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**PREDISPOSING FACTORS AFFECTING LOWER LIMB
AMPUTATION IN BANGLADESH**

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

“PREDISPOSING FACTORS AFFECTING LOWER LIMB AMPUTATION IN BANGLADESH”

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Declaration

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

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Acronyms

| | |
|-------------|--|
| AKA | Above Knee Amputation |
| BHPI | Bangladesh Health Profession Institute |
| BKA | Below Knee Amputation |
| BMRC | Bangladesh Medical Research Council |
| CRP | Centre for the Rehabilitation of Paralysed |
| IRB | Institutional Review Board |
| LLA | Lower Limb Amputation |
| TFA | Trans Tibial Amputation |
| TTA | Trans Femoral Amputation |
| WHO | World Health Organization |

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Abstract

Purpose: To identify the factors that are responsible for lower limb amputation in Bangladesh. *Objectives:* To explore the socio-demography (age, sex, occupational status, and living area) of the lower limb amputee patients. To find out the factors that are responsible for lower limb amputation in Bangladesh. *Methodology:* The study design was cross-sectional. Total 97 samples were selected conveniently for this study from the Prosthetic and Orthotic department of CRP, Dhaka Medical College, Dhaka, and National Institute of Traumatology and Orthopaedic Rehabilitation - NITOR. Data was collected by using a self-developed questionnaire. Descriptive statistic was used for data analysis which focused through table, pie chart and bar chart. *Results:* Among 97 participants, 2.1% (n=2) were between 0-10 years age range, 15.5% (n=15) were 11-20 years range, 33% (n=32) were 21-30 years range, 13.4% (n=13) were 31-40 years range, 18.6% (n=18) were 41-50 years range, 9.3% (n=9) were 51-60 years range, 8.2% (n=8) were 61-70 years range. The mean age was 35. Study focused that 17.5% (n=17) were females and 82.5% (n=80) were males. 60.8% (n=59) were married, and 39.2% (n=38) were unmarried, 21.6% (n=21) were illiterate, 20.6% (n=20) had primary education, 28.9% (n=28) had secondary education, 14.4% (n=14) had higher secondary education, 14.4% (n=14) had bachelor & masters. 15.5% (n=15) were businessman, 20.6% (n=20) were service holder, 7.2% (n=7) were farmer, 55.5% (n=54) were from others profession. Moreover 19.6% (n=19) were previously amputated. 30.9% (n=30) were trans-femoral amputated, 59.8% (n=58) were trans-tibial amputated, 5.2% (n=5) were knee disarticulated, 3.1% (n=3) were hip disarticulated, and 1% (n=1) amputation occur in others area of lower limb. Study demonstrated that 10.3% (n=10) occur due to congenital diseases, 3.1% (n=3) amputation due to vascular diseases & cancer, 5.2% (n=5) amputation due to diabetes, 2.1% (n=2) amputation occur due to post-operative complications, 6.2% (n=6) amputation occur due to infection, 70.1% (n=68) amputation occur due to trauma. Among trauma RTA was main and the frequency was 54.6% (n=53).

Key words: Amputation, trans-tibial, trans-femoral, disarticulation etc.

1.1 Background

An amputation is that the exclusion of a limb or alternative limb outgrowth of the body; Amputation is outlined because the surgical or spontaneous partial or complete removal of a limb or protruding piece lined by skin and is one amongst the foremost common developed disabilities (Kohler et al., 2009).

Anatomical loss is additionally established by the many losses of the perform, amendment of the distribution of body mass, coordination disorder and psychosocial disorders. The foremost common causes of surgical amputations square measure the complications caused by diabetes (diabetic foot) as well as variety of vascular complications within the style of ischemia and peripheral artery disease (Feinglass et al., 2012).

Limb amputations have been done since time immemorial. The first surgical description of a leg amputation was by Hippocrates (460-377 BC). For permanent disability one of the major reason is amputation. In including, amputation can frequently be connected with nervousness, detachment and despondency which may change the social and extra time exercises of the individual with lower appendage amputation.

Prevalence of upper limb amputations are less than lower limb amputations (Chalya et al., 2012). Prevalence rate varies significantly by country and according to factors such as socio-economic status, geographic location, severity of trauma, interim in seeking medical care, and clinicians' decision making (Gavan et al., 2016). Occurrence rate of lower limb amputation has been reported to range from 5.8 to 31.0 per 100,000 civilian population internationally (Moxey et al., 2011). The rate of recurrence is much higher

among military inhabitants because of the penetrating nature of damage they sustain from improvised explosive device (Dua et al., 2014).

Like frequency rate, the etiology of lower limb amputation also differs by nation (Ephraim et al., 2003) depending on natural and man-made atmosphere (Wrobel et al., 2001) and financial improvement (Kim et al., 1996). Transportation system and industrialisation as well as employment type (Largo-Rosenman 2015) and socio-economic status of the population (Ferguson et al., 2010) also impact lower limb amputation. One study by (Abbas et al. 2008) established that tumors and trauma were the chief reasons of lower limb amputation in Sub-Saharan Africa. While peripheral vascular disease and diabetic foot infection were testified to be foremost indications for lower limb amputation in Kenya (Awari & Ating'a, 2008). In India, 70% of the amputees were sufferers of trauma and among the traumatic cases majority suffered a road traffic accident (Pooja & Sangeeta, 2013). The global incidence of amputation is challenging to regulate, as rates vary widely both between and within countries (Holman et al., 2012). Evaluation of outcomes is further hindered by the wide range of methods and definitions of amputation used by researchers, attached with substantial alterations in the key characteristics of the populations (Fosse et al., 2009).

The Global Lower Extremity Amputation Study used a standard procedure to measure the frequency of lower limb amputation in ten different locations worldwide. For example, the yearly frequency of first major amputations amongst males ranged from 2.8 cases per 100,000 of the population in Madrid, Spain, to 43.9 cases per 100,000 among the Navajo population in the United States. The significant dissimilarity observed across regions was recognized primarily to differences in the prevalence of diabetes and peripheral vascular disease (PVD). Lower limb amputation is significantly

more common than amputation of the upper limb, accounting for 65% of all existing cases of amputation in the U.S. (Ziegler- Graham et al., 2008).

Over 90% of amputations carried out in the U.K. in 2006/07 involved the lower limb, with 53% executed at the trans-tibial level, and a further 39% at the transfemoral level (National Amputee Statistical Database, 2009).

Bangladesh is a low-and-middle-income-country with a population of 160 million. Incidence rate of lower limb amputation in Bangladesh is largely unknown except a study published in 1997 that reviewed 6 years-worth of data from one district and estimated incidence rate to be 75 per 100,000 population (Aftabuddin et al., 1997). The authors reported that 80% of these cases were consequences of limb ischemia. A high pace of urbanisation, developed modes of motorised transportation, and poor road conditions were identified as some factors leading to higher number of road accidents resulting in amputation (Chalya et al., 2012). According to World Health Organization (WHO) estimates, the number of people who suffer from non-fatal injuries are about 20–30 times more relative to fatalities in developing countries (World Health Organization. 2018). WHO also reported that there are 21,316 fatalities from road accidents in Bangladesh (World Health Organization. Global status report on road safety 2015). Thus, it can be estimated that about 426,320–639,480 people suffer from road traffic related injuries annually in Bangladesh. Road traffic accident has been reported as a leading cause of amputation in India (Pooja & Sangeeta 2013) and Nigeria (Yinusa & Ugbeye 2003). Moreover, peripheral vascular diseases—a common cause of limb amputation, is highly prevalent (70%) in low-and-middle-income-countries and the number of people with these diseases are increasing rapidly (Fowkes et al., 2013).

1.2 Rationale:

Lower extremity amputation is seen in clinical practice. Most of the cases have injuries caused by various diseases or trauma. Although various studies investigating the outcome of foot complications in patients with diabetes have been reported, prevalence of lower limb amputation in subjects on renal dialysis remains poorly recognized. Moreover, the most severe form may endanger life also sometimes need to exclusion of certain limb with infection. The most common is poor circulation because of damage or narrowing of the arteries, called peripheral arterial disease. Other causes for amputation may include: Severe injury (for example, from a vehicle accident or serious burn, Cancerous tumor in the bone or muscle of the limb, Frostbite and many more.)

A large number of lower socio-economic status and rural people in Bangladesh depend on informal caregivers like village doctors, drug sellers, and traditional healers for their acute healthcare needs. A shortage of qualified medical professionals and their uneven distribution in the rural areas in addition to cultural barrier and lack of trust in modern medicine aggravate this situation. Unavailability of appropriate services or financial constraint may lead patients with chronic vascular diseases to suffer from ischemic limb damage which leaves the physicians with no choice but to undertake amputation as the only viable option.

There is no such relevant research has been conducted in this field yet in Bangladesh. The great majority of individuals with lower limb amputation have limitation in physical functioning especially problem in locomotion or mobility. So for minimizing amputation we need to know actual cause of amputation. For this reason, the investigator is interested to find out the most frequent cause of amputation in Bangladeshi Population.

1.3 Research Question:

What are the prime causes that mainly lead lower limb amputation in Bangladesh?

1.4 Study Objectives:

General objective

To find out the causes that mainly lead lower limb amputation in Bangladesh.

Specific objectives

1. To evaluate the socio-demographic (age, gender, occupation, educational status) information of the participants.
2. To determine an association between gender and lower limb amputation
3. To find out an association between occupation and lower limb amputation.
4. To explore an association between disease and lower limb amputation.
5. To find out an association between various trauma and lower limb amputation.
6. To identify the level of lower limb amputation.

1.5 Conceptual Framework

Independent variables

Age

Sex

Occupation

Congenital Disease

Vascular diseases

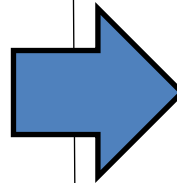
Diabetes

Cancer

Trauma

Dependent variable

Lower limb amputation
and its types.



1.6 Operational Definition

Amputation

An amputation is the exclusion of a limb or other limb outgrowth of the body. Amputation is defined as the surgical or spontaneous partial or complete removal of a limb or projecting body part covered by skin and is one of the most common developed disabilities (Kohler et al., 2009)

Disarticulation

Disarticulation is the separation of two bones at their joint, either traumatically by way of injury or by a surgeon during arthroplasty or amputation.

Lower limb amputation

Lower-limb amputation is the removal of a part or multiple parts of the lower limb. Though there is some discrepancy in literature regarding exact distal boundaries, it is generally accepted that “major” amputations include those which are at or proximal to the ankle

Trans-femoral

Across or through the femur.

Trans-tibial

An amputation of the lower leg between the ankle and knee.

Knee disarticulation

Through-knee amputation.

Hip disarticulation

Hip disarticulation is the surgical removal of the entire lower limb by transection through the hip joint.

Congenital disease

A congenital disorder is a medical condition that is present at or before birth. These conditions, also referred to as birth defects, can be acquired during the fetal stage of development or from the genetic make up of the parents.

Vascular disease

Vascular disease is a class of diseases of the blood vessels – the arteries and veins of the circulatory system of the body. It is a subgroup of cardiovascular disease

Amputation leads a person to endless incapacity. It carries associated affectedly alteration within the life, operate and quality of the sufferers. These reworked things area unit experienced a lot of by lower limb amputees than by upper limb amputees. The frequency of lower limb amputation is additionally more than the upper limb. Amputation can embrace one limb (unilateral), each upper and lower limbs (bilateral), or a mixture of upper and lower limb amputations (multiple amputations). Amputation could also be performed at totally different purposeful levels. Lower limb amputation might comprise amputation of 1 or additional toes, a part of the foot, mortise joint disarticulation (disarticulation means that amputation of a part through a joint), trans-tibial (below the knee) amputation, knee disarticulation, trans-femoral (above the knee) amputation, hip disarticulation and hemi-pelvectomy (removal of half the pelvis). higher limb amputation might embrace the removal of 1 or additional fingers, wrist joint disarticulation, below elbow amputation, elbow disarticulation, higher than elbow amputation, shoulder disarticulation and cut of meat amputation. Dysvascularity is that the foremost reason for amputation in high financial gain countries (Ziegler-Graham et al., 2008).

Lower limb amputation is a common chronic health condition and a reason for semipermanent incapacity. Lower limb amputation includes a major impact on virtually each facet of a person's life. the many clinical studies and analysis reports on operate and health related quality of life following amputation describe a large vary of outcomes. There square measure multiple interactive variables that contribute considerably to the practical outcome, together with medical co-morbidities, the surgical level of amputation, cognition, age, premorbid level of operate, personal header vogue, level of social support environmental factors and money resources on the market (Asano et al., 2008).

The evolvement of amputation as a successful technique in the treatment of injuries in World War I resulted in the first large group of amputees in history (Horne et al., 2009). From the time of surgery until return to normal life in the community, the majority of amputees are besieged in many suspicion and fears (Chalya et al., 2011). The amputee

most often oppress for the lost limb and the old body image and is thought to go through four or five stages as a part of their oppressing process, that is, refusal, anger, dealing, depression, and acceptance. This often assimilates the way in which people usually respond to the death of a loved one or when being diagnosed with a life threatening illness (Chin & Toda, 2016). The age of the amputees ranged from below 20 years to above 70 years. The most common age group for amputation was 21-30 years of age, accounting for 32.0% of all amputees (Pooja & Sangeeta, 2013). The 31-40 year age group was second, accounting for 23.2% of all amputees, and the 20 years and below age group was third (14.2%) (Pooja & Sangeeta, 2013). Non ambulatory status preoperatively, having an above-knee amputation, being home bound preoperatively, dementia, being over 60 years of age, having end-stage renal failure and having a coronary artery disease may be associated with not wearing a prosthesis (Yari et al., 2008). People over the age of 70 and those with a bilateral lower limb amputation might not walk after the amputation (Tashkandi et al., 2011). Other physical problems associated with amputation include phantom sensations and phantom pain (Mosaku et al., 2009).

The global incidence of amputation is unknown, available data evidence considerable variation both between and within countries. The major amputation rate was 5.1 per 100 000 population and did not change over the 5 years (Moxey et al., 2010). In south-East Asia, the prevalence of disability ranges from 1.5% to 21.3% of the total population, depending on the definitive and severity of disability (Mont, 2007). Using a standard protocol for data collection, the Global Lower Extremity Amputation Study Group assessed the incidence of lower limb amputation in ten different locations worldwide and reported marked differences among test sites in their annual rates of lower limb amputation (Yari et al., 2008). According to newest statistics in the United State of America, about 1.7 million people live with amputations and the number has increased in recent years (Mousavi et al., 2012). Comparison of all-cause amputation rates during the 1995-1997 period, revealed lowest age-adjusted rates of first major lower limb amputation in Madrid, Spain (0.5 per 100,000 women, 2.8 per 100,000 men) while highest rates were reported in the Navajo region of the United States (22.4 per 100,000 women, 43.9 per 100,000 men) (Moxey et al., 2010). In the United States it is estimated that one out of every 190 persons has lost a limb; the number of persons living

with amputation in the U.S. is projected to increase over two-fold to 3.6 million by the year 2050 if current trends continue (Ziegler- Graham et al., 2008).

Some 82.9% of those with lower limb amputation in Scotland lose a limb due to peripheral vascular disease, with 38.6% of this group having amputation due to diabetes (Desmond, 2007). Another important factor is the average age of the lower limb amputee population; the Scottish amputee population is predominantly elderly with around 80% of primary amputees over 60 and more than 20% over 80 (Verghese et al., 2008). On those attending a sub-regional English limb center, with trans-tibial amputation accounting for 50.5% and trans-femoral 49.5% of the vascular or diabetic cases (87.5% of the total amputee population) (Deans et al., 2008). These demographics give an indication of the low preoperative activity levels likely in this group, and suggest that post-operative activity levels may also be reduced (Van Eijk et al., 2012). Following on from this, found that physical mobility was the only independent factor which significantly affected quality of life in amputees as measured by the Nottingham Health Profile and when compared with their nondisabled counterparts (Chin & Toda., 2016). Based on this novel research, one can speculate that creation of pre-operative and post-operative personalised activity programs will ultimately reduce the incidence of amputation by the reduction of metabolic disorders such as diabetes (Vrieling et al., 2008).

There are several attainable reasons of amputation. The four primary etiological aspects requiring these - vascular illness and infection, trauma, tumors and inborn abnormalities (National Amputee Statistical Database, 2009). Dysvascularity followed by CVD and DM is that the leading reason for amputation in most developed countries, followed by trauma (Ziegler-Graham et al., 2008). In an epidemiological study Epiraim et al., stated that Extremity loss and extremity insufficiency are theoretically disabling conditions affecting the health and well-being of persons worldwide. There are multiple pathways to the loss of a limb, such as diabetes mellitus, peripheral vascular disease, trauma, and malignancy. On the other hand congenital limb deficiency may be caused by genetic variation, may be acquired from exposure to an environmental teratogen, or may be because of a gene-environment interaction. They also found that Lower-extremity disease is more prevalent among persons with diabetes mellitus than among persons without the disease. Overall, the national rates of diabetes-related amputation in the United States and European countries were 2 to 3 times those of the Scandinavian

countries. The homogeneity of the Scandinavian populations may account for the lower rates found in these countries. Within the United States, cross-sectional regional estimates of the rate of diabetes-related amputation varied substantially from state to state. The typical dysvascular patient with associated amputation is older than 60 years old-time and ordinarily experiences comorbidities, operative morbidity and mortality rates are unit high (Dillingham et al., 2008). A freshly revealed five-year review of lower limb amputation prevalence rates in European country found that 39% of patients WHO underwent major amputations throughout this era had a primary designation of polygenic disorder. what is more 43% had a designation of CVD, with simply 13.9% of measures being secondary to injury or trauma (Moxey et al., 2010). In the beginning of twenty century a study by Awari & Ating'a found that in Nairobi most of the lower limb amputation occurs due to peripheral vascular disease (55.3%), also others such as tumor (24.4%), they also stated others causes such as traumatic related gangrene, and road traffic accident. They also found that in elder person's amputation occurs mainly due to vascular complications and in young aged persons amputation occurs mainly due to trauma.

Lower limb amputation is a permanent surgical procedure that has important functional and sequelae that can influence the daily activity of the person with amputation (Van Twillert et al., 2014). Amputation may involve a single limb (unilateral), both the upper or lower limbs (bilateral), or a combination of upper and lower limb amputations (multiple amputations). Amputation may be performed at various anatomical levels (De Laat et al., 2011). Lower limb amputation may involve removal of one or more toes, part of the foot, ankle disarticulation (disarticulation is the amputation of a body part through a joint), trans-tibial (below the knee) amputation knee disarticulation, trans-femoral (above the knee) amputation, hip disarticulation and hemi-pelvectomy (removal of half of the pelvis). In high income countries, dysvascularity is the foremost cause of amputation; as a corollary the majority of amputations involve the lower limbs (Ziegler-Graham et al., 2008).

Lower limb amputation (LLA) is life-changing surgery (Geertzen et al., 2015). The incidence of vascular major lower limb amputations is higher in the developed countries than that reported in the developing ones mainly due to the ageing population (Awari & Ating, 2007). Safe and confident gait is important for mobility, especially for people

with lower extremity amputations (Kendell et al., 2016). In the general population aged 45years, the incidence of vascular LLA at or proximal to the trans-metatarsal level is eight times higher in diabetic than in nondiabetic individuals. One in four amputees may require contralateral amputation and/or reamputation (Johannesson et al., 2009). Musculoskeletal imbalances or pathologies often develop into secondary physical conditions or complications that may affect the mobility and quality of life of people with lower limb amputation (Robert Gailey, 2008).

The social impact of amputation can be substantial. Recovery and rehabilitation encompasses reintegration into the family, community, and for some the work place, and may require negotiation of evolving roles, relationships and identities (Horne and Neil, 2009). Major lower limb amputation which significantly compromises mobility can necessitate significant adaptations to the patient's home or transition into residential care (Coffey et al., 2014). Changes and restrictions in participation are commonly reported after limb amputation and may be related to personal (e.g. functional abilities, balance confidence, social discomfort, public self-consciousness, emotional impact of amputation, changes in goals and priorities) and/or external constraints (e.g. lack of accessibility, climate, transportation issues) (Tashkandi et al.,2011).

World over, the amputation rate has been increasing due to accidents, gun- shot injuries, vascular diseases, diabetes, terrorist attack, bomb blasts and earthquakes (Soomro et al., 2013). While estimation of trauma is 45 % in the young age yearly, the majority of amputations in the USA are ascribed to Peripheral vascular disease with an estimated to 64% in older age (Ziegler-Graham et al., 2008).Another Study in USA showed that The indications for amputations were critical ischaemia (78.5%), infected ulcer (15.2%), fixed flexion deformity (2.5%), osteomyelitis (1.3%), frostbite (1.3%) and post-compartment syndrome (1.3%) (Jordan et al., 2012). An approximate 49.4% non-traumatic lower extremity amputations were executed in England over a fiveyear period from 2004 to 2008. Moreover, the authors stated that peripheral vascular diseases cause 78.5% of amputation (Ziegler-Graham et al., 2008). A study in Australia found that most amputations were performed for indications related to ischemia secondary to vascular insufficiency with or without diabetes (76.3%). Other indications included trauma (4.7%), infection (9.3%), and tumor (9.8%) (Wu et al., 2010).Another study in Canada stated that amputations were most frequently indicated after admission for

diabetic complications (81%), cardiovascular disease (6%), or cancer (3%) (Kayssai et al., 2016). Thus, it can be concluded that, in developing countries, peripheral vascular disease is the most common cause of amputation. A study conducted in India suggests that trauma had caused 70.3% of amputation (Jordan et al., 2012). While a study from Korea suggests 60% of amputation (Kim et al., 1996). A study on Pakistani population stated that, in spite of safety rules which are not usually followed in this country, trauma (road traffic accident) is the most common cause of amputation (Soomro et al., 2013). Similarly, a cross sectional study of Pakistan also stated that the number of nondiabetic cases of amputation 858(78.6%) was greater than the diabetic 233(21.4%) cases. Therefore, other than peripheral diseases, causes like trauma are more dominant (Pooja & Sanjeeta 2012). A study of Chile (South America) stated that crushing injury and road traffic accident were consistent components among the traumatic causes leading to amputation to the lower limb (Soomro et al., 2013). Road traffic accidents according to the study of University of Maryland, USA are the common cause of amputation (Rotter et al., 2006). Similarly, road traffic accidents in India were most frequent components of traumatic cause (Jordan et al., 2012). Lower limb amputation is also associated with morbidity and mortality. The survival rate varies across countries but mortality rate is generally high (Mousavi et al., 2012). Old age and higher anatomical level of amputation are associated with poor survival and the mortality rate is higher in both people with diabetes and people who do not have diabetes (Papazafiropoulou et al., 2009).

Another study in Pakistan indicated that general causes were trauma 75%, disease 17.4% and congenital 7.7%. Subsequently, the results revealed the major cause, which was trauma. Therefore, the trauma was further classified into constituents: Road Traffic Accident 20%, Bomb blast 37.2%, Gunshot 22.6%, Electric current, 6.1%, Shelling 2.7% Work related accident 2.6%, mine Accident 1.4%, Diabetes trauma 2.8%, Burn 1.6% and sentence/Physical bits/fall injury 3%. Study also perceived that there were below knee amputation 50.1%, above knee amputation 22.4%, and amputation of either levels of lower or upper limb 27.4% (Shahzad et al. 2016). In Nigeria, Traumatic gangrene was the commonest indication for amputation 44.7% followed by diabetic gangrene 22.3%. Total trauma related gangrene constituted 70% of patients. These injuries were caused mainly by traffic accidents involving commercial motorcyclists (Agu & Ojiaku 2016). In Kenya, most of the LLA conducted due to peripheral vascular disease 55.3%. And among trauma RTA were main (Awari & Ating'a 2007). Patients

with amputations secondary to dysvascularity tend to be older, they face a lot of comorbid health conditions, and are at an augmented risk of surgical morbidity and mortality, whereas traumatic limb loss is a lot of dominant among younger, otherwise healthy persons (Dillingham & Pezzin, 2008). In the beginning of twenty century a study by Chalya et al., stated that Motorcycle (58.8%) was responsible for the majority of road traffic crashes.

In developed countries, vascular complications are the foremost factors to lower limb amputations. however within the developing countries, it's additional attainable that the traumatic accidents are the foremost causes of amputation. tube complications and polygenic disease are increasing health problems in developing countries, and diabetic ulcers are descendants of lower limb amputation (Hossain et al., 2007).

Lower limb amputation (LLA) is completed for a spread of reasons that amendment from malady to trauma. Lower limb amputation (LLA) ends up in a large vary of consequences. Amputation typically ends up in reduced physical operate, poor physical performance, lack of gathering, liveliness, general health, and additional pain compared to population standards. Amputation is devastating issue for each males and females however males sometimes have higher physical operate than females. those who consume the following options are sometimes ineffectual to measure severally in their homes once the amputation (Robinson et al., 2010). Individuals with amputations have a complex range of rehabilitation needs and are faced with multiple and evolving physical challenges including impairments in physical functioning, pain, prosthesis use, alterations in body image and self-concept, changes in close personal relationships, employment status or occupation, and disruptions to valued activities and lifestyle (Razak et al., 2016). Comprehensive rehabilitation requires an interdisciplinary team approach in collaboration with partnership with the patient and their family (Czerniecki et al., 2012). These findings support the need for greater acknowledgement by healthcare professionals involved in the care of those with amputation about the importance of the patient's social relationships with friends and family (Highsmith et al., 2016). Education about importance of increasing and maintaining a level of physical activity conducive to health benefits should be based on the implementation of such within a supportive sociable environment for the patient with lower limb amputation (Verghese et al., 2008). Amputation may influence negatively on mobility, emotion, sleep, pain and social function (De Laat et al., 2011). Some people with a lower limb

amputation can be mobile around their home while others may require a walking aid or use a wheelchair (Highsmith et al., 2016). Amputation may result in an inability to leave home (home bound) even with the assistance of the family thus impacting negatively on involvement in social activities (Gholizadeh et al., 2016). Even those who are able to leave home tend to use wheelchairs and only a few use walking aids. Lower limb amputee patient, they are also not able to use a knee and ankle strategy (Vrieling et al., 2008). So in that case, patient who had undergone amputation received artificial limbs give little attention to rehabilitation training including lower limb strengthening exercise, weight bearing exercise, gait training, obstacle management (walking on uneven ground) and functional training have improved their performance (Rau et al., 2007). Amputation affects the life of amputees greatly. Due to physical disability amputees suffer from many psychosocial problems (Hamamura et al., 2009). Unless he or she presents with apparent behavioral abnormality there is little attention given on the psychological state of the individual (Johannesson et al., 2009). In restraining long-term disabilities in an amputee early finding and treatment of psychological morbidity is very important (Highsmith et al., 2016). Cave paintings in Spain and France, about 36,000 years ago, have shown delineate of a mutilated hand (Ukibe et al., 2016). Amputation could be a distressing experience that's probably to cause extended challenges in terms of psychological and social adjustment. Not solely will this procedure experience permanent physical loss, it should additionally cause restrictions in several alternative vital life domains. Limb amputation will cause vital psychological and social disfunction among some people, whereas several others change and performance well (Desmond & MacLachlan, 2006).

3.1 Study Design

This study was conducted using cross sectional design under a quantitative study method. Survey methodology was chosen to meet the study aim as an effective way to collect data.

3.2 Study Area

The study will be conducted in several setting in Savar and Dhaka city. Tertiary level rehabilitation hospitals like Centre for the rehabilitation of the paralyzed (CRP) Savar, National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka and Dhaka Medical College (DMC).

3.3 Study Population

Peoples who have lower limb amputation will be collected using convenience sampling from Tertiary level hospitals like Centre for the rehabilitation of the paralyzed (CRP) Savar , National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka and Dhaka Medical College (DMC).

3.4 Sample Size

Sample is a group of subjects are selected from population, who are used in a piece of research (Hicks, 2009). A sample is a smaller group taken from the population. Sometimes the sample size may be big and sometimes it may be small, depending on the population and the characteristics of the study.

When the sample frame is finite,

The equation of finite population correction in case of cross sectional study is:

$$n = \frac{Z^2 pq}{d^2}$$

$$= \frac{(1.96)^2 \times 0.205 \times 0.795}{(0.05)^2}$$

$$= 250$$

Here,

Z (confidence interval) = 1.96

P (prevalence) = 20.5% (Korovessis et al., 2012)

And, q = (1-p)

$$= (1-0.205)$$

$$=0.795$$

The actual sample size was, $n= 250$.

3.5 Sampling Technique

Findings the appropriate number and type of people taking part in the study is called “sampling” (Hicks, 2009). The study was conducted by using the convenience sampling methods due to the time limitation and as it was the one of the easiest, cheapest and quicker method of sample selection. The researcher used this procedure, because, getting of those samples whose criteria were concerned with the study purpose.

3.6 Inclusion criteria

- Age range 3-75 years:

The age of the amputees ranged from 17 years to 70 years (Maqsood et al., 2015). The most common age group for amputation was 21–30 years of age, accounting for 32.0% of all amputees. The 31–40-year age group was second, accounting for 23.2% of all amputees (Pooja & Sangeeta, 2013).

- Both sex:

There were more male amputees than female ones, with 86% of all amputees being men (Pooja & Sangeeta, 2013).

- Both lower limb:

Among all lower limb amputation cases, below-knee amputations were the most common, followed by above-knee amputations (Pooja & Sangeeta, 2013).

- Good cognitive functional level.

3.7 Exclusion Criteria

- Age range less than 3 or more than 75 years.
- Willingness of the patient.
- Patient with poor cognitive function.
- Any Contraindication are found

3.8 Data Processing

3.8.1 Data Collection Tools

- Record or Data collection form
- Informed Consent
- Self developed questionnaire
- Papers, pen, and pencil etc.

3.8.2 Data Collection Procedure

At the very beginning researcher clarified that, the participant has the right to refuse to answer of any question during completing questionnaire. They can withdraw from the study at any time. Researcher also clarify to all participants about the aim of the study. Participants were ensured that any personal information would not be published anywhere. Researcher took permission from each volunteer participant by using a written consent form. After getting consent from the participants, standard questionnaire was used to identify the complain and collect demographic information. Questions were asked according to the Bangla format. For conducting the interview, the researcher conducted a face to face interview and asked questions. Physical environment was considered strictly. Stimuli that can distract interviewee were removed to ensure adequate attention of interview. Interviewee was asked questions alone as much as possible with consent as sometimes close relatives can guide answer for them. The researcher built a rapport and clarified questions during the interview. Face to face interviews are the most effective way to get full cooperation of the participant in a survey. Face to face interviews are also effective to describe characteristics of a population. Face to face interviews was used to find specific data which describes the population descriptively during discussion. According to the participants' understanding level, sometimes the questions were described in the native language so that the patients can understand the questions perfectly and answer accurately. All the data were collected by the researcher own to avoid the errors.

3.9 Data Analysis

Descriptive statistics were used to analyze data. Descriptive statistics refers methods of describing a set of results in terms of their most interesting characteristics (Hicks, 2009). Data were analyzed with the software named Statistical Package for the Social Science (SPSS) version 20.0. The variables were labeled in a list and the researcher established a computer based data definition record file that consist of a list of variables in order. The researcher put the name of the variables in the variable view of SPSS and defined the types, values, decimal, label alignment and measurement level of data. The next step was cleaning new data files to check the inputted data set to ensure that all data has been accurately transcribed from the questionnaire sheet to the SPSS data view. Then the raw data were ready for analysis in SPSS. Data were collected on frequency and contingency tables. Measurements of central tendency were carried out using the mean plus standard deviation (SD) for variables. For the study of the association of numeric variables chi squared test were used.

Data were analyzed by descriptive statistics and calculated as percentages and presented by using table, bar graph, pie charts etc. Microsoft office Excel 2017 was used to decorating the bar graph and pie charts. The results of this study were consisted of quantitative data. By this study a lot of information was collected.

Chi-squared test:

A chi-squared test, also written as χ^2 test, is any statistical hypothesis test where the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. The chi-squared test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

Assumptions of the Chi-square:

1. The data in the cells should be frequencies, or counts of cases rather than percentages or some other transformation of the data.
2. The levels (or categories) of the variables are mutually exclusive. That is, a particular subject fits into one and only one level of each of the variables.

3. Each subject may contribute data to one and only one cell in the χ^2 . If, for example, the same subjects are tested over time such that the comparisons are of the same subjects at Time 1, Time 2, Time 3, etc., then χ^2 may not be used.
4. The study groups must be independent. This means that a different test must be used if the two groups are related. For example, a different test must be used if the researcher's data consists of paired samples, such as in studies in which a parent is paired with his or her child.
5. There are 2 variables, and both are measured as categories, usually at the nominal level. However, data may be ordinal data. Interval or ratio data that have been collapsed into ordinal categories may also be used. While Chi-square has no rule about limiting the number of cells (by limiting the number of categories for each variable), a very large number of cells (over 20) can make it difficult to meet assumption #6 below, and to interpret the meaning of the results.
6. The value of the cell expecteds should be 5 or more in at least 80% of the cells, and no cell should have an expected of less than one (3). This assumption is most likely to be met if the sample size equals at least the number of cells multiplied by 5. Essentially, this assumption specifies the number of cases (sample size) needed to use the χ^2 for any number of cells in that χ^2 . This requirement will be fully explained in the example of the calculation of the statistic in the case study example.

Calculating Chi-square

The formula for calculating a Chi-Square is:

$$\sum \chi_{i-j}^2 = \frac{(O - E)^2}{E}$$

Where,

O = Observed (the actual count of cases in each cell of the table)

E = Expected value

χ^2 = The cell Chi-square value

$\sum \chi^2$ = Formula instruction to sum all the cell Chi-square values

χ_{i-j}^2 = i-j is the correct notation to represent all the cells, from the first cell (i) to the last cell (j); in this case Cell 1 (i) through Cell 6 (j).

The first step in calculating a χ^2 is to calculate the sum of each row, and the sum of each column. These sums are called the “marginals” and there are row marginal values and column marginal values.

3.10 Ethical Consideration

The researcher maintained some ethical considerations: Researcher has followed the Bangladesh Medical Research Council (BMRC) guideline & WHO research guideline. A research proposal was submitted to the physiotherapy department of BHPI for approval and the proposal was approved by the faculty members and gave permission initially from the supervisor of the research project and from the course coordinator before conducting the study. The proposal of the dissertation including methodology was presented to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) for oral presentation defense was done in front of the IRB. Then the necessary information was approved by Institutional Review Board and was permitted to do this research. After getting the permission of doing this study from the academic institute the researcher had been started to do it. The researcher had been taken permission for data collection from the P&O dept. CRP Savar and from hospitals. The participants would be informed before to invite participation in the study. A written consent form used to take the permission of each participant for the study. The researcher ensured that all participants were informed about their rights and reserves and about the aim and objectives of the study. Researcher also ensured that the organization (CRP) was not hampered by the study. All kinds of confidentiality highly maintained. The researcher ensured not to leak out any type of confidentialities. The researcher was eligible to do the study after knowing the academic and clinical rules of doing the study about what should be done and what should not. All rights of the participants were reserved and researcher was accountable to the participant to answer any type of study related question.

Socio-demographic information

4.1. Age of the participants:

Among 97 participants, 2.1% (n=2) were between 0-10 years age range, 15.5% (n=15) were 11-20 years range, 33% (n=32) were 21-30 years range, 13.4% (n=13) were 31-40 years range, 18.6% (n=18) were 41-50 years range, 9.3% (n=9) were 51-60 years range, 8.2% (n=8) were 61-70 years range. The mean age is 35. The standard deviation is 15.659.

Table no 1: Age of the participants

| Age | Frequency | Percentage | Mean (SD) |
|-------------|-----------|------------|------------|
| 0-10 years | 2 | 2.1% | 35 ±15.659 |
| 11-20 years | 15 | 15.5% | |
| 21-30 years | 32 | 33.0% | |
| 31-40 years | 13 | 13.4% | |
| 41-50 years | 18 | 18.6% | |
| 51-60 years | 9 | 9.3% | |
| 61-70 years | 8 | 8.2% | |

4.2. Demographic Characteristics

In this table we will know about the gender, marital status, religion, educational status, and other socio-demographic status. Among 97 patients 17.5% (n=17) were females and 82.5% (n=80) were males. 60.8% (n=59) were married, 39.2% (n=38) were unmarried, and 0% (n=0) was divorced and separated. Participant's religion 93.8% (n=91) were Islam, 5.2% (n=5) were Hindu, 1% (n=1) was Buddah, and 0% (n=0) was Christian. Among 97 patients 21.6% (n=21) were illiterate, 20.6% (n=20) had primary education, 28.9% (n=28) had secondary education, 14.4% (n=14) had higher secondary education, 14.4% (n=14) had bachelor & masters. 15.5% (n=15) were businessman, 20.6% (n=20) were service holder, 7.2% (n=7) were farmer, 55.5% (n=54) were from others profession. Between 97 participants 47.4% (n=46) were amputated between 0-6 months, 13.4% (n=13) were amputated between 6-12 months, 9.3% (n=9) were amputated between 12-24 months, and 29.9% (n=29) were amputated more than 24 months ago.

Table No-2: Socio-demographic status

| Demographic Status | Frequency (n) | Percent (%) |
|--|----------------------|--------------------|
| Gender of the participant | | |
| Male | 80 | 82.5 |
| Female | 17 | 17.5 |
| Marital status of the participant | | |
| Married | 59 | 60.8 |
| Unmarried | 38 | 39.2 |
| Religion of the Participant | | |
| Islam | 91 | 93.8 |
| Hinduism | 5 | 5.2 |
| Buddah | 1 | 1 |

Educational status

| | | |
|--------------------|----|------|
| Illiterate | 21 | 21.6 |
| Primary | 20 | 20.6 |
| Secondary | 28 | 28.9 |
| Higher secondary | 14 | 14.4 |
| Bachelor & Masters | 14 | 14.4 |

Occupation of the Participant

| | | |
|----------------|----|------|
| Businessman | 15 | 15.5 |
| Service holder | 20 | 20.6 |
| Farmer | 7 | 7.2 |
| Other | 54 | 55.5 |

Duration of amputation of the participant

| | | |
|--------------|----|------|
| 0-6 months | 46 | 47.4 |
| 6-12 months | 13 | 13.4 |
| 12-24 months | 9 | 9.3 |
| >24 mmonths | 29 | 29.9 |

| | | |
|--------------|-----------|------------|
| Total | 97 | 100 |
|--------------|-----------|------------|

Factors behind amputation

4.3: Previous amputation history of the participants

Among 97 participants 19.6% (n=19) were previously amputated, and 80.4% (n=78) were not previously amputated. (Figure 7)

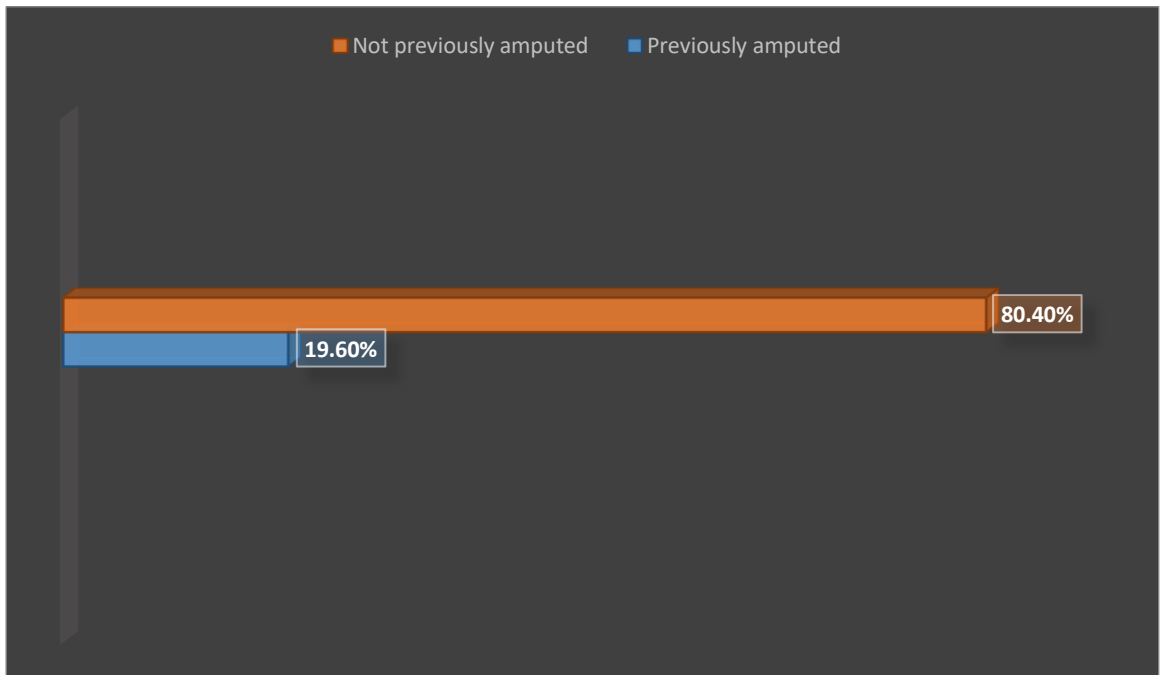


Figure 1: Previous amputation history of the participants

4.4: Type of current lower limb amputation of the participants

Among 97 participants 30.9% (n=30) were trans-femoral amputated, 59.8% (n=58) were trans-tibial amputated, 5.2% (n=5) were knee disarticulated, 3.1% (n=3) were hip disarticulated, and 1% (n=1) amputation occur in others area of lower limb. (Figure 8)

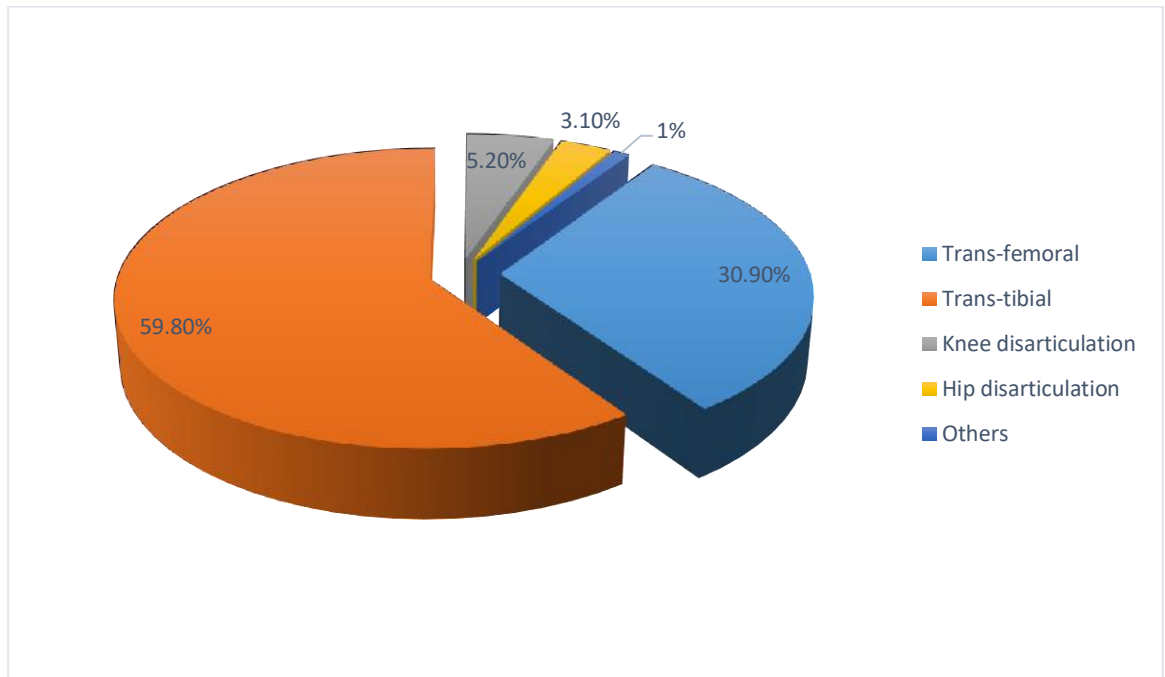


Figure 2: Type of current lower limb amputation

4.5: Factors behind amputation

Among 97 participants 10.3% (n=10) amputation occurred due to congenital diseases, and 89.7% (n=87) were not occurred due to congenital diseases, 3.1% (n=3) amputation occurred due to vascular diseases, and 96.9% (n=94) were not occurred due to vascular diseases, 5.2% (n=5) amputation occurred due to diabetes, and 94.8% (n=92) were not occurred due to diabetes, 3.1% (n=3) amputation occurred due to cancer, and 94.8% (n=92) were not occurred due to cancer, 2.1% (n=2) amputation occurred due to post operative complications, and 97.9% (n=95) were not occurred due to post operative complications, 6.2% (n=6) amputation occurred due to infection, and 93.8% (n=91) were not occurred due to infection, 70.1% (n=68) amputation occurred due to trauma, and 29.9% (n=29) were not occurred due to trauma.

Table no. 3: Factors behind amputation

| Values | Frequency (n) | Percent (%) |
|---|----------------------|--------------------|
| Relation between congenital disease and lower limb amputation | 10 | 10.3 |
| Relation between vascular disease and lower limb amputation | 3 | 3.1 |
| Relation between diabetes and lower limb amputation | 5 | 5.2 |
| Relation between cancer and lower limb amputation | 3 | 3.1 |
| Relation between post operative complications and lower limb amputation | 2 | 2.1 |
| Relation between infection and lower limb amputation | 6 | 6.2 |
| Relation between trauma and lower limb amputation | 68 | 70.1 |
| Total | 97 | 100 |

4.6 : Types of trauma and lower limb amputation

Among 97 participants 54.6% (n=53) amputation occur due to road traffic accident, and 45.4% (n=44) were not occur due to road traffic accident. 1% (n=1) amputation occur due to diabetic trauma, and 99% (n=96) were not occur due to diabetic trauma. 3.1% (n=3) amputation occur due to electric current, and 96.9% (n=94) were not occur due to electric current. 6.2% (n=6) amputation occur due to work related accident, and 93.8% (n=91) were not occur due to work related accident. 3.1% (n=3) amputation occur due to burn, and 96.9% (n=94) were not occur due to burn. 1% (n=1) amputation occur due to punishment, and 99% (n=96) were not occur due to punishment. 1% (n=1) amputation occur due to animal bite, and 99% (n=96) were not occur due to animal bite. Between 97 participants no amputation occur due to bomb blast, gun shot, shelling, and mine blast (n=0).

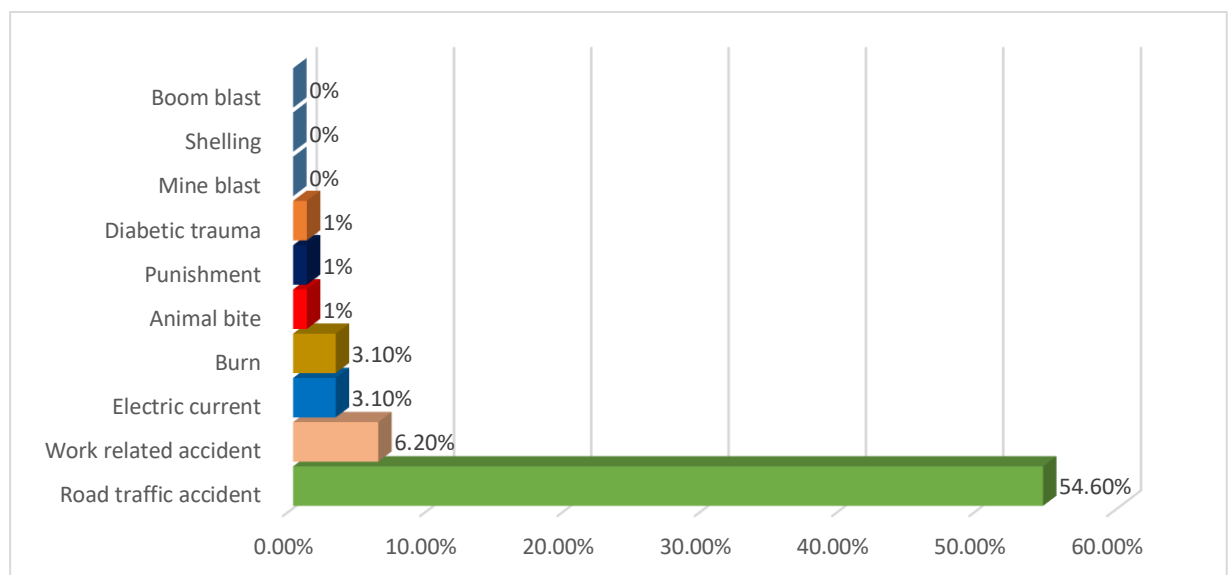


Figure 3 : Types of trauma and lower limb amputation

Table 4: Association between age and marital status of the participants.

| Age and marital status of the participants | Chi-Square | P value |
|--|------------|---------|
| | 58.82 | 0.00 |

This observed Chi-square value was 58.82 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between age and marital status of the participants.

Table 5: Association between age and marital status of the participants.

| Diabetes related amputation and age | Chi-Square | P value |
|-------------------------------------|------------|---------|
| | 22.285 | 0.01 |

This observed Chi-square value was 22.285 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Diabetes related amputation and age of the participants.

Table 6: Association between diabetes related amputation and age.

| Diabetes related amputation and age | Chi-Square | P value |
|-------------------------------------|------------|---------|
| | 22.285 | 0.01 |

This observed Chi-square value was 22.285 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Diabetes related amputation and age of the participants.

Table 7: Association between post operative complications related amputation and age.

| Post operative complications related amputation and age | Chi-Square | P value |
|---|------------|---------|
| | 3.315 | 0.768 |

This observed Chi-square value was 3.315 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was accepted and alternative hypothesis was rejected. So, there was no association between post operative complications related amputation and age of the participants.

Table 8: Association between age and congenital diseases related amputation.

| Age and congenital diseases related amputation | Chi-Square | P value |
|--|------------|---------|
| | 30.689 | 0.00 |

This observed Chi-square value was 30.689 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between age and congenital diseases related amputation of the participants.

Table 9: Association between Vascular disease related amputation and age.

| Vascular disease related amputation and age | Chi-Square | P value |
|---|------------|---------|
| | 7.007 | 0.320 |

This observed Chi-square value was 7.007 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was accepted and alternative hypothesis was rejected. So, there was no association between Vascular disease related amputation and age of the participants.

Table 10: Association between Cancer related amputation and age.

| Cancer related amputation and age | Chi-Square | P value |
|-----------------------------------|------------|---------|
| | 9.509 | 0.147 |

This observed Chi-square value was 9.509 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was accepted and alternative hypothesis was rejected. So, there was no association between Cancer related amputation and age of the participants.

Table 11: Association between Infection related amputation and age.

| Infection related amputation and age | Chi-Square | P value |
|--------------------------------------|------------|---------|
| | 13.482 | 0.036 |

This observed Chi-square value was 13.482 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Infection related amputation and age of the participants.

Table 12: Association between Trauma related amputation and age.

| Trauma related amputation and age | Chi-Square | P value |
|-----------------------------------|------------|---------|
| | 22.976 | 0.001 |

This observed Chi-square value was 22.976 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Trauma related amputation and age of the participants.

Table 13: Association between Sex and congenital disease related amputation.

| Sex and congenital disease related amputation | Chi-Square | P value |
|---|------------|---------|
| | 3.896 | 0.048 |

This observed Chi-square value was 3.896 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Sex and congenital disease related amputation of the participants.

Table 14: Association between Sex and cancer related amputation.

| Sex and cancer related amputation | Chi-Square | P value |
|-----------------------------------|------------|---------|
| | 14.568 | 0.000 |

This observed Chi-square value was 14.568 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was rejected and alternative hypothesis was accepted. So, there was association between Sex and cancer related amputation of the participants.

Table 15: Association between Education level and types of amputation.

| Education level and types of amputation | Chi-Square | P value |
|---|------------|---------|
| | 22.542 | 0.127 |

This observed Chi-square value was 22.542 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was accepted and alternative hypothesis was rejected. So, there was no association between Education level and types of amputation of the participants.

Table 16: Association between Occupation and type of amputation.

| Occupation and type of amputation | Chi-Square | P value |
|-----------------------------------|------------|---------|
| | 6.419 | 0.983 |

This observed Chi-square value was 6.419 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. The result means Null-hypothesis was accepted and alternative hypothesis was rejected. So, there was no association between Occupation and type of amputation of the participants.

Discussion

This population based cross sectional survey revealed the factors that are responsible for lower limb amputation in Bangladesh. The purpose of the study was to find out the main factors that are responsible for lower limb amputations. The majority of people's age range was 21-30 years (n=32) and their percentage was 32.7%. In mid twenty century a study by Amponsah et al., found that most of the people 31.6%(n=140) belong the age group 25-30 years of age. Here in my study, between 97 participants, 60.8% (n=59) were married, 39.2% (n=38) were unmarried, and 0% (n=0) was divorced and separated. In this study, among 97 patients 21.6% were illiterate, 20.6% participants had primary education, 28.9% had secondary education, 14.4% had higher secondary education, 14.4% had bachelor & masters. In a similar study with 100 participants with limb prosthesis in Pakistan, 18 participants had primary education, 33 participants had middle class education according to their country, 20 participants had secondary education, 8 participants had intermediate education, 10 participants had their graduation and only 2 participants had post-graduation degree (Malik et al., 2013). In an another similar study conducted in Bangladesh, the educational status revealed that among 332, 83 participants or 25% had no formal education, 37% had gone to primary school, 18.4% had gone to secondary school and 10.5% to higher secondary school. 7.5% had bachelor degree and 1.5% had religious education. (Hassan et al., 2019)

Another finding from this study is among 97 patients 15.5%(n=) were businessman, 20.6% were service holder, 7.2% were farmer, 55.5% were from other professions. In a similar study, among 100 participants, 39 were employed and 61 participants were unemployed (Malik et al., 2013). Another study conducted in Bangladesh, among all 332 participants student was 18.5%, service holder was 19.1%, 18.5% business owners, 15.9% were day Laborers, drivers 8.6%, farmers 9.9% and unemployed 3.8%. this shows that both employed and unemployed participants significantly have amputation for different causes. It means from all aspects of occupation a person may become possibly affected by amputation (Hassan et al., 2019).

In my study among 97 participants 30.9% (n=30) were trans-femoral amputated, 59.8% (n=58) were trans-tibial amputated, 5.2% (n=5) were knee disarticulated, 3.1% (n=3) were hip disarticulated, and 1% (n=1) amputation occur in other areas of lower limb. Similar existing study also observed that below knee amputation was 55% and above knee amputation was 22% (Shahzad et al., 2016). A different study conducted from Bangladesh had shown that majority of the participants had below knee amputation 52.1% followed by above knee 30.4%, through knee 6.0%, through hip 5.7%, through ankle 4.2%, and below ankle 1.5%. Moreover, unilateral amputation made up the majority 95.8% (Hassan et al., 2019). A different study from Norway showed that the 215 primary amputations included partial foot (19%), ankle disarticulation (1%), trans-tibial (24%), knee disarticulation (32%), trans-femoral (23%) and hip disarticulation (2%). Partial foot amputations consisted of toe amputations, ray amputations, trans-metatarsal amputations and hind-foot amputations (Witsø & Rønningen 2001). A study from Canada showed, patients who required a reamputation most commonly underwent a below-knee amputation (61%). An above-knee amputation was performed in 22% and a foot amputation in 14% of reamputation patients. (Kayssi et al., 2016). From these studies it indicates that in most of the cases among lower extremities amputation trans-tibial amputation occurs mostly.

The causes and severity of amputation vary by country depending on degree of industrialization, mode of transportation, social and economic circumstances, and health care system (Pooja 2013). Here in my study among 97 participants 10.3% amputation occur due to congenital diseases, 3.1% amputation occur due to vascular diseases, 5.2% amputation occur due to diabetes, 3.1% amputation occur due to cancer. 1% amputation occur due to diabetic trauma. Among 97 participants 70.1% amputation occur due to trauma, 54.6% amputation occur due to road traffic accident. Another study in Bangladesh shows that RTA occurs in 58.7% population, peripheral vascular disease 7.5%, infection 6.3%, congenital disease 5.4%, diabetes 5.1% (Hassan et al., 2019). Sansam et al. (2009) stated that traumatic amputation was higher in developing countries whereas amputation due to vascular diseases was more frequent in developed countries. In Bangladesh, road traffic accidents are the leading cause of lower limb amputation. Rapid and unplanned urbanization, increasing number of motorized vehicles-many of which do not have fitness, inadequate and poor roads and highway conditions and capacity, and inadequate or a lack of traffic safety rules and practices are taking a toll on the population. The fact that road traffic accidents are the leading

cause of lower limb amputation as reported in this study is supported by other studies conducted in India (Pooja 2013) and Nigeria (Obalum & Okeke). However, Aftabuddin et al. (1997) found vascular diseases as the most common indication of lower limb amputation in a study based at a government tertiary hospital in Bangladesh. Subsequently, the study from Pakistan, the results revealed that the major cause was trauma. Therefore, the trauma was further classified into constituents: Road Traffic Accident 20%, Bomb blast 37.2%, Gunshot 22.6%, Electric current 6.1%, Shelling 2.7%, Work related accident 2.6%, mine accident 1.4%, Diabetes trauma 2.8%, Burn 1.6% and sentence/Physical bits/fall injury 3%. Study also perceived that there were below knee amputation 50.1%(n=1638), above knee amputation 22.4 % (Shahzad et al., 2016). Additionally, the study was held in Karachi (Pakistan) to know the major causes of amputation which was the trauma (80%), therefore the results were related to this study on characteristic of gender and mean age as well (Soomro et al., 2013). Hence, the above results of study of India and Karachi (Pakistan) revealed that major cause of amputation was the trauma. In these countries, reason for trauma takes place due to violation of traffic rules and ignorance of the security measures in daily life. The writers of this study classified that traumatic cause into further categories, which were road traffic accident, bomb blast, gunshot and others. The cause of trauma, the most frequent component was bomb blast to cause amputation that was in contrast to the results of Korean study because the common component in trauma was road traffic accident. Incidence of road traffic accidents was much similar to this study because of violation of traffic rules in both countries. Another reason was that the sample size of that study was less than that of Korean.

Study (Kim et al., 1996). Also, the study of India, there was greater concordance of road traffic accident in all varieties of trauma because people are having same type of routine. On the other hand, current study showed that there was higher concordance of bomb blast to cause amputation (Jordan et al., 2012). The results of study of Mexico indicated that among the components of trauma, crushing injury was conquered more than the road traffic accident because country was a developed country as compared to Pakistan and India (Soomro et al., 2013). The study of University of Maryland, stated common cause of amputation was road traffic Accident. So, the results were not similar to this study (Rotter et al.,2006). The previous studies of said countries revealed that road traffic accident was the most common component in trauma. However, no study revealed that bomb blast was frequent cause because the incidence of bomb blast was

very low as compared to Pakistan. This study was carried out soon after and during the war on terror. Another study of Pakistan (Karachi) revealed that road traffic accident was 38.38 % and bomb blast was 1.34 % and its outcomes were also different to that of this study. Current study revealed that bomb blast had great concordance than road traffic accident. Reasons for difference of findings were that, first, current study is very recent and secondly, present study has large sample size as compared to prior one (Soomro et al 2013). Another study of Pakistan revealed that maximum amputation was due to Firearm injuries, and then a few cases were due to road traffic accidents injuries (Jawaid et al.,2008).

Study conducted in Canada showed that amputations were most frequently indicated after admission for diabetic complications (81%), cardiovascular disease (6%), or cancer (3%) (Kayssi et al., 2016). In my study, I found that 2.1% amputation occur due to post-operative complications, 6.2% amputation occur due to infection. 3.1% amputation occur due to burn. 3.1% amputation occur due to electric current. Here in my study among 97 participants 6.2% amputation occur due to work related accident, 1% amputation occur due to punishment, 1% amputation occur due to animal bite. Also between 97 participants no amputation occurs due to bomb blast, gun shot, shelling, mine blast. In correlation with another study that lower limb amputation occurs mostly due to fall from height 3.9%, cancer 3.3% and other conditions such as burn, bullet attack and electric shock 2.4%. Study in Norway found that three different etiology groups were recorded: diabetic amputees (DA): 74 (34%), non-diabetic peripheral vascular disease amputees (PVDA): 113 (53%) and "other conditions": 28 (13%). Diabetes was diagnosed at the actual hospitalization in 5% of the amputees (Witsø & Rønningen 2001). A study conducted in Rwanda shows that the main cause of amputation is gangrene 43.9%, malignancy 29%, burn 2.8%, diabetic foot 1.9%, peripheral vascular disease 0.9%, trauma 13.1% (Murwanashyaka et al.,2013).

So from above discussion we can easily understand that in developing countries like Bangladesh, India, Pakistan the culprit reason for amputation is trauma. Among trauma RTA is the main reason in Bangladesh. Whereas in developed countries like Canada, Norway the main reason for amputation showed vascular disease, diabetes. The result vary country to country because of different structure, geographical area, laws, habit and so many things. However proper law employment for road safety can decrease this rate.

LIMITATION OF THE STUDY:

The current study had some potential limitations. The main limitation of this study was its short duration. The study was conducted with 97 lower limb amputee patients which was a very small number of samples. This study only conduct in different hospitals at Saver & Dhaka that is not cover the full area of Bangladesh. The data collection was challenging in hospital site.

6.1 Conclusion

Amputation is a devastating and life threatening incident of a person's life. This leads a man to a whole new challenging stages of life. It is one of the leading causes of poor functioning, hampered daily living activities and a socioeconomic challenge. This is particularly true for developing countries like Bangladesh, where health support system including the rehabilitation system is not within the reach of ordinary people. It is clear that, this destructive condition not only affects the patient but also their family. Bangladesh is a developing country with low socio-economic condition health services are not sufficient in the Government and non-government sector. As in some conditions amputation can not be subsided, it is important to take some preventive measures to overcome amputation. Through my study I've wanted to find out the key factors that are mainly responsible for amputation so that we can decrease the percentage of amputation in our country. In my study I've found that road traffic accident is the leading cause for amputation in Bangladesh. It occurs because of Rapid and unplanned urbanization, increasing number of motorized vehicles-many of which do not have fitness, inadequate and poor roads and highway conditions and capacity, and inadequate or a lack of traffic safety rules and practices are taking a toll on the population. So if government is strict in this issue and employ rules for safe road and traffic the percentage of amputation due to RTA may decrease. Also it is not only responsibility of the government but also need awareness among people of Bangladesh to decrease RTA. This study can help to specify the leading cause behind lower limb amputation.

6.2 Recommendations

The aim of this study was to find out the predisposing factors that are responsible for lower limb amputation in Bangladesh and the result which found from the study has fulfilled the aim of this research project. The following recommendations are-

- Should take more samples for generating the result and make more valid and reliable.
- Should do pilot study to establish the appropriateness of the questionnaire.
- Sample should collect from different hospital, clinic, institute and organization in different district of Bangladesh to generalize the result.

This is an undergraduate study and doing the same study at graduate level will give more precise output. There were some limitation of this study mentioned at the relevant section; it is recommended to overcome those limitations during further study. So for further study it is strongly recommended to increase sample size with adequate time to generalize the result in all of the lower limb amputee patients in Bangladesh for better results and perspectives.

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APPENDIX

Institutional Review Board (IRB) Approval



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
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B.Sc. in Physiotherapy
Session: 2014-15, Student ID:112140262
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal “**predisposing factors affecting lower limb amputation in Bangladesh**” by ethics committee.

Dear Tamal Ghosh Tripta,

Congratulations.

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

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

The study involves use of a questionnaire to explore predisposing factors affecting lower limb amputation in Bangladesh that may take 15 to 20 minutes to answer the questionnaire and there is no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 11 AM on 18th August, 2019 at BHPI.

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

Best regards,

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

Permission Letter

25th May, 2019

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

Subject: Application for review and ethical approval.

Sir,

With due respect and humble submission to state that I am TAMAL GHOSH TRIKTA, student of 4th Professional B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under faculty of Medicine of University of Dhaka (DU). This is a 4(four) year full time course. Conducting thesis project is partial fulfillment of the requirement for the degree of B.Sc in physiotherapy. As I have to conduct a thesis entitled, "**PREDISPOSING FACTORS AFFECTING LOWER LIMB AMPUTATION IN BANGLADESH.**" under the supervision of Ehsanur Rahman, Assistant Professor of the Physiotherapy Department, BHPI, CRP, Savar, Dhaka-1343, Bangladesh. The purpose of the study is to find out the predisposing factors that are responsible for lower limb amputation in Bangladesh. I would like to assure that anything of my study will not be harmful for the participants. Informed consent will be received from all participants, data will be kept confidential.

May I, therefore pray and hope that you would be kind enough to approve the thesis proposal and to start data collection. I can assure you that I will maintain all the requirements for study.

Sincerely,
তামাল ঘোষ ত্রিকতা
TAMAL GHOSH TRIKTA
4th professional B.Sc in Physiotherapy
Roll: 30, Session: 2014-15

BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Recommendation from the thesis supervisor:

Ehsanur Rahman

Assistant Professor,

Department of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343

Attachment: Thesis proposal including process and procedure for maintaining confidentiality, Questionnaire (English & Bangla version), Informed consent.

Forwarded
E.Rh
18/5/19

সম্মতিপত্র

আসসালামুয়ালাইকুম/নমস্কার,

আমি তমাল ঘোষ তৃত্ত বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট এর বি এস সি ইন ফিজিওথেরাপি বিভাগের ৪র্থ বর্ষের শিক্ষার্থী, আমার গবেষণা প্রকল্পটি বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বি এস সি ইন ফিজিওথেরাপি কোর্সের অধিভুক্ত। আমি " বাংলাদেশে পা কেটে ফেলার পেছনের প্রভাবক কারণসমূহ "এর উপর গবেষণা করছি। এই গবেষণার উদ্দেশ্য বাংলাদেশে পা কেটে ফেলার জন্য কারণসমূহ বের করা। আমি এক্ষেত্রে আপনাকে কিছু ব্যক্তিগত, রোগ সম্পর্কিত আনুষঙ্গিক প্রশ্ন করতে চাচ্ছি। এতে ১০-১৫ মিনিট সময় লাগবে। এই গবেষণা সম্পূর্ণ ভাবে কোর্সের কাজ ছাড়া অন্য কোন উদ্দেশ্যে ব্যবহার করা হবে না এবং গবেষণাপত্র প্রকাশকালে অংশগ্রহণকারীর পরিচয় ও অন্যান্য তথ্য সমূহের গোপনীয়তা রক্ষা করা হবে। অংশগ্রহণকারীগণ যে কোন সময় গবেষণার কার্যক্রম থেকে নিজেদের প্রত্যাহার করতে পারবেন।

এই অধ্যয়নে অংশগ্রহণকারী হিসেবে যদি আপনার কিছু জানার থাকে তাহলে আপনি আমাকে অথবা /এবং আমার সুপারভাইজার এহসানুর রহমান, সহকারী অধ্যাপক, ফিজিওথেরাপি বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩ উনার সাথে যোগাযোগ করতে পারেন।

আমি কি আপনার অনুমতি নিয়ে সাক্ষাৎকার শুরু করতে পারি?

হ্যাঁ

না

অংশগ্রহণকারীর স্বাক্ষর ও তারিখ.....

উপাত্ত সংগ্রহকারীর স্বাক্ষর ও তারিখ.....

গবেষকের স্বাক্ষর ও তারিখ.....

Consent Form

Assalamualaikum/ Namashker,

I am Tamal Ghosh Tripta, 4th professional B.sc. in physiotherapy student of Bangladesh Health Professions Institute (BHPI) under the Medicine faculty of University of Dhaka .To obtain my Bachelor degree, I shall have to conduct a research which is a part of my study . The participants are requested to participate in the study after reading the following.

My research title is “**PREDISPOSING FACTORS AFFECTING LOWER LIMB AMPUTATION IN BANGLADESH**”. Through this Study I will find the main causes behind amputation.To fulfill my research project, I need to collect data. Considering the area of my research, which criteria is necessary for my research is present of you. So you can be a respected participant of my research and I would like to request you as a subject of my study

I would like to inform you that this is a purely academic study and will not be used for any other purpose. I assure that all data will be kept confidential. Your participation will be voluntary. You may have the right to withdraw consent and discontinue participation at any time of the experiment. You also have the right to answer a particular question that you don't like.

If you have any query about the study or right as a participant, you may contact with me and/ or Assistant Professor Ehsanur Rahman, BHPI, CRP.

Do you have any question before I start?

So, may I have your consent to proceed with the interview?

Yes

No

Signature of the participant and Date.....

Signature of the researcher and Date.....

Signature of the witness and Date.....

প্রশ্নাবলী (বাংলা)

প্রশ্নপত্র

শিরোনামঃ “ বাংলাদেশে পা কেটে ফেলার পেছনের প্রভাবক কারণসমূহ”

অংশ-১ঃ রোগীর সনাক্তকরণ (মেডিকেল রেকর্ড/রোগীর থেকে সংগ্রহ করতে হবে)ঃ

| | |
|-----|------------------|
| ১.১ | সনাক্তকরণ নম্বরঃ |
| ১.২ | সাক্ষাতের তারিখঃ |
| ১.৩ | উত্তরদাতার নামঃ |
| ১.৪ | ঠিকানাঃ |
| ১.৫ | মোবাইল নম্বরঃ |

অংশ-২ঃ সামাজিক-বৈষয়িক তথ্যাবলি (মেডিকেল রেকর্ড/রোগীর থেকে সংগ্রহ করতে হবে)ঃ

| প্রশ্ন নম্বর | প্রশ্নাবলী | উত্তর | কোড |
|--------------|------------|----------------------|--------|
| ২.১ | বয়স | | |
| ২.২ | লিঙ্গ | ১. পুরুষ ২. মহিলা | ১ ২ |
| ২.৩ | শরীরের ওজন | | |

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| ২.৪ | উচ্চতা |মি (১ ফুট=.৩০৪৮ মিটার) | |
| ২.৫ | আপনার বৈবাহিক অবস্থা কি? | ১.বিবাহিত ২.অবিবাহিত ৩.তালকপ্রাপ্ত ৪.আলাদা | ১ ২ ৩ ৪ |
| ২.৬ | আপনার ধর্ম কি? | ১.ইসলাম ২.হিন্দু ৩.খ্রিস্টান ৪.বৌদ্ধ | ১ ২ ৩ ৪ |
| ২.৭ | আপনার শিক্ষাগত যোগ্যতা কি? | ১.অশিক্ষিত ২.প্রাথমিক শিক্ষা ৩.মাধ্যমিক ৪.উচ্চমাধ্যমিক ৫.স্নাতক ও স্নাতকোত্তর | ১ ২ ৩ ৪ ৫ |

| | | | |
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| ২.৮ | আপনার পেশা কি? | ১.ব্যবসায়ী ২.চাকুরীজীবী ৩.কৃষক ৪.অন্যান্য..... | ১ ২ ৩ ৪ |
| ২.৯ | কত বছর পূর্বে অঙ্গ হানি হয়েছিল? | ১. ০-৬ মাস ২. ৬-১২ মাস ৩. ১২-২৪ মাস ৪. ২৪ মাসের অধিক | ১ ২ ৩ ৪ |

অংশ ৩ঃ পা হানির পেছনে কারণসমূহ

| প্রশ্ন নম্বর | প্রশ্নাবলী | উত্তর | কোড |
|--------------|---|--|-----------------------|
| ৩.১ | আপনার পূর্বে অঙ্গ হানি হয়েছিল? | ১.হ্যা ২.না | ১ ২ |
| ৩.২ | বর্তমান পা কাটার ধরণ | ১.ট্রান্স ফিমোরাল ২.ট্রান্স টিবিয়াল ৩.হাঁটু থেকে ৪.নিতম্ব থেকে ৫.অন্যান্য | ১ ২ ৩ ৪ ৫ |
| ৩.৩ | জন্মগত রোগের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৪ | রক্ত সংবহনতন্ত্রের রোগের কারণে আপনার অঙ্গ হানি হয়েছে?? | ১.হ্যা ২.না | ১ ২ |
| ৩.৫ | ডায়াবেটিসের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |

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| ৩.৬ | ক্যান্সারের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৭ | অপারেশন পরবর্তী জটিলতার জন্য আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৮ | ইনফেকশনের জন্য আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯ | আঘাতের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |

যদি ৩.৯ এর উত্তর হ্যাঁ হয়ে থাকে তাহলে দয়া করে নিচের প্রশ্নগুলোর উত্তর দিন, যদি না হয়ে থাকে তাহলে এগুলো উপেক্ষা করুন।

| প্রশ্ন নম্বর | প্রশ্নাবলী | উত্তর | কোড |
|--------------|---|----------------|--------|
| ৩.৯.১ | সড়ক দুর্ঘটনার কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.২ | বোমা বিস্ফোরণের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৩ | ডায়াবেটিস আঘাতের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৪ | বন্দুকের গুলির আঘাতের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৫ | গোলাবর্ষনের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৬ | বিদ্যুৎ প্রবাহের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৭ | কাজ সম্পর্কিত দুর্ঘটনার কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.৮ | খনি বিস্ফোরণের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |

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| ৩.৯.৯ | আগুনে পোড়ার কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.১০ | কোন প্রকার শক্তির কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |
| ৩.৯.১১ | কোন প্রাণীর কামড়ের কারণে আপনার অঙ্গ হানি হয়েছে? | ১.হ্যা ২.না | ১ ২ |

Questionnaire (English)

Questionnaire sheet

Title: “PREDISPOSING FACTORS AFFECTING LOWER LIMB AMPUTATION IN BANGLADESH.”

Part-1: Patient’s identification (To be collected from medical record/respondent):

| | | |
|-----|------------------------|--|
| 1.1 | Identification number: | |
| 1.2 | Date of interview: | |
| 1.3 | Name of respondent: | |
| 1.4 | Address: | |
| 1.5 | Contact number: | |

Part 2: Socio-demographic information (To be collected from medical record/respondent):

| QN | Question and filters | Response | Code |
|-----|----------------------|----------------------|----------------------|
| 2.1 | Age | | |
| 2.2 | Sex | 1. Male 2. Female | 1 2 |
| 2.3 | Body weight | | |

| | | | |
|------------|----------------------------------|---|--|
| 2.4 | What is your marital status? | 1. Married 2. Unmarried 3. Divorced 4. Separated | 1 2 3 4 |
| 2.5 | What is your religion? | 1. Islam 2. Hinduism 3. Christian 4. Buddha | 1 2 3 4 |
| 2.6 | What is your educational status? | 1. Illiterate 2. Primary education 3. Secondary education 4. Higher secondary education 5. Bachelor & masters | 1 2 3 4 5 |
| 2.7 | What was your Occupation? | 1. Businessman 2. Service Holder 3. Farmer 4. Others..... | 1 2 3 4 |
| 2.8 | Years of amputation | 1. 0-6 months 2. 6-12 months 3. 12-24 months 4. >24 months | 1 2 3 4 |

Part 3: Factors behind amputation

| QN | Question and filters | Response | Code |
|-----|--|---|-----------------------|
| 3.1 | Are you previously amputated? | 1. Yes 2. No | 1 2 |
| 3.2 | Type of current lower limb amputation | 1. Trans-femoral 2. Trans-tibial 3. Knee disarticulation 4. Hip disarticulation 5. Others | 1 2 3 4 5 |
| 3.3 | Does amputation occur due to congenital diseases? | 1. Yes 2. No | 1 2 |
| 3.4 | Does amputation occur due to vascular diseases? | 1. Yes 2. No | 1 2 |
| 3.5 | Does amputation occur due to diabetes ? | 1. Yes 2. No | 1 2 |
| 3.6 | Does amputation occur due to cancer? | 1. Yes 2. No | 1 2 |
| 3.7 | Does amputation occur due to post operative complications? | 1. Yes 2. No | 1 2 |
| 3.8 | Does amputation occur due to infection? | 1. Yes 2. No | 1 2 |
| 3.9 | Does amputation occur due to trauma? | 1. Yes 2. No | 1 2 |

If answer of 3.9 is yes please answer following questions,if no than skip these part

| QN | Question and filters | Response | Code |
|-------|--|-----------------|--------|
| 3.9.1 | Does amputation occur due to Road Traffic Accident | 1. Yes 2. No | 1 2 |
| 3.9.2 | Does amputation occur due to Bomb Blast | 1. Yes 2. No | 1 2 |

| | | | |
|---------------|--|-----------------|----------------------|
| 3.9.3 | Does amputation occur due to Diabetes trauma | 1. Yes 2. No | 1 2 |
| 3.9.4 | Does amputation occur due to Gun Shot | 1. Yes 2. No | 1 2 |
| 3.9.5 | Does amputation occur due to Shelling | 1. Yes 2. No | 1 2 |
| 3.9.6 | Does amputation occur due to Electric Current | 1. Yes 2. No | 1 2 |
| 3.9.7 | Does amputation occur due to Work Related Accident | 1. Yes 2. No | 1 2 |
| 3.9.8 | Does amputation occur due to Mine Blast | 1. Yes 2. No | 1 2 |
| 3.9.9 | Does amputation occur due to Burn | 1. Yes 2. No | 1 2 |
| 3.9.10 | Does amputation occur due to Punishment | 1. Yes 2. No | 1 2 |
| 3.9.11 | Does amputation occur due to Animal Bite | 1. Yes 2. No | 1 2 |