaction level of the patients and caregivers about the orthosis used by children with CP, stroke, paraplegia and congenital deformity were present. Overall, this study demonstrates that the result was more or less satisfied with their device and services received by the prosthetic and orthotic department. The study revealed that no statistically significant difference regarding satisfaction with assistive device and services but in complimentary services were found slightly higher score than assistive devices and services. Even though, the result was more or less satisfied but they experienced pain and difficulties walking on challenging surface. Lower limb orthosis satisfaction with assistive devices was associated with pain and wound, condition of the devices, ability to walk on uneven ground. There were lot of patients depend on the device but unable to walk without assistive devices. Male were more satisfied than female. The study makes awareness and concern about the improvement the quality of orthotics devices and services and also professional services.

In this unfortunately, we cannot be sure if the results reflect the entire population due to study limitations. The authors suggest that further research is necessary with larger sample sizes in order to demonstrate more reliable results.

#### **6.2. Study Limitation**

The purpose of the study was to find out the satisfaction level of the primary caregiver of children using lower- limb orthotic devices and service. The mean age of the sample groups was relatively high and research has shown that there is no association between age and satisfaction as the older a patient was, the quite satisfied. The result of this study will be useful for improve the quality of the services towards the orthotic patient. As the results showed no significant difference between the subgroups it can be interpreted as good results. Since this is a single non-government organization based cross-sectional, the results of this study cannot generalize to the general population but still be useful and relevant for Bangladesh in prosthetic and

orthotic field. This study is part of a more comprehensive project that aims to investigate the opinion and satisfaction level of primary caregivers, children and adolescents about the use of different assistive technology resources. In this part of the study, the perception of caregivers about the orthosis used by children with CP was presented. The results showed that the participants were more or less satisfied with the use of the lower limb orthosis, a fact related to the follow up by the professionals who prescribed it and with the guidelines on its function. Limitation in the efficacy of assistive devices and concerns with service delivery systems, delivery systems such as inadequate access to follow up care and maintenance were also issuing that practitioners in the field of rehabilitation as well as health officials needed to tackle. The main limitation was language barrier whereas strength was staff support and supervision. Finally, the data was collected through a self-administrated questionnaire and the answer is 100% reliable.

### **6.3. Implication of the study**

This study will helpful for furthermore research in developing assistive device technology in low – income countries, taking into account consumer needs for improves comfort, cosmesis and ambulation on uneven and sloping terrain. Investment in the technology of assistive devices would make it available to users in low and middle countries and be effective. Access to effective facilities would allow people with disabilities to be more fully engaged in society.

### **6.4 Recommendations**

It is recommended that prosthetic and orthotics department required addition attention on the quality of the service and devices. They should improve cosmetic appearance of the devices. Although the result of satisfaction was more or less satisfied, these finding pointed out that level of satisfaction about the device plays a vital role for further improvement of quality. According to patient reports of mobility and satisfaction with assistive devices shown that the design, cosmesis, manufacture technology is good according to ICRC. They need to enhance the order to ambulation training method on uneven ground challenges and to minimize the wound and pain. Follow up service should be carried out after each month. They should use FES system in some foot drop cases. According to research, FES system is better than AFO orthosis. They should make colorful orthosis for the children. For patient

satisfaction, professional should write all point instead of verbal so patient can remember all advice regarding the device. Another method of satisfaction the quality of assistive devices and services delivery can be improved with the help of assessing the level of staff education. They should need some additional attention on the access to follow up services & repairs and also the mention the general condition of the devices. Discrimination should be reduced and professional have to provide same facilities to each and every patient.

## Chapter VII

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## APPENDIX

### Consent form

I am Rinku pal, student of M.Sc. in Rehabilitation Science at Bangladesh Health Professions Institute (BHPI) - the Academic Institute of Centre for the Rehabilitation of the Paralysed (CRP). I am doing my research on '*Satisfaction Level of the Primary Caregiver of Children using Lower Limb Orthotic Device and Services* at a selected Rehabilitation Centre in Dhaka, Bangladesh

The information that I collect from you would be kept confidential. There may be some words that you do not understand. In this case, please ask me to stop as we go through the information and I will take time to explain.

If you faced any problem during the interview you can ask me. Your decision to have your participate in the study is entirely voluntary. You may have the rights to withdraw consent and discontinue participation in any time of the interview.

If you have any query research you may ask researcher Mr. Rinku Pal or the supervisor Of my thesis, before start do you any questions.

Name of the parents:

Signature of parents:

Date

If uneducated ...

I have witnessed the accurate reading of the consent form

Name of witness

Signature of witness or thumb print of parents



Date

Name of the Researcher / person taking consent

Signature of the Researcher / person taking consent

Date

## Questionnaire:

Demographic Questionnaire:

Date:

1. Name: \_\_\_\_\_
2. Gender:  
*a) Male      b) Female*
3. Age: \_\_\_\_\_
4. Contact no. \_\_\_\_\_
5. Address: \_\_\_\_\_
6. Area:  
*a) Rural    b) Urban    c) Semi-urban*
7. Religion:  
*a) Muslim    b) Christianity    c) Hinduism    d) Buddhism*
8. Types of assistive device:  
*a) FO    b) AFO    c) KO    d) KAFO    e) Others*
9. Level of assistive device:  
*a) Below knee assistive device      b) Above knee assistive devices*
10. Hours of assistive device are used per day:
11. Do you use wheelchairs?  
*a) Yes, instead of device      b) Yes, together with device      c) No*
12. Walking distance without assistive device.  
*a) Not at all      b) few min.*
13. Assistive device causes pain and or wound / skin irritation while using it  
*a) Always    b) Often    c) Seldom    d) Never*
14. Do you use crutches?  
*a) Yes, instead of device    b) Yes, together with device    c) No*
15. Ability to walk on stairs?  
*a) Yes, without and difficulty    b) Yes, with difficulty    c) No not at all*

- Response scale:** 1: not satisfied at all;  
2: not very satisfied  
3: more or less satisfied  
4: quite satisfied  
5: very satisfied

**Satisfaction with assistive device**

1. How satisfied are you with the dimensions of your assistive device?
2. How satisfied are you with the weight of your assistive device?
3. How satisfied are you with the ease in adjusting the parts of your assistive device?
4. How satisfied are you with how safe and secure your assistive device is?
5. How satisfied are you with the durability of your assistive device?
6. How satisfied are you with how easy it is to use your assistive device?
7. How satisfied are you with how comfortable your assistive device is?
8. How satisfied are you with how effective your assistive device is (the degree to which your assistive device meets your needs)?

**Satisfaction with services**

9. How satisfied are you with the service delivery programme in which you obtain your assistive device?
10. How satisfied are you with the repairs and servicing provided for your assistive device?
11. How satisfied are you with the quality of the professional services you received for using your assistive device?
12. How satisfied are you with the follow-up services received for your assistive device?

**Complementary questions**

1. How satisfied are you with the training you received with your assistive device?
2. How satisfied are you with the coordination of prosthetic and orthotic services with other Rehabilitation Professionals (physiotherapist community based rehabilitation worker, doctor others)?
3. How satisfied are you with, the looks/appearance of your assistive device?
4. How satisfied are you with how easy it is to keep your assistive device clean?

আমি রিংকু পাল। সি অর পির শিক্ষ প্রতিষ্ঠানে বি এইচ পি আইতে রিহেবিলিটেশন সয়েস এ এম. এস. সি কোর্সে অধ্যয়নত আছি। আমি একটি গবেষণা পরিচালনা করছি। গবেষণার বিষয় ব্যবহারকারী ও তাদের মতা পিতা সি অর পি থেকে পায়ের অর্থেসিস ডিভিইস ও সেবা গ্রহন করে তাদের সঙ্কষ্টের মাত্রা।

এই গবেষণা থেকে প্রাপ্ত তথ্য প্রাপন থাকবে। এখনে কিছু শব্দ থাকতে পরে, যা আপনি না ও বুঝতে পারেন। অনুলিখ করে আমাকে জিজ্ঞাসা করবেন এবং আমি আপনাকে ব্যাখ্যা করবো।

এই সাক্ষাৎকার চলাকালীন আপনি কোন সমস্যা বোধ করেন ত হলে আপনি আমাকে জিজ্ঞাসা বা আলোচনা করতে পারেন। এই গবেষণা অংশগ্রহন সম্পূর্ণ আপনার ইচ্ছিক। আপনার অধিকার রয়েছে, যে কোন মুহূর্তে এই সম্মতপত্র প্রত্যাহান ও অংশগ্রহন থেকে নিজেকে বিরত রাখার।

আপনাকে এই গবেষণা সম্পর্কে প্রশ্ন করার আশা যদি আপনার কোন কিছু জনার থাকে তাহলে আপনি গবেষক রিংকু পাল অথবা গবেষণার সুপারভাইজার এর (বি এইচ পি আই- এম অর এস শিক্ষক) সাথে যোগাযোগ করতে পারেন।

অভিভাবকের নামঃ

অভিভাবকের স্বাক্ষরঃ

তারিখঃ

নিরক্ষরঃ

আমি এই গবেষণার সম্মতিপত্রের সাক্ষীঃ

সাক্ষীর স্বাক্ষর/ হাতের আঙ্গুলের ছাপঃ

গবেষকের নাম/ সম্মতি গ্রহনকারীর নামঃ

গবেষকের / সম্মতি গ্রহনকারীর স্বাক্ষরঃ

তারিখঃ

প্রশ্নপত্র

ডেমোগ্রাফিক তথ্য

তারিখ

১. নামঃ \_\_\_\_\_

লিংগঃ ১) পুরুষ

২) মহিলা

২. বয়সঃ \_\_\_\_\_

৩. মোবাইল নংঃ \_\_\_\_\_

৪. ঠিকানাঃ \_\_\_\_\_

৫. বসবাসের স্থানঃ ১) গ্রাম ২) শহর

৩) আধা গ্রামীণ

৬. ধর্মঃ ১) মুসলিম ২) হিন্দু

৩) খ্রিস্টান

৭. সহায়ক ডিভাইসের ধরনঃ \_\_\_\_\_

১) এফ ও ২) এ এফ ও ৩) কে ও ৪) কে এস ও ৫) এইচ কে এ এফ ও ৬) অন্যান্য

৮. সহায়ক ডিভাইসের স্তর বা অবস্থানঃ \_\_\_\_\_

১) হাটুর নিচে

২) হাটুর উপরে

৯. নিয়মিত সহায়ক ডিভাইস ব্যবহারের সময় / ঘন্টা \_\_\_\_\_

১০. আপনি কি হুইল চেয়ার ব্যবহার করেন?

১) হ্যা, ডিভাইসের পরিবর্তে

২) হ্যা, ডিভাইসের সাথে

৩) না

১১. সহায়ক ডিভাইস ব্যতীত হাটার দূরত্ব \_\_\_\_\_

১) একদমই না

২) কয়েক মিনিট

১২. সহায়ক ডিভাইস ব্যবহারের কারণে ব্যথা, ছিলে যাওয়া বা চামড়ায় অস্বস্তি হয়, যখন এটা ব্যবহার করি

১) সবসময় ২) মাঝেমাঝে ২) হঠাৎ ৪) কখনই না

১৩. আপনি কি স্ক্র্যাচ ব্যবহার করেন?

১) হ্যা, ডিভাইসের পরিবর্তে

২) হ্যা, ডিভাইসের সাথে

৩) না

১৪. সিঁড়িতে হাটার ক্ষমতা \_\_\_\_\_

১) হ্যা, কোন অসুবিধা ছাড়া

২) হ্যা, অসুবিধা হয়

৩) ন ৩) না, এখনও নেই

১৫. ১৫. সহায়ক ডিভাইস ব্যবহারের কারণে ব্যথা, ছিদ্রে যাওয়া বা চামড়ায় অস্বস্তি হয়, যখন এটা ব্যবহার করি

১) স ১) সবসময় ২) মাঝেমাঝে ২) হঠাৎ ৪) কখনই না

### **প্রতি প্রতিক্রিয়া স্কেল**

১) অ ১) অসন্তোষজনক

২) খু ২) খুব সন্তোষজনক নয়

৩) ৩) মোটামুটি সন্তোষজনক

৪) স ৪) সন্তোষজনক

৫) খু ৫) খুবই সন্তোষজনক

### **সহায়ক ডিভাইস নিয়ে সন্তুষ্টি:**

প্রশ্ন ১. আপনার সহায়ক ডিভাইসের মাত্রা নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ২. আপনার সহায়ক ডিভাইসের ওজন নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ৩. আপনার সহায়ক ডিভাইসের বিভিন্ন অংশ সংযুক্তের সহজতা নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ৪. আপনার সহায়ক ডিভাইস যতটুকু নিরাপদ ও সুরক্ষিত তা নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ৫. আপনার সহায়ক ডিভাইসের স্থায়িত্ব নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ৬. আপনার সহায়ক ডিভাইস ব্যবহার করা কতটুকু সহজ?

প্রশ্ন ৭. আপনার সহায়ক ডিভাইস ব্যবহার করা কতটুকু আরামদায়ক?

প্রশ্ন ৮. আপনার সহায়ক ডিভাইস ব্যবহার করা কতটুকু কার্যকর (যে পর্যন্ত সহায়ক ডিভাইস আপ আপনার প্রয়োজন পূরণ করে)?

### **সেবা নিয়ে সন্তুষ্টি**

প্রশ্ন ৯. আপনি আপনার সহায়ক ডিভাইস পেতে যে পরিষেবা বিতরণ প্রোগ্রামের সেবা নিয়েছেন তা নিয়ে নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ১০. আপনার সহায়ক ডিভাইসের মেরামত এবং সেবা সুবিধা নিয়ে আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ১১. আপনার সহায়ক ডিভাইস ব্যবহার করার জন্য প্রাপ্ত পেশাদার পরিষেবার গুণগত মানে আপ আপনি কতটুকু সন্তুষ্ট?

প্রশ্ন ১২. আপনার সহায়ক ডিভাইসের জন্য গৃহীত ফলোআপ সেবা নিয়ে আপনি কতটুকু সন্তুষ্ট?

### **পরি পরিপূরক প্রশ্ন:**

১. স ১. সহায়ক ডিভাইসের জন্য প্রদানকৃত প্রশিক্ষণ নিয়ে আপনি কতটুকু সন্তুষ্ট?

২. প্র ২. প্রস্বেটিক এবং অর্থোটিক সেবার সাথে অন্য পুনর্বাসন সেবা নিয়ে আপনি কতটুকু সন্তুষ্ট ( ফিজিওথেরাপিস্ট, সমাজভিত্তিক পুনর্বাসন কর্মকর্তা, ডাক্তার ইত্যাদি)?

৩. সহায়ক ডিভাইসের বাহ্যিক ধরন নিয়ে আপনি কতটুকু সন্তুষ্ট?
৪. সহায়ক ডিভাইস পরিষ্কার রাখতে পারার সহজেতা নিয়ে আপনি কতটুকু সন্তুষ্ট?



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

Ref. CRP-BHPI/IRB/07/19/1314

Date:.....  
29/07/2019

To  
Rinku Pal  
M.Sc. in Rehabilitation Science (MRS)  
Session: 2018-2019, Student ID 181180117  
BHPI, CRP-Savar, Dhaka-1343, Bangladesh

**Subject:** Approval of thesis proposal 'Satisfaction Level of the Primary Caregiver of Children using Lower Limb Orthotic Device and Services at a Selected Rehabilitation Centers in Dhaka' by ethical committee.

Dear Rinku Pal,

Congratulations,

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned thesis, with yourself, as the Principal Investigator" The Following documents have been reviewed and approved:

S.N.	Name of Documents
1.	Thesis Proposal
2.	Questionnaire (English and Bangla version)
3.	Information sheet & consent form.

Since the study involves answering a questionnaire and measuring tools that may take 20 to 25 minutes to answer the questionnaire, there is no likelihood of any harm to the participants. The members of the ethical committee have approved the study to be conduct in the presented form at the meeting held at 8: 30 am on 18 February, 2019 at BHPI (20<sup>th</sup> IRB Meeting).

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,

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

সিআরপি-চাপাইন, সাজার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন : ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স : ৭৭৪৫০৬৯

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

To,  
The Institutional Review Board (IRB)  
Bangladesh Health Professions Institute (BHPI)  
CRP-Savar, Dhaka-1343, Bangladesh.

Date: Dec 1, 2020

Subject: Application for Review and Ethical Approval.

Sir,

With due respect, I'm Rinku Pal, student of M.Sc. in Rehabilitation Science program at Bangladesh Health Professions Institute (BHPI) - an academic institute of CRP under Faculty of Medicine, University of Dhaka (DU). I have to conduct a thesis entitled, 'Satisfaction Level of the Primary Caregiver of Children using Lower limb Orthotic Device and Services' under the guidance of Sk. Moniruzzaman, Associate Professor, Department of Occupation Therapy, BHPI.

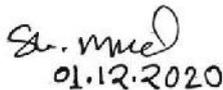
The study involves use of standardized question that may take 30 min to collect the data. A written consent will be taken prior to the experimental. The confidentiality will be maintained and they can withdraw themselves at any time according to their desire. The trained professionals will be involved and the safety of the participant will be insured. Related information will be collected from the patients guide book. Data collection will receive informed consent from all participants. Any data collected will be kept confidential.

Therefore, I look forward to having your kind approval for the thesis proposal and to start data collection. I also assure you that I will maintain all the requirements for the study.

Sincerely,



Rinku Pal  
Part-II, Roll No-13  
Student of Rehabilitation Science (MRS)  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh



01.12.2020

Recommendation from the thesis Supervisor  
Sk. Moniruzzaman  
Associate Professor, Department of Occupation Therapy, BHPI.