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PREDISPOSING FACTORS AFFECTING BURN IN BANGLADESH

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

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

PREDISPOSING FACTORS AFFECTING BURN IN BANGLADESH

Submitted by **Bibi Sajida Tultul**, for the partial fulfilment of the requirement for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

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DECLARATION

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

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Acronyms

BHPI: Bangladesh Health Profession's Institute

CRP: Centre for the Rehabilitation of the Paralysed

IRB: Institutional Review Board

SPSS: Statistical Package for the Social Sciences

USA: United State of America

WHO: World Health Organization

TBSA: Total Body Surface Area

LMIC: Low- and middle-income countries

CI: Confidence Interval

HIC: High Income Countries

SES: Socio Economic state

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Abstract

Purpose: To identify the predisposing factors affecting burn in Bangladesh. **Objectives:** To explore the socio-demography (age, sex, occupational status, and living area) of the burn. To find out the factors that is responsible for burn in Bangladesh. **Methodology:** The study design was cross-sectional. Total 121 samples were selected conveniently for this study from the study was conducted in several setting in Chittagong, Savar and Dhaka city. Chittagong Medical College (CMC), Enam Medical College and Shiekh Hasina Burn Hospital. 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:** The mean age was 22.43 (± 14.399). Among 121 patients 47.9% (n=58) were female and 52.1% (n=63) were male, In this study, among 121 participants, 56.2% (n=68) participant's injury were accidental, 33.9% (n=41) participants were injured while working, 2.5% (n=3) participant's type of injury were homicidal, 7.4% (n=9) participants were injured while cooking. Among 121 participants, the majority types of burn caused by flames were 37.2% (n=45), 23.1% (n=28) were scald, 38.8% (n=47) were electrical and minority was chemical 0.8% (n=1). **Conclusion:** From this study it is concluded that most of the burn injury occurs accidentally. Among types of burns, flame burn occurs mainly from the fire of stove, scald burns occurs due to hot water, electric burn occurs from the electric line and chemical burn occurs due to acid throwing. These accidents occur because there is lack of awareness and proper knowledge about burn. Most of the electrical burn occurs due to lack of appropriate training. So if government is strict in this issue and employ rules for working consciously the percentage of burn due may decrease. Also it is not only responsibility of the government but also need awareness among people of Bangladesh to decrease burn injury. This study can help to specify the leading cause behind burn injury.

Key words: Burn, Predisposing factors, Epidemiology, Bangladesh.

1.1 Background

Burn is the most destructive of all injuries and a public health problem worldwide. It is common in developing countries and causes significant morbidity and mortality (Mashreky et al., 2011a). Due to prolonged hospitalization and rehabilitation, burns are also one of the most costly traumas. Injuries cause a higher incidence of permanent disability and economic difficulties for individuals and their families (Sánchez et al., 2007) and (He et al., 2017).

The World Health Organization (WHO) reports that burns cause approximately 265,000 deaths each year (Jahromi et al., 2018). In addition to causing large numbers of deaths, millions of non-fatal cases often leave people disabled and disfigured for life. In 2013, the average disability-adjusted life year per capita caused by such injuries was 12.3 years (Haagsma et al., 2016).

A burn injury is a traumatic experience for both the victim and their families. Internationally, the number of burn injuries severe enough to necessitate medical attention was nearly 11 million, ranking fourth among all injuries. Every year, it kills over 300,000 people worldwide. Burns are one of the leading causes of disability. Loss of Adjusted Life Years in Low- and Middle-Income Countries (Peck et al., 2011).

In low and middle-income countries, burn injuries are among the leading causes of disability-adjusted life years lost. Every year, approximately 6-7 million people in India suffer from burn injuries. 7 million of them require hospitalization, and 2.4 million become disabled. At all costs, burn injuries should be avoided, and health education about safety precautions should be implemented in all educational institutions (Shankar & Naik, 2016).

Research also shows that compared with children, adolescents and younger adults in low- and middle-income countries are at higher risk of burns (Sharma et al., 2011). Unlike HICs that help prevent proliferation, emergency care and care capacity and burn care, LMICs struggle to deal with infrastructure and management in an efficient manner (Atiyeh et al., 2009).

Many LMIC recommend that people continue to handle home injuries (using several mixtures, such as urine, mud, beef stool, beaten eggs), and delaying the presentation of health care facilities. Limited resources and the lack of trained personnel in medical facilities also increase the main challenges for the adequate treatment of the LMIC (Forjuuh et al., 2006) & (Atiyeh et al., 2009).

Bangladesh is an exception of combustion scenario in Southeast Asia. Almost 173,000 children in Bangladesh have injured in 2003, and made the fifth major cause of their domestic children's diseases (Mashreky et al., 2008).

Low socioeconomic status, illiteracy or low education, crowded living spaces, and certain cultural practices have been shown to increase the risk of burns in the environment of low- and middle-income countries (Mashreky et al., 2010).

Flames and scalds are the most common causes of burn death and non-fatal injuries, respectively. Similar results have been seen in previous studies in Bangladesh and neighboring countries such as India, Sri Lanka, Pakistan and Nepal, which may be due to the use of unsafe open-fire stoves and the lack of safe practices for fuels such as oil and butane. South Asia (Gupta et al., 2015) & (Lama et al., 2015).

Although electrical burns are less common than other forms of burns, due to their high morbidity and mortality, this type of injury is considered one of the most devastating (Sahin et al., 2011).

Risk factors include factors related to socioeconomic status, race and ethnic origin, age, and gender, as well as factors related to residential area, intention to injury, and co-morbidities. All risk factors combine and overlap, making the problem exponentially worse (Peck et al., 2011).

A total of six people died as a result of respiratory problems, including pneumonia in two cases (2.1%) and aspiration in four cases (4.3%). Eight people died as a result of neurological problems, including three cases of cerebral stroke (3.2%) and five cases of neurological deterioration (5.3%). MOF killed 61 people (64.9 %); the remaining six died of toxic shock syndrome (two cases), carbon monoxide intoxication (one case), crush syndrome (one case), refusal of dialysis (one case), and refusal of blood transfusion (one case) (Bloemsma et al., 2008).

1.2 Rationale:

After studying many researches we can say, now a days burn has become a common devastating injury. So many predisposing factors are responsible for this incidence. After a burn injury not only a patient becomes the sufferer but also his family members. A burn patient has to face many problems socially, economically, psychologically. As he becomes dependent on others for his daily needs. After burn injury patient undergoes so many complications, like-Bacterial infection, which may lead to a bloodstream infection (sepsis), fluid loss, including low blood volume (hypovolemia), dangerously low body temperature (hypothermia), breathing problems from the intake of hot air or smoke, scars or ridged areas caused by an overgrowth of connective tissue (keloids), bone and joint problems, like when connective tissue causes the shortening and tightening of skin, muscles or tendons (contractures) etc. Sometimes these conditions get so worsen that patient have to stay longer duration, than normal in the ICU. For some patients, these conditions become life threatening. Due to burns, age-specific interventions, knowledge of care plans, and improvements in acute care management may even become a potential outcome in slowing death and disability. It is difficult to prevent. Different communities have different risk factors and epidemiological patterns. Government programs must be implemented. Should use to educate people about safety and proper usage of electricity handling, chemical things, hot contact etc. Education and policing and training should be emphasized as the primary goal weapons to combat this issue. If it is possible to make people aware about these predisposing factors which are responsible for burn injury, this major public health issue can be prevented. For this reason, people need to gain knowledge about these factors (Latenser et al., 2007).

1.3 Research question:

What are the predisposing factors affecting burn in Bangladesh?

1.4 Study Objectives:

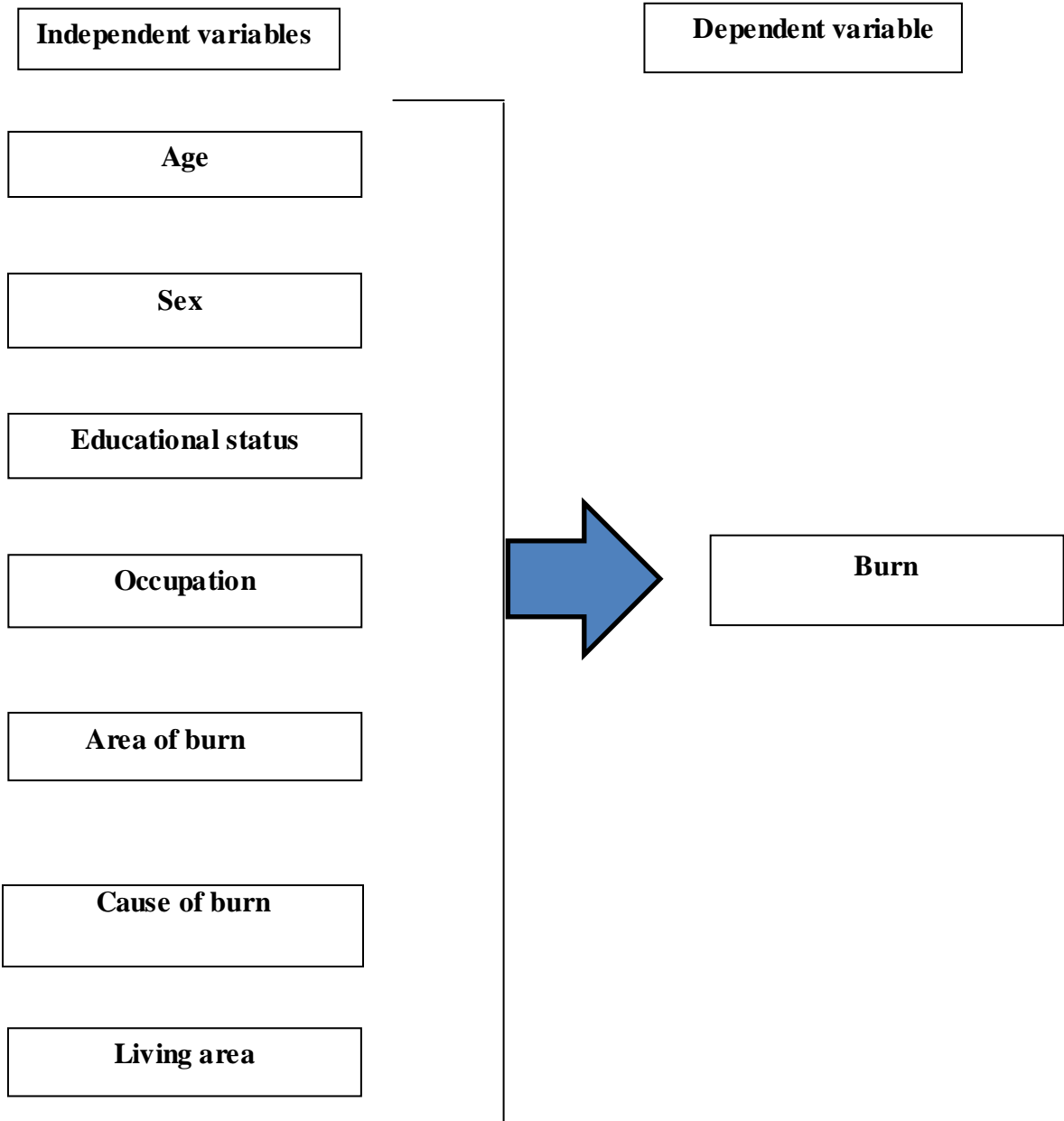
General objective:

- To find out the predisposing factors affecting burn in Bangladesh.

Specific Objective:

- To find out socio-demographic characteristics of patient undergone burn injury.
- To determine an association between gender and burn
- To establish an association between age and burn.
- To identify an association between occupation and burn.

1.5 Conceptual Framework:



1.6 Operational Definition

Burn: A burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals.

Predisposing factors: Factors or conditions that render an individual vulnerable to a disease or disorder.

Epidemiology: It is a branch of medical science that deals with the incidence, distribution, and control of disease in a population.

Scald: Scalding is a form of thermal burn resulting from heated fluids such as boiling water or steam.

The Rule of Nine: It is a quick way to calculate the amount of skin surface that has been burned. The name comes from the fact that various regions of the adult anatomy are assigned nine percent of the body surface or multiples of nine.

TBSA: Total body surface area (**TBSA**) is an assessment of injury to or disease of the skin, such as burns or psoriasis. In adults, the Wallace rule of nines can be used to determine the total percentage of area burned for each major section of the body.

Bangladesh, as a developing country, is still seeing an increase in the number of people dying from burn injuries. An estimated 5000 deaths occurred in 2002 as a result of burns, whereas approximately 9000 deaths occurred in 2015 as a result of burns, as reflected by death rates of 3.5 and 5.7 per 100,000 populations in respective years. WHO estimated the burn mortality rate in 2004 to be 4.8 per 100,000 per year (Othman and Kendrick, 2010).

The 2013 Global Burden of Disease study reported that the global burn death rate is 3.3 per 100,000 population (Haagsma et al., 2016). Men appear to have higher burn death rates than women in the two national surveys included in this study. Male death rates have doubled since 2002. This result is similar to some results from other recent studies that indicate a male predominance among burn deaths (Ahmad et al., 2015).

However, some studies contradict this result and conclude that women are a risk factor for burn mortality (Panjeshahin et al., 2001). A study conducted in France in the year 2000 discovered that the frequency of burn injuries, as well as fatalities caused by them, were higher in rural areas than in urban areas (Vidal-Trecan et al., 2000) & (Mashreky et al., 2018).

Previously, rural areas had very limited access to electricity, but this has changed dramatically as the country's economy has grown. According to the study findings, rural farm fields where farmers are increasingly using electricity for irrigation are the most common location for electrocution deaths. However, the people are still poor and uneducated, with no knowledge of electrocution safety precautions (Mashreky et al., 2012).

No such program has been made available to rural farmers in order to raise their awareness of the issue. Further research into occupational injuries in rural Bangladesh can be conducted (Barss et al., 2009). According to recent data, the global child death rate from burns is 2.5 per 100,000 (Sengoelge et al., 2017).

In Bangladesh, more than 3,000 people die from burns every year. The burn rate was 2.2 per 100,000 population per year, but only 0.6 per 100,000 burns were found in children under 18 years of age (Mashreky et al., 2008). The female burn death rate was roughly

four times that of fatal flame burns, with the majority occurring in the kitchen. The sources of fire were heating fires, kitchen fires, and traditional kerosene lamp (kupi bati). None of the men cook for the family in this country. The reasons for the higher incidence of burns in women are evident by observing that cooking fires are a major cause of burns and that women are more exposed to this risk due to inherent social norms. Higher rates of death among women from burns have also been seen in Kuwait, Iran and India, and flames are considered the leading cause of burn morale. Similar sources of fire were responsible for deaths in India. In Iran and Kuwait, cooking fires were the leading cause of fatal burns (Bang et al., 2000).

The burn deaths all occurred during the winter season. One of the leading causes of the large seasonal variation in burn deaths may be the use of unsafe heating fires. Winter is a dry season in Bangladesh, so the risk of fire and burn increases from open flames such as cooking fires, traditional kerosene lamps, and even heating fires. During the winter season, special attention must be paid to burn prevention. In comparison to many other countries, this study found a much lower self-inflicted burn morality, accounting for only 5% of total fatal burns. Suicidal burns were found to be much more prevalent in India, accounting for 27 percent of all fatal burns. It was around 11% in Kuwait and more than 13% in Jordan (Mashreky et al., 2011a).

The large percentage of those killed were women, the majority of whom were illiterate and impoverished housewives. This low socioeconomic status could be one of the factors that contributed to the disparity in burn incidence between the poor and the wealthy. Because of illiteracy and poverty, they are unaware of the dangers of burns. Many studies have suggested that a low socioeconomic status is one of the significant factors leading to burn injury (Delgado et al., 2002).

These deformities impair the patient's social, economic, and psychological well-being. Disabled people are unable to act independently in many areas of life, and as a result, they face numerous challenges in their social adjustment. Their incapacity causes emotional problems such as apathy, self-pity, and resentment, as well as social isolation. In India, burn injuries are a common public health issue. Post-Burn Scarring Is Both Physical And Psychological, And It Can Be As High As 95%, With Hypertrophic Scarring Accounting For 41% (Gupta, 2010).

In rural Bangladesh, the burn injury mortality rate was 21 per 1,000,000 people. As previously reported in South Asian studies, the majority of fatalities occurred in children aged one to four years old and the elderly over the age of 65. (Gupta et al., 2015). Similarly, female participants in our study had a higher rate of burn injury mortality (Batra et al., 2003).

The majority of fatal burn injuries occurred during the winter season. The significant difference in the distribution of fatal and non-fatal burn injuries can be attributed to the need for continuous heating during the winter months. Heat sources such as coal and wood, when used for extended periods of time during the night, put residents at greater risk of death due to burns (Afify et al., 2012).

Non-fatal injuries followed different seasonal patterns, with the most injuries occurring during the summer and monsoon seasons. This is most likely due to domestic or occupational activities, such as cooking or working with machinery, which have shorter contact spans and a lower burn death threshold. When it comes to location, the majority of burn incidents occurred at home, primarily in the kitchen. The most common causes of burn deaths and non-fatal injuries were flames and scalds, respectively. Previous studies from Bangladesh and neighboring countries such as India, Sri Lanka, Pakistan, and Nepal found similar results, possibly due to the use of unsafe cooking stoves with open fires and a lack of safe practice of fuels such as petroleum and butane across South Asian regions (Ahuja et al., 2011) & (Lama et al., 2015).

According to a study conducted in Bangladesh that included both urban and rural populations, electrical burns were the most common cause of burn injuries (Mashreky et al., 2011). Females are more vulnerable to fire injuries due to cultural and societal norms that place them in charge of preparing meals in kitchens. In addition, women are more likely to sustain burn injuries if they wear loose clothing, cook on the floor, or live in cramped quarters (Mashreky et al., 2010).

A further study from Bangladesh found that children from low-income families were nearly three times more likely to die as a result of a burn injury than children from other socioeconomic backgrounds (Balan & Lingam, 2012).

A structured study of relevant socioeconomic factors associated with the risk of burn injuries found that low income, illiteracy, unemployment, crowded and substandard

living conditions, and other factors all increased the risk of severe burns (Edelman, 2007).

Flame burns had been found to be associated with higher mortality as well as the lengthiest hospital stay. At home, more than half of all flame burns took place. One-third of the injuries were sustained by women while cooking or preparing meals, and one-third were sustained by children under the age of five while at home. Previous research has also found that flame burns most commonly occur in adult women while cooking in the kitchen (Ebel et al., 2010). According to community studies in Bangladesh, flame burns account for a significant part of burn injuries among children under the age of five in the home (Mashreky et al., 2011a).

Scar contractures and amputations are the most common physical disabilities caused by extensive and deep burn injuries. Because of the small sample size, our findings could not be compared to those of other similar studies. Burn injuries should be avoided at all costs, and all high schools and colleges should implement health education about safety precautions. Alternative safer cooking implements that do not cause severe and life-threatening injury should be marketed. Legislation prohibiting the use of dangerous equipment should be introduced as soon as possible so that women in India do not suffer disability as a result of burns when they are at their most productive (Shankar & Naik, 2016).

Almost three-quarters of elderly patients with flame burns had a sixth-grade education or less, and 76% were from low socioeconomic backgrounds. Scald burns have been linked to morbidity in early childhood not only in Bangladesh, but also in other LMICs (Vaghardoost et al., 2016) & (RP, 2016).

Areas of study were young, with children under the age of five accounting for a sizable proportion of injuries. Almost 79 percent of all scald burns occurred at home, with more than half occurring during household chores such as cooking and eating. Typical Bangladeshi cooking involves boiling large amounts of rice, which frequently results in standing pots of boiling rice water on the floor, which can easily spill on nearby young children (Mashreky et al., 2011a).

As a result, intervention strategies should once again start educating families about the importance of elevating cooking stoves and preserving hot food out of the reach of young

children. Previous research has shown that community-based interventions focused on home interventions, as described above, are efficient in lowering scald burns in children (Bailey et al., 2019).

Electrical burns were also discovered to be a significant contributor to patient mortality. Electrical injuries resulted in the second-longest hospitalization (at 25.5 days), with 60 percent of patients requiring surgical treatment (Klein et al., 2014).

Though there's no unified database for recording demographics and findings in Bangladesh, current works with the Global Burn Registry are attempting to collect data recognizing risk factors and preventative measures for minimizing burn injuries (Sugerman et al., 2016).

Bangladesh is among the world's most populous countries, and a significant proportion of the population, both elderly and pediatric, tend to suffer from completely avoidable burn injuries, which have a high morbidity and mortality rate. Burns in Bangladesh should be studied further because the country has a relatively high proportion of burn injuries in South Asia. Interventions can target specific risk factors and tailor appropriate prevention strategies with improved injury surveillance (Peck et al., 2009).

According to WHO data from 2012, there are 195,000 burn deaths each year, with the majority occurring in low and middle-income countries and nearly half occurring in the WHO South East Asia Region. Electrical burns are among the most upsetting of all types of burns. From July 2017 to June 2018, 512 burn patients were admitted to Khulna Medical College Hospital's Department of Burn and Plastic Surgery. 68 (13.28 %) of the patients had electrical injuries. Electrical injury is more common in developing countries than in developed countries. According to international data, electrical injuries account for 5.8% of all burn cases. For example, the United States (3.7 percent), Italy (4%), and Singapore (2.8%). Taiwan (5.6%) and China (5.6%). The incidence of electric burn is 13.28 % in this study. However, the admission rate for electrical burns in developing nations ranges between 21 and 27 % (Islam et al., 2018).

The frequent occurrence of electrical burns may be due to the population's low social and economic status, improperly enclosed wires, badly constructed and operated electrical switches, unauthorized electrical connections, and unskilled repair work on the electricity grid (Elloso & Cruz, 2017).

The majority of these high voltage injuries were caused by work-related activity, with linemen and electricians being the most common occupations. These patients seemed to be teenage boys in their prime working years, who are more vulnerable due to their occupation's increased exposure to electric current, high voltages, heavy machinery, and equipment (Patil et al., 2010).

This could also be due to insufficient equipment, education, and/or training. Operator error can also be a factor, but as other studies have shown, proper training and education can mitigate this. Mashreky et al. (2011b) found male predominance (52%) in their study in Bangladesh. However, according to this study, the majority of the burns (78%) occurred at home. In our study, the majority of electric burns (52.94%) occurred at work. According to American Burn Association, (2014) this could be due to improvements in the safety of household electric equipment (such as switches, sockets, properly insulated wire, circuit breakers, and so on), as well as the rapid modernization and economic growth of Bangladesh, which has resulted in an increase in the number of people employed in building projects and electrical work. Pediatric electric burns are also prevalent, and the majority of them are the result of inattention and illiteracy. In this study, 16 (23.53 %) of the cases of electric burn occurred in people under the age of 18. The vast majorities (87.50%) of them were at home and were as a result of direct and indirect accidental contact with faulty electric equipment and chewing wires. Outside the home, the patient received an electric burn in two cases (12.5 %) while kite flying and climbing a mango tree. Many studies have found that the incidence rate of electric burns in this age group is equivalent (He et al., 2017).

To assess burn patient's total body surface area (TBSA) a tool is used by trauma and critical care practitioners named The Rule of Nines, which is also known as the Wallace Rule of Nines. Because patients with severe burns will have massive fluid losses due to the removal of the skin barrier, measuring the initial burn surface area is critical in estimating fluid resuscitation requirements (Cheah et al., 2018).

This method of calculating amount of surface area burned is based on identifying percentages to various body areas. The total head is estimated to be 9% (4.5% for anterior and posterior). The trunk as a whole is estimated to be 36%, with the anterior components

accounting for 18% and the back accounting for 18%. The anterior aspect of the trunk is further subdivided into chest (9%) and abdomen (9%).

The upper limbs account for 18% of the total, with each upper limb accounting for 9%. Each upper extremity is further subdivided into anterior (4.5%) and posterior (4.5%). The lower extremities are estimated to be 36%, with 18% for each lower extremity. Again, this is divided into 9 percent for the anterior and 9 percent for the posterior. The groin is estimated to be 1% (Ali et al., 2016) & (Thom, 2017).

The mortality rate after a burn has decreased dramatically over the last 50 years. Approximately 5% of victims survived if their burns contained more than 40 percent TBSA half a century ago. Burns involving more than 90% TBSA are now uncommon. Young and healthy people can sometimes survive. In the case of In the Western world, overall mortality rates following a burn have decreased. Reduced to 5–6% (Latenser et al., 2007). This spectacular fall can be as a result of the establishment of specialized burn centers, therapeutic advancements, including critical care advances and anaesthetic procedures, as well as aggressive fluid resuscitation (Bloemsma et al., 2008).

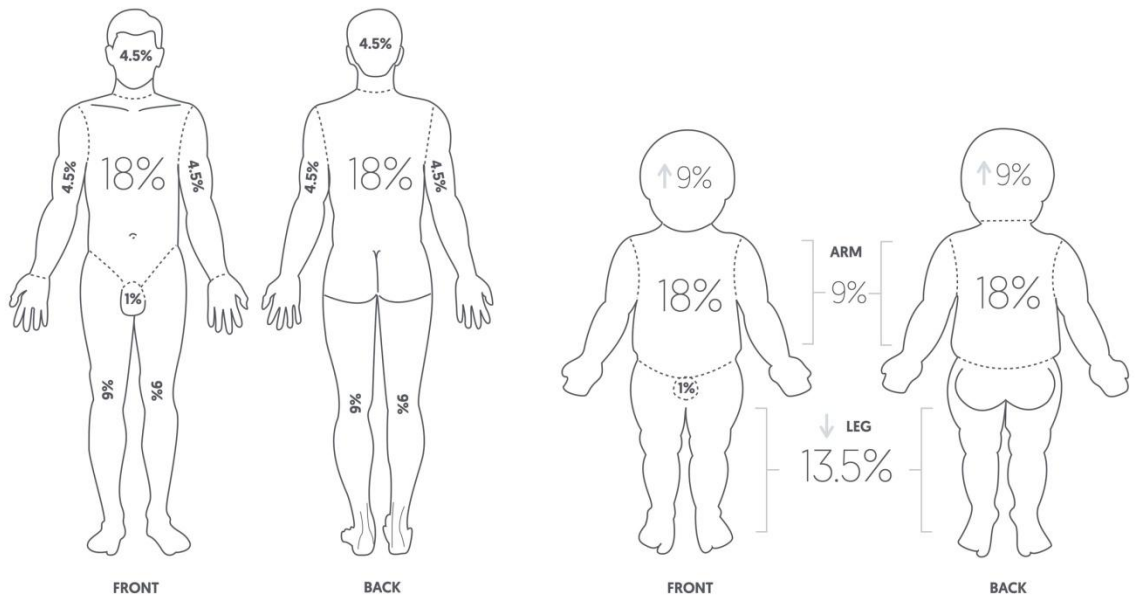


Figure 1: Rule of 9

3.1 Study Design

Cross sectional study was selected for conduct the study. A cross-sectional study is a descriptive study in which disease and exposure status is measured simultaneously in a given population and the most important advantage is it is quick and cheap.

3.2 Study Area

The study was conducted in several setting in Chittagong, Savar and Dhaka city. Chittagong Medical College (CMC), Enam Medical College and Shiekh Hasina Burn Hospital.

3.3 Study Population & sample population

Peoples who had burn injury was collected using convenience sampling from Chittagong Medical College (CMC), Enam Medical College and Sheikh Hasina National Institute of Burn and Plastic Surgery.

3.4 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.

3.5 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:

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

$$= \frac{(1.96)^2 \times 0.29 \times 0.71}{(0.05)^2}$$

= 316

Here,

Z (confidence interval) = 1.96

P (prevalence) = 29% (Young et al., 2012)

And, $q = (1 - p)$

= (1 - 0.29)

= 0.71

The actual sample size was, $n = 316$.

Conventionally through calculation sample size is determined as, lack of time and due to this COVID19 pandemic situation I managed to collect 121 samples.

3.6 Data Collection Tools

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

3.7 Data Collection Procedure

At the very beginning researcher clarified that, the participant had the right to refuse to answer of any question during completing questionnaire. They could withdraw from the study at any time. Researcher also clarified 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 guided 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 were 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.

3.8 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 (Statistical package for the social Science version 20) 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 expected 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^2_{i-j} = 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.

	Male (n)	Female (n)	Chi-Square	P value
Type Of Burn				
Flame	10% (13)	26.5% (32)	22.294	0.000
Scald	10% (13)	12.4% (15)		
Electric	29.8% (36)	9% (11)		
Chemical	0.8% (01)	0% (0)		
Type Of Injury				
Accidental	26.45% (32)	29.8% (36)	8.642	0.034
Working	23.14% (28)	10% (13)		
Homicidal	0.8% (1)	1.65% (2)		
Cooking	1.65% (2)	14.05% (7)		

Table 1: Associations of gender with type of burn and type of injury

3.9 Inclusion criteria

- Age range 05-70 years (Patel et al., 2016).
- Both sexes (Mashreky et al., 2018).
- Patients who are admitted in the hospital at least for 1 week (Bailey et al., 2018).

3.10 Exclusion Criteria

- Willingness of the patient.
- Patient with poor cognitive function.
- Patients who have any warnings and precautions.

3.11 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 burn unit of Chittagong Medical College (CMC), Enam Medical College and Shiekh Hasina Burn Hospital. 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

4.1.1 Age of the participants:

Table no 1: Age of the participants

Among 121 participants, 38.0% (n=46) were between 05-15 years age range, 25.6% (n=31) were 16-25 years range, 23.1% (n=28) were 26-35 years range, 4.1% (n=5) were 36-45 years range, 5.8% (n=7) were 46-55 years range, 2.5% (n=3) were 56-65 years range, 0.8% (n=1) were >65 years range. The mean age was 22.43 (\pm 14.399).

Age	Frequency	Percentage	Mean (SD)
5-15 years	46	38.0%	
16-25 years	31	25.6%	
26-35 years	28	23.1%	22.43 \pm 14.39
36-45 years	5	4.1%	
46-55 years	7	5.8%	
56-65 years	3	2.5%	
>65 years	1	0.8%	

4.1.2. Demographic Characteristics

This study revealed that the gender, marital status, educational status, and other socio-demographic status. Among 121 patients in case of gender, 52.1% (n=63) were males and 47.9% (n=58) were females. In marital status, 50.4% (n=61) were unmarried and 49.6% (n=60) were married. In educational status, 26.4% (n=32) were illiterate, 41.3% (n=50) had primary education, 22.3% (n=27) had secondary education, 7.4% (n=9) had higher secondary education, 2.5% (n=3) had bachelor & masters. In case of occupation, 24.8% (n=30) were service holder, 21.5% (n=26) were housewife, 9.9% (n=12) were electrician, 2.5% (n=3) were labor, 24.8% (n=30) were student, 3.3% (n=4) were unemployed, 13.2% (n=16) were from other profession. In the living areas, 36.4% (n=44) were from rural area, 2.5% (n=3) were from semi urban area, 61.1% (n=75) were from urban area among 121 patient. In the year of burn, 26.4% (n=32) were burned 1-7 days ago, 24.0% (n=29) were burned 8-14 days ago, 10.7% (n=13) were burned 15-21 days ago, 4.1% (n=5) were burned 22-28 days ago, 8.3% (n=10) were burned 29-35 days ago, 26.4% (n=32) were burned more than 34 days ago.

Table No-2: Socio-demographic status

Demographic Status	Frequency (n)	Percent (%)
Gender of the participants		
Male	63	52.1
Female	58	47.9
Marital status of the participants		
Married	60	49.6
Unmarried	61	50.4
Educational status of the participants		
Illiterate	32	26.4
Primary	50	41.3
Secondary	27	22.3
Higher secondary	9	7.4
Bachelor & Masters	3	2.5
Occupation of the Participants		
Service Holder	30	24.8
Housewife	26	21.5
Electrician	12	9.9
Labor	3	2.5
Student	30	24.8
Unemployed	4	3.3
Others	16	13.2
Living area of the Participants		
Rural	44	36.4
Semi Urban	3	2.5
Urban	74	61.1
Years of burn of the Participants		
1-7 days	32	26.4
8-14 days	29	24.0
15-21 days	13	10.7
22-28 days	5	4.1
29-34 days	10	8.3
>34 days	32	26.4
Total	121	100

Factors behind Burn

4.2.1: Area of burn of the participants

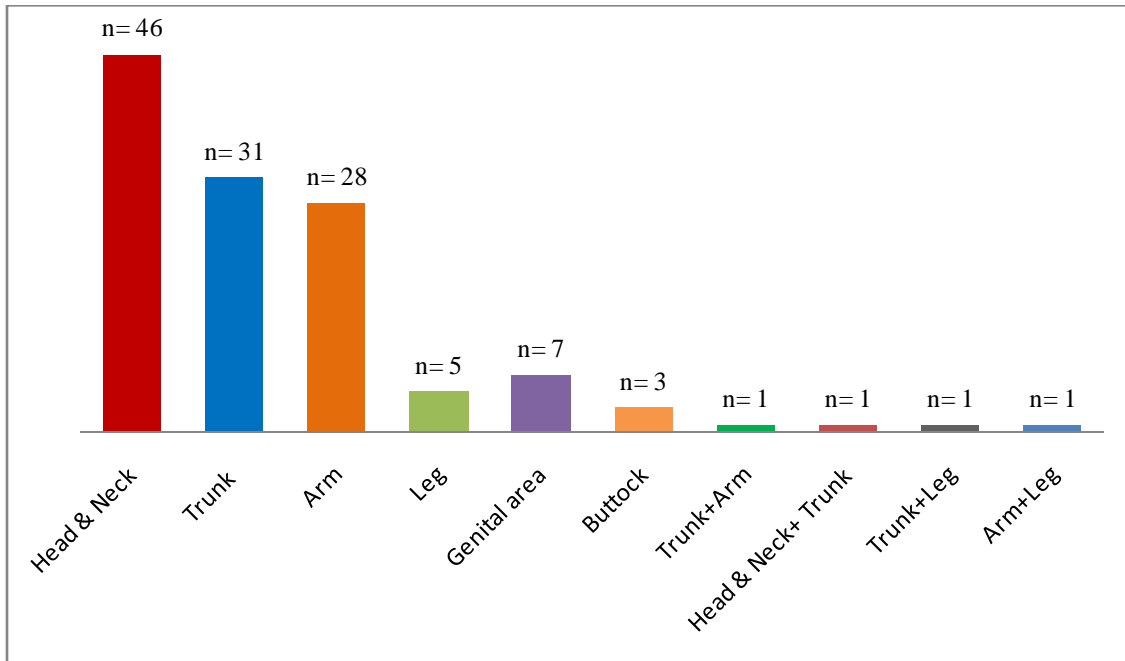


Figure 2: Area of burn of the participants

This study showed that among 121 participants, 38.0% (n= 46) burn occurred in head & neck area, 25.6% (n= 31) burn occurred in trunk area, 23.1% (n= 28) burn occurred in arm area, 5.8% (n=7) burn occurred in genital area, 4.1% (n=5) burn occurred in leg area, 2.5% (n=3) burn occurred in buttock area, 0.8% (n=1) burn occurred in trunk+arm area, 0.8% (n=1) burn occurred in head & neck+trunk area, 0.8% (n=1) burn occurred in trunk+leg area, 0.8% (n=1) burn occurred in arm+leg area.

4.2.2: Coverage area of burn

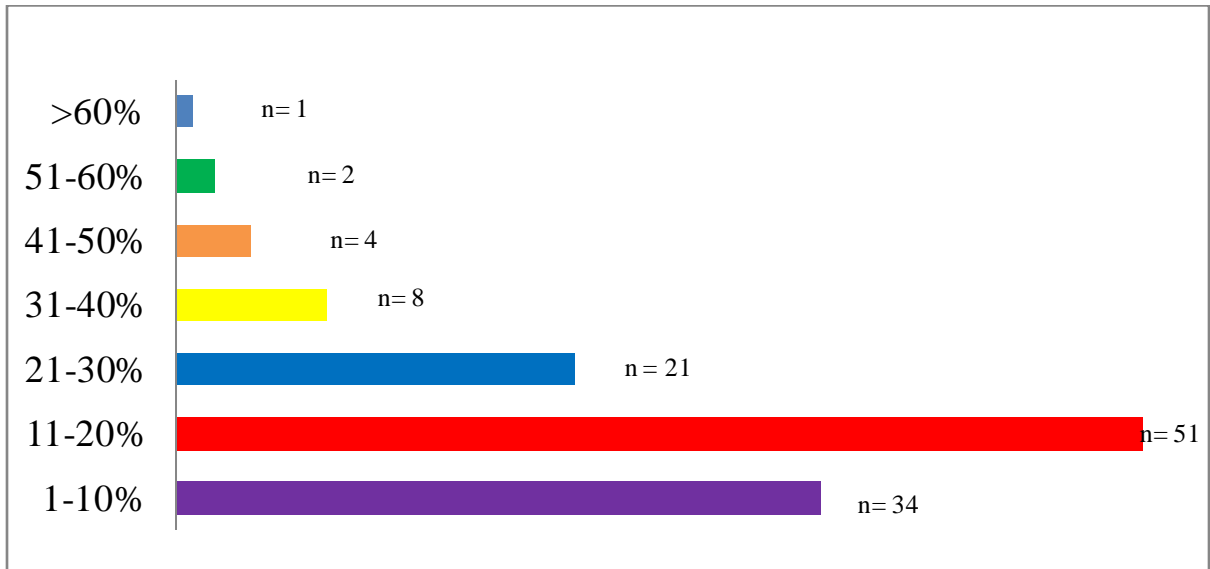


Figure 3: Coverage area of burn

This study showed that among 121 participants, 42.1% (n= 51) were injured about 11-20% of the coverage area of burn, 28.1% (n= 34) were injured about 1-10% of the coverage area of burn, 17.4% (n= 21) were injured about 21-30% of the coverage area of burn, 6.6% (n= 8) were injured about 31-40% of the coverage area of burn, 3.3% (n= 4) were injured about 41-50% of the coverage area of burn, 1.7% (n= 2) were injured about 51-60% of the coverage area of burn, .8% (n= 1) were injured about >60% of the coverage area of burn.

4.2.3: Type of injury

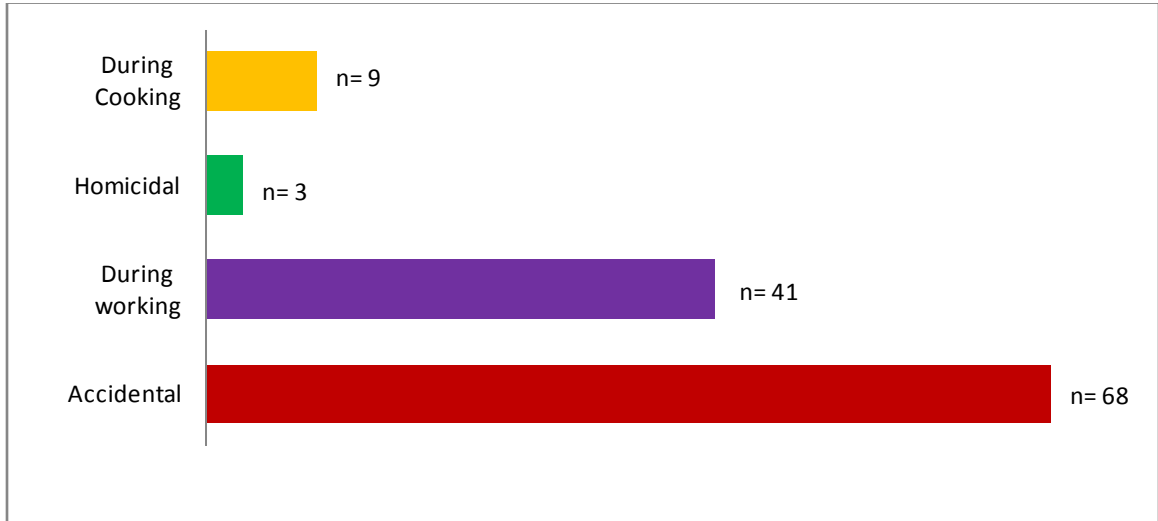


Figure 4: Type of injury

In this study, among 121 participants, 56.2% (n=68) participant's type of injury were accidental, 33.9% (n=41) participants were injured while working, 7.4% (n=9) participants were injured while cooking 2.5% (n=3) participant's type of injury were homicidal.

4.2.4: Type of burn

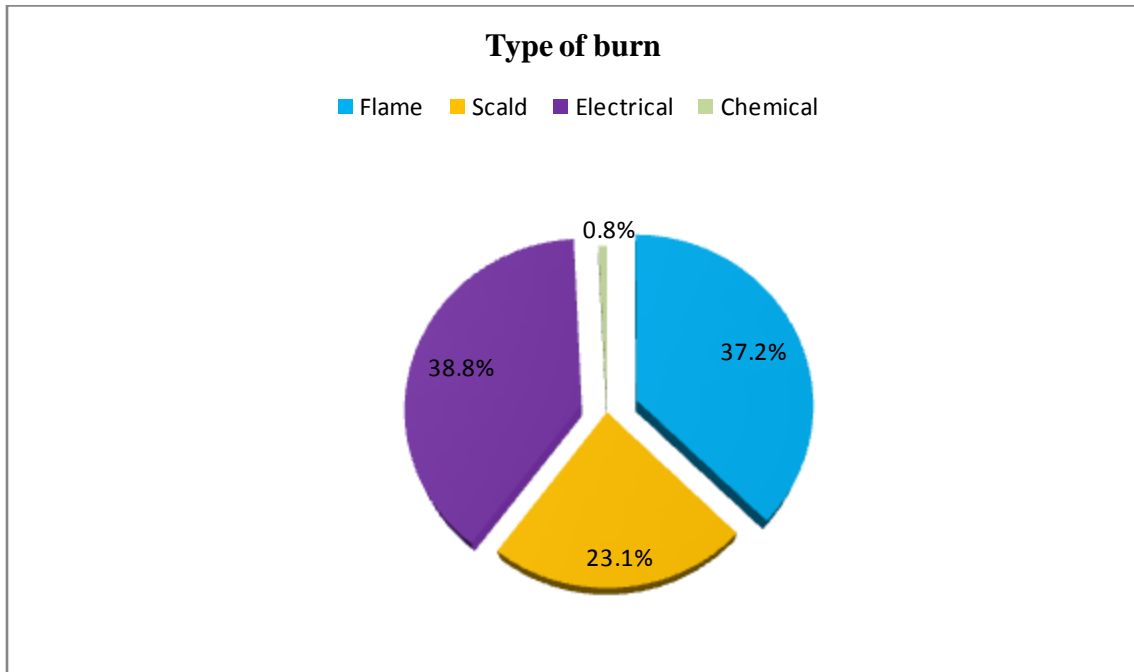


Figure 5: Type of burn

Among 121 participants, the majority type of burn caused by electrical were 38.8% (n=47), flames were 37.2% (n=45), 23.1% (n=28) were scald and minority was chemical 0.8% (n=1).

4.2.5: Cause of burn

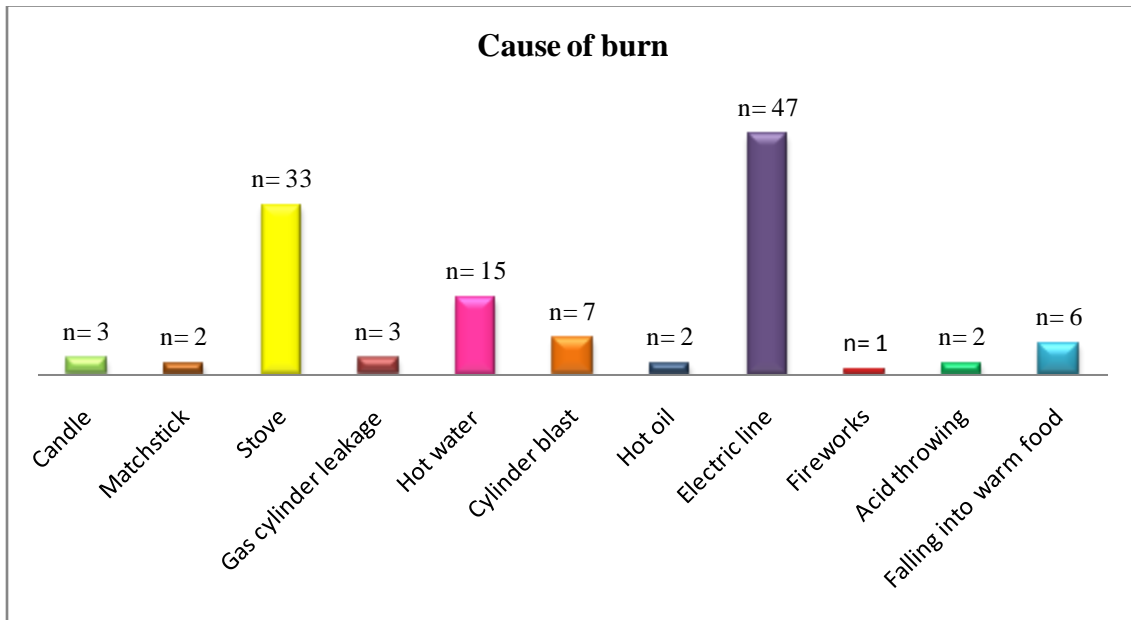


Figure 6: Cause of burn

This study showed that among 121 participants, 38.8% (n=47) burn occurred by electric line, 27.3% (n=33) burn occurred by stove, 12.4% (n=15) burn occurred by hot water, 5.8% (n=7) burn occurred by cylinder blast, 5.0% (n=6) burn occurred by falling into warm food, 2.5% (n=3) burn occurred by candle, 2.5% (n=3) burn occurred by gas cylinder leakage, 1.7% (n=2) burn occurred by hot oil, 1.7% (n=2) burn occurred by matchstick, 1.7% (n=2) burn occurred by acid throwing, 0.8% (n=1) burn occurred by fireworks.

Table 3: Distribution of Association between gender and type of burn of the participants

In association test using chi-square, the value was 22.294 which indicates among variables was associated because p value was 0.000 ($p < 0.05$). So gender is significantly related to type of the burn of the patient. In the association test using 95% CI it was observed that between upper and lower value difference was small. It proves that gender & type of burn was statistically significant.

Gender	Type of burn (n)				Chi-Square	P value	95% CI	
	Flame	Scald	Electrical	Chemical			Upper	Lower
Male	10% (13)	10% (13)	29.8% (33)	0.8% (1)	22.294	0.000	2.61	2.19
Female	26.5% (32)	12.4% (15)	9% (11)	00.% (0)	22.294	0.000	1.85	1.43

Table 4: Distribution of Association between gender and type of injury of the participants

In association test using chi-square, the value was 8.642 which indicates among variables was statistical significant because p value was 0.034 ($p < 0.05$). So gender is significantly related to type of the burn of the patient. In the association test using 95% CI it was observed that between upper and lower value difference was small. It proves that gender & type of injury was statistically significant.

Gender	Type of injury (n)				Chi-Square	P value	95% CI	
	Accidental	Working	homicidal	Cooking			Upper	Lower
Male	26.45% (32)	23.14% (28)	0.8% (1)	1.65% (2)	8.642	0.034	1.74	1.40
Female	29.8% (36)	10% (13)	1.65% (2)	14.05% (7)	8.642	0.034	1.92	1.39

Table 5: Distribution of association between occupation and cause of burn

In association test using chi-square, the value was 112.654 which indicates among variables was statistical because p value was 0.000 ($p < 0.05$). It proves that occupation & cause of burn was statistically significant.

Cause of burn	Occupation							Chi-Square	P value
	Service Holder	House wife	Electrician	Labor	Student	Unem ployed	Others		
Candle	1.65% (2)	0% (00)	0% (00)	0% (00)	0.8% (1)	0% (00)	0% (00)	112.654	0.000
Matchstick	0% (00)	0% (00)	0% (00)	0% (00)	0.8% (1)	0.8% (1)	0% (00)	112.654	0.000
Stove	5.79% (7)	13.22% (16)	0% (00)	0.8% (1)	13.22% (6)	0% (00)	2.48% (3)	112.654	0.000
Gas cylinder leakage	0% (00)	1.65 % (2)	0% (00)	0.8% (1)	0% (00)	0% (00)	0% (00)	112.654	0.000
Hot water	3.31% (40)	2.48% (3)	0% (00)	0% (00)	0.8% (1)	1.65 % (2)	0.41% (5)	112.654	0.000
Cylinder blast	0% (00)	1.65 % (2)	0% (00)	0% (00)	0.8% (1)	0% (00)	0.8% (1)	112.654	0.000
Hot oil	0.8% (1)	0% (00)	0% (00)	0% (00)	0.8% (1)	0% (00)	0% (00)	112.654	0.000
Electric line	9.92% (12)	1.65% (2)	9.92% (12)	1.65% (2)	13.22% (6)	0.8% (1)	1.65% (2)	112.654	0.000
Fire works	0% (00)	0% (00)	0% (00)	0% (00)	0.8% (1)	0% (00)	0% (00)	112.654	0.000
Acid throwing	0.8% (1)	0.8% (1)	0% (00)	0% (00)	0% (00)	0% (00)	0% (00)	112.654	0.000
Falling into warm food	0% (00)	0% (00)	0% (00)	0% (00)	0.8% (1)	0% (00)	0.41% (5)	112.654	0.000

Table 6: Distribution of association between occupation and type of burn

In association test using chi-square, the value was 55.747 which indicates among variables was significant because p value was 0.000 ($p < 0.05$). It proves that occupation & type of burn was statistically significant.

Occupation	Type of burn (n)				Chi-Square	P value
	Flame	Scald	Electrical	Chemical		
Service Holder	9.09% (11)	4.96% (6)	9.92% (12)	0.8% (1)	55.747	0.000
Housewife	14.88% (18)	4.96% (6)	1.65% (2)	0% (00)	55.747	0.000
Electrician	0% (00)	0% (00)	9.92% (12)	0% (00)	55.747	0.000
Labor	0.8% (1)	0% (00)	1.65% (2)	0% (00)	55.747	0.000
Student	8.26% (10)	3.31% (4)	13.22% (16)	0% (00)	55.747	0.000
Unemployed	0.8% (1)	1.65% (2)	0.8% (1)	0% (00)	55.747	0.000
Others	3.31% (4)	8.26% (10)	1.65% (2)	0% (00)	55.747	0.000

Discussion

This population based cross sectional survey revealed the factors that are responsible for burn in Bangladesh. The purpose of the study was to find out the main factors that are responsible for burn. To find out the factors 121 samples were taken. In this dissertation, age is one of the variables, here the mean age was 22.43 (± 14.39). The majority of people's age range was 5-15 years and their percentage was 38.00% (n=46), participants with 16-25 years range of age were found 25.6% (n=31), 26-35 years range of age were found 23.1% (n=28), 36-45 years range of age were found 4.1% (n=5), 46-55 years range of age were found 5.8% (n=7), 56-65 years range of age were found 2.5% (n=3), >65 years range of age were found 0.8% (n=1). A study by Mashreky et al. (2011 a) showed that there mean age was 35.6 (± 21) in Bangladesh.

Here in this study, between 121 participants, 47.9% (n=58) were females and 52.1% (n=63) were males. 49.6% (n=60) were married and 50.4% (n=61) were unmarried. Among them 26.4% (n=32) were illiterate, 41.3% (n=50) had primary education, 22.3% (n=27) had secondary education, 7.4% (n=9) had higher secondary education, 2.5% (n=3) had bachelor & masters. He et al. (2017) conducted a study in Bangladesh, finding Epidemiology of Burns in Rural there were 1169,594 respondents where male participants were 48.5% (n=567,674), rest were female with 51.5% (n=601,919). The majority of the study, participants were married 49% (n = 571,206) and unmarried were 19.4% (n=227,319). Nearly half of all burn injuries were sustained by married people. Approximately 25.3% (n=295,314) had no formal education, 35% (n = 409,923) received education at primary level, 24.8% (n=289,658) received education at secondary level, 5.1% (n=59144) received education at higher secondary education, 0.4% (n=4729) had bachelor & masters.

Another finding from this study was among 121 patients 24.8% (n=30) were service holder, 21.5% (n=26) were housewife, 9.9% (n=12) were electrician, 2.5% (n=3) were laborer, 24.8% (n=30) were student, 3.3% (n=4) were unemployed, 13.2% (n=16) were from other profession. Where He et al. (2017) stated that among of the participants there were agriculture 9.0% (n=104,956), business 5.3% (n=61,661), skilled labor

(Professional) 7.6% (n=89,151), unskilled/domestic (Unskilled) 2.1% (n=24,520), rickshaw/bus (Transport worker) 1.5% (n=17,037), students 26.7% (n=312,537), retired/unemployed/housewife 35.0% (n=408,583). In the year of 2010, Chawla et al. stated that in his study housewives accounted for 56% of burn victims, while laborers accounted for 6% of females. Males made up 16% of the labor force, 8% of business owners, 6% of private-sector workers, and 2% of students. 4% of females were students. In this study, 36.4% (n=44) were from rural area, 2.5% (n=3) were from semi urban area, 61.1% (n=75) were from urban area among 121 patient. In 2012 a different study of Mashreky et al. showed that among the total non-fatal electrical injury of 604 participants, 87% were rural residents and only 13% were urban residents. In similar study of Mashreky et al. in 2011(b) showed rural residents accounted for 87% of all non-fatal electrical injuries, while urban residents accounted for only 13%.

Another finding of this study was area of burn it was made of according to rule of nine. Here it was showed that among 121 participants, 38.0% (n=46) burn occurred in head & neck area, 25.6% (n=31) burn occurred in trunk area, 23.1% (n=28) burn occurred in arm area, 4.1% (n=5) burn occurred in leg area, 5.8% (n=7) burn occurred in genital area, 2.5% (n=3) burn occurred in buttock area, 0.8% (n=1) burn occurred in trunk+arm area, 0.8% (n=1) burn occurred in head & neck+trunk area, 0.8% (n=1) burn occurred in trunk+leg area, 0.8% (n=1) burn occurred in arm+leg area. In a similar study with 50 participants in India showed their area of burn, there head & neck were involved in 94% (n=47) cases and spared in 6% cases. Chest & abdomen were involved in 92% (n=46) cases and spared in 8% cases. Extremities were involved in 100% (n=50) cases. Genitalia were involved in 50% (n=25) cases (Chawla et al., 2010).

One of the finding in this study was coverage area of burn. Coverage area of burn means a method that divides the body's surface area into a percentage. This study showed that among 121 participants, 28.1% (n=34) were injured about 1-10% of the coverage area of burn, 42.1% (n=51) were injured about 11-20% of the coverage area of burn, 17.4% (n=21) were injured about 21-30% of the coverage area of burn, 6.6% (n=8) were injured about 31-40% of the coverage area of burn, 3.3% (n=4) were injured about 41-50% of the coverage area of burn, 1.7% (n=2) were injured about 51-60% of the coverage area of burn, .8% (n=1) were injured about >60% of the coverage area of burn. Chawla et al.

(2010) stated in his study that the highest percentage of burns were 32 % of cases, were in the 91-100% range. Only 14% of the cases had burns that were less than 50%. In Iran, a study about Electrical Burn Injury, the mean percentage of total body surface area (TBSA) was higher in patients with other types of burn injury (32.54%) than electric burn injury (14.43%) among the 681 participants (Ghavami et al., 2014).

In this study, among 121 participants, 56.2% (n=68) participant's type of injury were accidental, 33.9% (n=41) participants were injured while working, 2.5% (n=3) participant's type of injury were homicidal, 7.4% (n=9) participants were injured while cooking. From the study of He et al. (2017) it was found that almost all burns were unintentional, and nearly one-third (78%) occurred in the kitchen. The majority of the incidents occurred while the victim was preparing food for the family. More than half of the injuries (56%) occurred in the kitchen while cooking. In the another study it was showed that, accidental contact with electrical power lines by metal rods in the hands of construction workers, as well as accidental electrification of various metallic equipment, caused the electric injury in 42.64% of the cases (Islam et al., 2018). Another study of United states showed among the 87 cases injury type of burn were homicide in 35% (30/87) of cases, suicide in 23% (20/87), and accidental death in 44% (37/87) (Peck et al., 2011). Chawla et al. (2010) showed in his study, suicidal burns by kerosene were seen only in 2% cases all of which were females.

Among 121 participants, the majority type of burn caused by flames were 37.2% (n=45), 23.1% (n=28) were scald, 38.8% (n=47) were electrical and minority was chemical 0.8% (n=1). From another study of Bangladesh, it was showed that the most common non-fatal types of burn injuries were flame (35%), electrical (31%) and scald (24%) (Bailey et al., 2018). A study of Bangladesh about assault by burning showed, among the 311 cases, 189 (61%) were chemical burns, 78 (25%) were flame burns and 44 (14%) were contact or other types of burns (Das et al., 2012). In U.S. a study about The epidemiology of burns in young children showed the primary causes of injury were flame burns 51% (n = 226) followed by scalds burns 46% (n = 208) with fewer children sustaining contact 1% (n = 5), chemical 1% (n = 4) and electrical injuries 1% (n = 4) (Patel et al., 2016). Scald burns have been related to morbidity in early childhood not only in Bangladesh, but also in other LMICs (Bailey et al., 2019).

The causes of burn can vary by country depending on type of burn, type of injury, sometime on environment. In this study it was showed that among 121 participants, 2.5% (n=3) burn occurred by candle, 1.7% (n=2) burn occurred by matchstick, 27.3% (n=33) burn occurred by stove, 2.5% (n=3) burn occurred by gas cylinder leakage, 12.4% (n=15) burn occurred by hot water, 5.8% (n=7) burn occurred by cylinder blast, 1.7% (n=2) burn occurred by hot oil, 38.8% (n=47) burn occurred by electric line, 0.8% (n=1) burn occurred by fireworks, 1.7% (n=2) burn occurred by acid throwing, 5.0% (n=6) burn occurred by falling into warm food. In 2010 Chawla et al. showed in his study, cause of burn was stove burst in 6% males and 13% females. Among 50 participants cause of burn were, stove burst 38% (n= 19), clothes caught fire from gas while working 4% (n=2), clothes caught fire from stove while working 8% (n= 4), while saving victims of cylinder blast 2% (n= 1), cylinder blast 10 % (n= 5), clothes caught fire from candle 2% (n= 1), suicidal burns by kerosene 4% (n= 2), burnt by husband 4% (n= 2), burnt by in laws 2% (n= 1), burnt by a known person 2% (n= 1), to conceal crime 4% (n= 2), gas leakage 2% (n= 1), fall into fire 2% (n= 1), blast of machine while working 2% (n= 1), factory fire 2% (n= 1), House fire 8% (n= 4), fall of burning cigarette in to bed while asleep working 4% (n= 2).

In this study, association between gender and type of burn was significant as they were related. Here in flame burn females were majority in number 26.5% (n= 32) then male 10% (n= 13), in scald burn female 12.4% (n= 15) and male 10% (n= 13) were nearby. Males were predominant then females in electrical burn, here male was 29.8% (n= 36) and females were 9% (n= 11). In chemical burn there was only male 0.8% (n= 1). From the study of Islam et al. (2018), it was showed that males 77.94% (n= 53) were majority in number then females 22.06% (n= 15). Mashrekly et al. (2011a) stated in his study that a relatively high burn highest incidence among females was also discovered in Kuwait, Iran, and India, with flame being the most common cause of burn morality. In India, fatalities were caused by similar sources of fire. Cooking fires were the leading cause of severe burns in Iran and Kuwait.

In this study, association between gender and type of injury burn was significant as they were related. Here, accidental injury was high in number in male 26.45% (36), female 29.8% (32). In 2019 Bailey et al. conducted a study in Bangladesh where he stated that

flame burn among females were 38.1% (n=8) and male were 61.9% (n=13). A similar study conducted in Bangladesh about Epidemiology of Burns in Rural Bangladesh where it was found that Women were more predisposed to fire-related incidents (He et al., 2017).

Another association between occupations and cause of the burn of the patient was significantly related. In Bangladesh, a study was conducted with 68 participants where it was found that the majority 77.94 % (n= 53) of those injured participants were men of working age, and those injuries were work-related 52.94 % (n= 36) (Islam et al., 2018).

This study focused between the association of occupation and type of the burn which were significantly related. This investigation found flame burn was high in house wives 14.88% (n= 18), scald burn was high in others 8.26% (n= 10) where children were included mostly, electric burn was high in service holders and electricians 9.9% (n= 12), in case of chemical burn it was a service holder 0.8% (n= 1). Ghavami et al. (2014) and Islam et al. (in 2018) found an association between occupation and type of the burn. They stated that most of the electric burn occurred to electricians.

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 121 burn patients which was a very small number of samples. This study only conducts in burn hospitals at Chittagong, Dhaka and Enam medical hospital that is not covering the full area of Bangladesh. The data collection was challenging in hospital site.

6.1 Conclusion

Bangladesh is a developing country, and all sectors, including health, are constantly changing and becoming more resourceful through manpower, research, and service quality. Burn is a major public health issue all over the world. It is among the leading causes of poor performance, hampered regular activities, and a social economic challenge. It is obvious that this destructive issue affects not only the patient but also their family. Health services are insufficient in both the government and non-government sectors here. Because burns cannot be suppressed in some conditions, it is critical to take preventive measures to overcome them. Through my study I've wanted to find out the key factors that are mainly responsible for burn so that we can decrease the percentage of burn in our country. In this study I've found that most of the burn injury occurs accidentally. Among types of burns, flame burn occurs mainly from the fire of stove, scald burns occurs due to hot water, electric burn occurs from the electric line and chemical burn occurs due to acid throwing. These accidents occur because there is lack of awareness and proper knowledge about burn. Most of the electrical burn occurs due to lack of appropriate training. So if government is strict in this issue and employ rules for working consciously the percentage of burn due may decrease. Also it is not only responsibility of the government but also need awareness among people of Bangladesh to decrease burn injury. This study can help to specify the leading cause behind burn injury.

6.2 Recommendations

The aim of this study was to find out the predisposing factors that are responsible for burn 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

সম্মতিপত্র (বাংলা)

আসসালামু আলাইকুম,

আমি বিবি সাজিদা তুলতুল, 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। অংশগ্রহনকারীদেরকে নিম্নলিখিত অংশটুকু পড়ার পর অংশগ্রহন করার অনুরোধ রইল।

আমি “**বাংলাদেশে অগ্নিদূর্ঘটনার পেছনের প্রভাবিত কারণসমূহ**” এর উপর গবেষণা করছি। এই গবেষণার উদ্দেশ্য বাংলাদেশে পুড়ে যাওয়ার পেছনে কারণসমূহ বের করা। আমার গবেষণাটি সম্পন্ন করার জন্য, আমার কিছু তথ্য নেওয়া প্রয়োজন। আমি এক্ষেত্রে আপনাকে কিছু ব্যক্তিগত, রোগসম্পর্কিত আনুশঙ্গিক প্রশ্ন করতে চাচ্ছি। এতে ১০-১৫ মিনিট সময় লাগবে।

এই গবেষণা সম্পূর্ণভাবে কোর্সের কাজ ছাড়া অন্য কোন উদ্দেশ্যে ব্যবহার করা হবেনা। এ গবেষণায় অংশগ্রহন আপনার বর্তমান অথবা ভবিষ্যৎ চিকিৎসায় কোনো প্রভাব ফেলবে না। গবেষণাপত্র প্রকাশকালে অংশগ্রহন কারীর পরিচয় ও অন্যান্য তথ্য সমূহের গোপনীয়তা রক্ষা করা হবে। এই গবেষণায় অংশগ্রহনকারী স্বেচ্ছায় অংশগ্রহন করছেন এবং অংশগ্রহনকারীগণ যে কোন সময় গবেষণার কার্যক্রম থেকে নিজেকে প্রত্যাহার করতে পারবেন।

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

আমি শুরু করার আগে আপনি কি কিছু জানতে চান?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাতকার শুরু করতে পারি?

হ্যাঁ

না

অংশগ্রহনকারীর স্বাক্ষর ও তারিখ.....

উপাত্তসংগ্রহকারীর স্বাক্ষর ও তারিখ.....

গবেষকের স্বাক্ষর ও তারিখ.....

Inform Consent (English)

Assalamualaikum,

I am Bibi Sajida Tultul, 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 burn in Bangladesh**”. Through this study I will find the main causes behind burn injury. To fulfill my research project, I need to collect data. Now I want to ask some related question. This will take approximately 10-15 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. Your participation in the research will have no impact on your present or future treatment in this area. All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. If you have any query about the study or right as a participant, you may contact with me and/ or Ehsanur Rahman, Associate Professor, Department of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343.

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)

শিরোনাম: “বাংলাদেশের অগ্নিদূর্ঘটনার পেছনের প্রভাবিত কারণসমূহ”

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

১.১	সনাক্তকরণ নম্বর	
১.২	সাক্ষাৎের তারিখ	
১.৩	উত্তরদাতার নাম	
১.৪	ঠিকানা	
১.৫	মোবাইল নম্বর	

অংশ-২: সামাজিক-বৈশ্বিক তথ্যাবলী (মেডিকেল রেকর্ড/রোগীর থেকে সংগ্রহ করতে হবে)

প্রশ্ননম্বর	প্রশ্নাবলী	উত্তর	কোড
২.১	বয়স	১. ৫-১৫ ২. ১৬-২৫ ৩. ২৬-৩৫ ৪. ৩৬-৪৫ ৫. ৪৬-৫৫ ৬. ৫৬-৬৫ ৭. >৬৫	
২.২	লিঙ্গ	১. পুরুষ ২. মহিলা	
২.৩	বৈবাহিক অবস্থা	১. বিবাহিত ২. অবিবাহিত ৩. তালাকপ্রাপ্ত ৪. বিধবা/বিপল্লীক ৫. আলাদা	
২.৪	শিক্ষাগত যোগ্যতা	১. কোনো প্রাতিষ্ঠানিক শিক্ষা নেই ২. প্রাথমিক শিক্ষা ৩. মাধ্যমিক ৪. উচ্চমাধ্যমিক ৫. স্নাতক ৬. স্নাতোকোত্তর	
২.৫	পেশা	১. ব্যবসায়ী ২. চাকুরীজীবী ৩. গৃহিণী ৪. বৈদ্যুতিক মিস্ত্রী ৫. কামার	

		৬. ল্যাব সহকারী ৭. দিনমজুর ৮. শিক্ষার্থী ৯. অন্যান্য	
২.৬	বসবাসের জায়গা	১. গ্রাম ২. উপশহর ৩. শহর	
২.৭	অগ্নিদূষটিনাটি কতদিন আগে ঘটেছে?	১. ১-৭ দিন ২. ৮-১৪ দিন ৩. ১৫-২১ দিন ৪. ২২-২৮ দিন ৫. ২৯-৩৪ দিন ৬. >৩৪ দিন	

অংশ ৩: অগ্নিদূষটিনাটির পেছনের কারণ সমূহ

প্রশ্নসম্বর	প্রশ্নাবলী	উত্তর	কোড
৩.১	শরীরের কোন অংশ পুড়েছে?	১. মাথা ও ঘাড় ২. ধড় ৩. উর্ধ্ববাহতে ৪. নিম্নবাহতে ৫. যৌনঙ্গ অঞ্চলে ৬. নিতম্ব ৭. উরু ৮. অন্যান্য	
৩.২	শরীরের কত শতাংশ পুড়েছে?	১. ১-১০% ২. ১১-২০% ৩. ২১-৩০% ৪. ৩১-৪০% ৫. ৪১-৫০% ৬. ৫১-৬০% ৭. >৬০%	
৩.৩	আঘাতের ধরণ	১. দূষটিনামূলক ২. কর্মরত অবস্থায় ৩. হত্যাপূর্ণ ৪. রান্নার সময় ৫. আত্মহত্যামূলক	

		৬. অন্যান্য	
৩.৪	অগ্নিদূর্ঘটনাটির ধরণ	<ol style="list-style-type: none"> ১. অগ্নিশিখা থেকে ২. উষ্ণ তরল থেকে ৩. বৈদ্যুতিক লাইন থেকে ৪. রাসায়নিক দ্রব্য থেকে ৫. বিকিরন থেকে ৬. অন্যান্য 	
৩.৫	অগ্নিকান্ডের কারণ	<ol style="list-style-type: none"> ১. মোমবাতি ২. দেয়াশলাই ৩. চুলা ৪. বোমা বিস্ফোরণ ৫. গ্যাস সিলিন্ডার লিকেজ ৬. মশার কয়েল ৭. গরম পানি ৮. সিলিন্ডার বিস্ফোরণ ৯. গরম তেল ১০. কারেন্টের লাইন ১১. আতশবাজি ১২. সিগারেট ১৩. এসিড নিক্ষেপ ১৪. গরম খাবারে পড়ে গিয়ে ১৫. অন্যান্য 	

Questionnaire (English)

Title - “PREDISPOSING FACTORS AFFECTING BURN IN BANGLADESH”

Part-1: Respond’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	1. 5-15 years 2. 16-25 years 3. 26-35 years 4. 36-45 years 5. 46-55 years 6. 56-65 years 7. >65 years	
2.2	Gender	1. Male 2. Female	
2.3	Marital status	1. Married 2. Unmarried 3. Divorced 4. Widow 5. Separated	
2.4	Educational status	1. No formal education 2. Primary 3. Secondary 4. Higher secondary 5. Bachelor 6. Masters and more	
2.5	Occupation	1. Businessman 2. Service Holder 3. Housewife 4. Electrician 5. Blacksmith 6. Lab assistant 7. Labor 8. Student 9. Others	

2.6	Living area	1. Rural 2. Semi Urban 3. Urban	
2.7	Years of Burn	1. 1-7 days 2. 8-14 days 3. 15-21 days 4. 22-28 days 5. 29-34 days 6. >34 days	

Part 3: Factors behind burn

QN	Question and filters	Response	Code
3.1	Area of burn	1. Head & Neck 2. Trunk 3. Arm 4. Leg 5. Genital area 6. Buttock 7. Thigh 8. Others	
3.2	Coverage area of burn	1. 1-10% 2. 11-20% 3. 21-30% 4. 31-40% 5. 41-50% 6. 51-60% 7. >60%	
3.3	Type of injury	1. Accidental 2. During working 3. Homicidal 4. During Cooking 5. Suicidal 6. Others	
3.4	Types of burn	1. Flame 2. Scald 3. Electrical 4. Chemical 5. Radiation 6. Others	
3.5	Cause of burn	1. Candle 2. Matchstick 3. Stove 4. Bomb Blast 5. Gas cylinder leakage	

		<ol style="list-style-type: none">6. Mosquito coil7. Hot water8. Cylinder blast9. Hot oil10. Electric line11. Fireworks12. Cigarette13. Acid throwing14. Falling into warm food15. Others	
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Permission Letter

14th March 2021
The Chairman
Institution 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, I want to state that I am Bibi Sajida Tultul, student of 4th professional B. Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of Centre for the Rehabilitation of the Paralyzed (CRP) under the faculty of Medicine of University of Dhaka (DU). This is a four-year full-time course. Conducting thesis project is partial fulfillment of the requirement for the degree of B. Sc. in Physiotherapy. I have to conduct a thesis entitled, "PREDISPOSING FACTORS AFFECTING BURN IN BANGLADESH" under the supervision of Ehsanur Rahman, Associate Professor, department of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343. The purpose of this study is to find out the predisposing factor that are responsible for burn among the patient who are admitted at Sheikh Hasina National Institute of Burn and Plastic Surgery. 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.

I, therefore, pray and hope that your honor would be kind enough to approve my thesis proposal and give me permission to start data collection and oblige thereby.

Sincerely,

Bibi Sajida Tultul

Bibi Sajida Tultul
4th professional B. Sc. in Physiotherapy
Roll No: 23
Session: 2015-16, ID: 112150294
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Recommendation from the thesis supervisor:

E. Rahman, 9.03.21
Ehsanur Rahman
Associate Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Attachment: Thesis proposal including process and procedure for maintaining confidentiality, Questionnaire, Informed consent.

Institutional Review Board (IRB) Approval



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

Ref:

CRP/BHPI/IRB/06/2021/461

Date:

16/06/2021

To
Bibi Sajida Tultul
B.Sc. in Physiotherapy
Session: 2015-16, Student ID: 112150294
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "Predisposing factors affecting burn in Bangladesh".

Dear Bibi Sajida Tultul,
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 & Bangali version)
3	Information sheet & consent form.

The purpose of the study is to find the main causes behind burn injury in Bangladesh. The study involves use of a questionnaire to find out the cause behind burn injury, that may take 10 to 15 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 8.30 am on 1st March 2020 at BHPI (23rd 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

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404

E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd, www.crp-bangladesh.org



বাংলাদেশ হেল্থ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)

(The Academic Institute of CRP)

CRP-Chapain, Savar, Dhaka. Tel: 02-224445464-5, 224441404, Website: www.bhpi.edu.bd

সিআরপি-বিএইচপিআই/০৪/২১/৭১

তারিখ : ১৮.০৪.২০২১

প্রতি
পরিচালক
চট্টগ্রাম মেডিকেল কলেজ ও হাসপাতাল
চট্টগ্রাম।

বিষয় : রিসার্চ প্রজেক্ট এর জন্য আপনার প্রতিষ্ঠান সফর ও তথ্য সংগ্রহ প্রসঙ্গে।

জনাব,
আপনার সদয় অবগতির জন্য জানাচ্ছি যে, পক্ষাঘাতগ্রস্তদের পুনর্বাসন কেন্দ্রে (সিআরপি)'র শিক্ষা প্রতিষ্ঠান বাংলাদেশ হেল্থ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই) ঢাকা বিশ্ববিদ্যালয়ের অধিভুক্তিক্রমে চিকিৎসা অনুষদের অধীনে বিএসসি ইন ফিজিওথেরাপি কোর্স পরিচালনা করে আসছে।

উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামূলক।

বিএইচপিআই'র ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপি কোর্সের ছাত্রী বিবি সাজিদা তুলতুল তার রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য আপনার সুবিধামত সময়ে আপনার প্রতিষ্ঠানে সফর করতে আশ্রয়ী। তার রিসার্চ শিরোনাম “**Predisposing factors affecting burn in Bangladesh.**”

তাই তাকে আপনার প্রতিষ্ঠান সফর এবং প্রয়োজনীয় তথ্য প্রদান সহ সার্বিক সহযোগীতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

অধ্যাপক ডাঃ মোঃ ওমর আলী সরকার
অধ্যক্ষ
বিএইচপিআই, সিআরপি
সাভার, ঢাকা।



বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
(The Academic Institute of CRP)
CRP-Chapain, Savar, Dhaka, Tel: 02224445464, 02224441404, Website: www.bhpi.edu.bd

তারিখ : ২৮.০৮.২০২১

প্রতি
পরিচালক
শেখ হাসিনা জাতীয় বার্ন ও প্রাস্টিক সার্জারী ইনস্টিটিউট,
ঢাকা।

বিষয় : রিসার্চ প্রজেক্ট এর জন্য আপনার প্রতিষ্ঠান সফর ও তথ্য সংগ্রহ প্রসঙ্গে।

জনাব,
আপনার সদয় অবগতির জন্য জানাচ্ছি যে, পক্ষাঘাতগ্রস্তদের পুনর্বাসন কেন্দ্রে-সিআরপি'র শিক্ষা প্রতিষ্ঠান বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই) ঢাকা বিশ্ববিদ্যালয় অনুমোদিত বিএসসি ইন ফিজিওথেরাপি কোর্স পরিচালনা করে আসছে।

উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামূলক।

বিএইচপিআই'র ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপি কোর্সের ছাত্রী বিবি সাজিদা তুলতুল তার রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য আপনার সুবিধামত সময়ে আপনার প্রতিষ্ঠানে সফর করতে আশ্রয়। তার রিসার্চ শিরোনাম “**Predisposing factors affecting burn in Bangladesh.**”

তাই তাকে আপনার প্রতিষ্ঠান সফর এবং প্রয়োজনীয় তথ্য প্রদান সহ সার্বিক সহযোগিতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

Shofiq

মোঃ সফিকুল ইসলাম
সহযোগী অধ্যাপক ও বিভাগীয় প্রধান
ফিজিওথেরাপি বিভাগ
বিএইচপিআই, সিআরপি।