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POSSIBLE OF THE RISK FACTORS OF OSTEOARTHRITIS AT KNEE JOINT FOR FEMALE PATIENT ATTENDED AT CRP

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

POSSIBLE OF THE RISK FACTORS OF OSTEOARTHRITIS AT KNEE JOINT FOR FEMALE PATIENT ATTENDED AT CRP

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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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Contents

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Acronyms

&	And
ADL	Activity of Daily Living
BHPI	Bangladesh Health Professions Institute
BMI	Body Mass Index
CI	Confidence interval
CRP	Centre for the rehabilitation of the paralyzed
MRI	Magnetic resonance imaging
NSAIDs	Non-steroidal anti-inflammatory drugs
OA	Osteoarthritis
ROM	Range of motion
SPSS	Statistical Package for the Social Science
TB	Tuberculosis
WHO	World Health Organization

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Abstract

Purpose: To identify the possible of risk factors of osteoarthritis at knee joint for female patient attended at CRP. **Objective:** To explore the socio-demography information, to identify the vulnerable age group, occupation, traumatic and non-traumatic injury for possible of risk factors of osteoarthritis at knee joint for female patient attended at CRP. **Methodology:** The study was hospital based case control Study. Convenience sampling technique was used to carry out the study. Total sample was 60 among them 30 were cases and 30 were controls. The data were collected through using structured questionnaire by face-to-face interview. The area of the study was musculoskeletal unit of CRP, Savar, Dhaka. Descriptive statistics were used for data analysis. **Result:** Investigator found the risk of knee osteoarthritis increased in the past history of a major or acute knee injury, odds ratio (OR) = 1.529 (95% confidence interval [CI] = 0.536-4.361), using high heeled shoe, OR = 1.784 (95% CI = 0.616-5.169), past history of painful knee swelling, OR = 6.000 (95% CI = 1.890-19.043), bare foot walking, OR = 2.667 (95% CI = 0.924-7.699), high body mass index, OR = 2.000 (95% CI = 0.619-6.465), duration of daily physical activity more than four hour, OR = 1.308 (95% CI = 0.473-3.615), stair climbing, OR = 1.351 (95% CI = 0.460-3.968), sitting on the floor for home activity, OR = 2.250 (95% CI = 0.801-6.321), prolong standing, OR = 4.125 (95% CI = 1.387-12.270), positive family history of knee or other joint diseases, OR = 2.591 (95% CI = 0.914-7.342), regular weight bearing, OR = 1.818 (95% CI = 0.518- 6.382), and sustained knee bending, OR = 2.000 (95% CI = 0.705-5.677). **Conclusion:** The result of research is including the female person who have the past history of knee injury or overweight or physical problem and or any faulty functional activity. Acknowledging these risk factors are useful for the prevention of knee osteoarthritis of female person in Bangladesh.

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CHAPTER-I INTRODUCTION

1.1 Background

Osteoarthritis (OA) is a chronic degenerative disorder composed of multiple etiology characterized by the loss of articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis, and a variety of biochemical and morphological alterations of the synovial membrane and joint capsule (Pal et al., 2016).

Half of the world's population, aged 65 and older, suffers from OA (Bijlsma et al., 2011). Many studies showed that increased age is the most prominent risk factor for the initiation and progression of primary OA in typically affected joints including interphalangeal, hips, knees, and intervertebral. The rare cases of OA diagnosed in young individuals, under the age of 25–30 years old, are mostly due to mutations in matrix genes that cause significant structural abnormalities and/or joint deformities (Loeser et al., 2013).

Pathological changes such as softening, ulceration, and focal disintegration of the articular cartilage, Synovial inflammation may occur in the late-stage of OA. Osteoarthritis is a major cause of disability in developed countries and increasing with population aging (Hunter et al., 2002).

Osteoarthritis (OA) of the knee is the most prevalent condition and a leading cause of chronic disability, pain (Colbert et al., 2012). Knee osteoarthritis causes more dependency in walking, stair climbing, and reduced ability to do lower extremity tasks than any other disease (Hunter et al., 2002). Knee OA is the major cause of mobility impairment, especially among females (Pal et al., 2016).

OA is more commonly frequent in women than men, and the prevalence increases with age. An approximate prevalence of symptomatic OA was found at 18% in females and 9.6% in men. Nearly, 45% of women who are aged over 65 years have symptoms when radiological evidence is seen in 70% of those over 65 years. The studies conducted on females for determining the relationship between estrogen and the prevalence of OA in menopausal age showed opposite results (Pal et al., 2016).

Knee osteoarthritis (OA) affects 6% of adults aged 30 years and older (Felson et al., 2004). Knee OA affects more than 9.3 million people in the United States. The affected people's age is more than 45. people who are aged 55 or more. they contribute 10% of the incidence. of being affected in knee OA. About 25% of them are severely disabled (Gohal et al., 2018). The global prevalence of knee OA is approximately 3.8% in 2010 (Cross et al., 2014). In the USA knee, OA prevalence was about 28% in 2007. Also in Europe, Australia, Canada prevalence rates are high vary from 13.4% to 67.00% (Mine K et al., 2018).

The prevalence of knee OA is 22% to 39% in India. (Pal et al., 2016). In Bangladesh, there are no real statistics. But, one statistic indicates a give a general prevalence of osteoarthritis which is 10,392,681 people who are suffering from osteoarthritis in 2004 (Statistics by Country Osteoarthritis, 2005).

Most of the OA disability burden is attributable to the knees. In fact, OA is the precipitating diagnosis for more than 90% of the increasing number of total hip or knee joint replacement operations being undertaken worldwide (Newman et al., 2009). Many countries in Asia are ageing rapidly. It has been estimated that the percentage of people aged 65 years and over in Asia will more than double in the next two decades, from 6.8% in 2008 to 16.2% in 2040. In most of the developed world, demographic change was a gradual process following steady socioeconomic growth over several decades. In many Asian countries, the change is being compressed into two or three decades. For example, during the period 2008– 2040, it is estimated that Singapore will increase the proportion of people aged 65 and over by 316%, India by 274%, Malaysia by 269%, Bangladesh by 261%, and the Philippines by 256%. In 2008, Japan had the world's oldest population (21.6% aged 65 years and over) and China and India were ranked the top two countries in the absolute number of people aged 65 (Kinsella et al., 2009).

The COPCORD studies conducted in India, Bangladesh and Pakistan each collected data from several communities, aiming to detect rural–urban or affluent– poor differences. The two large surveys conducted in India by one group of researchers presented data from these two communities adjusted to the Indian population census of 2001. This adjusted comparison revealed a significantly higher prevalence of knee pain in the rural (13.7%) compared with the urban (6.0%) community (Joshi et al., 2009). The two surveys conducted in Pakistan demonstrated a higher prevalence of knee pain

among the urban affluent compared with the urban poor cohorts within each study. Both attributed this finding to the increasing prevalence of obesity with rising affluence in Pakistan. The finding of a higher prevalence of knee pain in affluent urban compared with poor urban or rural communities was again demonstrated in a large survey conducted in Bangladesh (Haq et al., 2005). The COPCORD study showed prevalence was higher in urban as compared to the rural prevalence of OA in Bangladesh. (Pal et al., 2016). The societal impact of disability from knee OA is likely to increase among the older segment of the US population (Colbert et al., 2012).

OA is the most common joint disorder in the world and one of the most common sources of pain and disability in the elderly (Lawrence et al., 2008). The incidence of OA is predicted to increase as the senior population grows; placing a significant financial burden on healthcare providers and governments OA affects at least 27 million Americans and is the leading cause of disability in the United States. Compared to only 7.6% of those 18 44 years of age and 29.8% of those 45–64 years of age, 50%of individuals older than 65 years are diagnosed with this disease (Cheng et al., 2007-2009).

OA affects one in six adults, and by 2030 it is estimated that 20% of people in Europe and the United States will suffer from OA. The senior population is growing rapidly in many Asian countries. It is estimated that the 65+ population in Asia will more than double in the next two decades, increasing from 6.8% in 2008 to 16.2% in 2040. In most of the developed world demographic change is a gradual progress following the steady socioeconomic growth over several decades. In contrast, this change is compressed into 2-3 decades in many Asian countries. For example, during the period between 2008 and 2040, it is estimated that the 65+ population will increase by 316% in Singapore, 274% in India, 269% in Malaysia, 261% in Bangladesh, and 256% in the Philippines. In 2008, Japan had the world's oldest population (people 65+ represented 21.6% of whole population), and both China and India were ranked top two for the size of 65+ population (106 and 60 million, resp. The high prevalence and heavy impact on working capacity make OA a major social issue. Therefore, healthcare and socioeconomics need to put a high priority to the prevention and treatment of OA (De Bari et al., 2010).

People who are affected by knee osteoarthritis once, the disease develops gradually over several years. There are no treatments convenient that would delay the course of this disease, which is usually characterized as progressive cartilage loss (Felson et al., 2004). It also causes considerable economical load on the health care system (Bennell et al., 2005).

The several modifiable risk factors include repetitive movement of joints, obesity, infection, and injuries. The occupational physical activities are unchanging motions and great forces such as kneeling, squatting, 18-25 climbing, and heavy weight lifting (Pal et al., 2016). Among various risk factors, the most important risk factors for knee OA are obesity, previous knee injury, and family history of OA. For the impact of knee OA, people with symptomatic knee OA may be more motivated to take preventive measures for delaying disease progression than those without radiographic OA. Therefore, investigators and persons suffering from knee OA are especially interested in risk factors that are linked with radiographic OA progression because such knowledge will provide valuable guidance for secondary prevention (Felson et al., 2010).

1.2 Rationale

Knee OA is responsible for more than 80% of the disease's total burden and affects at least 19% of American adults aged 45 y and older. Although extensive evidence suggests that mechanical loading and inflammation are proximate causes of knee OA, the deeper underlying causes of the illness's high prevalence remain unknown and poorly studied, hampered efforts to prevent and cure the condition. (Wallacea et al., ,2017). Identifying risk variables is essential for developing primary and secondary prevention measures for knee osteoarthritis (Haq et al., 2010). Many observational studies have looked at risk factors for the development and progression of knee OA throughout the last few decades. Several risk variables have been discovered to be strongly related with an elevated incidence of incident radiographic knee OA (e.g., female sex, obesity, high bone mineral density, joint injury, recurrent occupational stress on joints, and specific sports (Felson et al., 2010) . Overweight people had a higher incidence of knee osteoarthritis than non-overweight controls, according to population-based studies of osteoarthritis.Obese women (BMI greater than30, but less than35) had nearly four times the risk of osteoarthritis as women with a BMI under 25 according to data from the first National Health and Nutrition Examination Survey, which was conducted across the United States from 1971 to 19752 (FELSON., 1996). OA is a complex illness that affects the entire joint,. Modern Knee osteoarthritis management should be based on an individualized approach that includes not only palliative pharmacological pain relief, but also identifying and managing risk factors that contribute to the patient's condition, resulting in an improvement in the joint's metabolic and biomechanical environment (Georgiev & Angelovs., 2019)

Due to a lack of awareness, the number of people suffering from knee osteoarthritis is growing every day. It affects a great number of people, making them a burden to themselves and having a disastrous effect on their families, society, and the entire country. Research in this field can help establish physiotherapy skills and serve as a foundation for expanding the profession in this country. As a result, the researcher intended to perform a study for Bangladeshi people called "risk factors of developing knee osteoarthritis in female." Other healthcare professionals will gain up-to-date information on the causes of knee osteoarthritis. This understanding will also benefit a large portion of the people.

1.3 Research question

What are the risk factors associated with developing knee osteoarthritis in female?

1.4 Aim

The aim of this study to find out the developing risk factors of knee osteoarthritis in female patient who attended at CRP, Savar.

1.5 Objectives

General objectives

- To identify the risk factors of developing knee osteoarthritis in female attended at CRP, Savar.

Specific objectives

- To find out the association between using of high heeled shoe and causing of knee osteoarthritis and, to discover the association between past history of painful knee swelling and causing of knee osteoarthritis.
- To evaluate the association between bare feet walking and causing of knee osteoarthritis and the association between overweight and causing of knee osteoarthritis.
- To determine and clarify the association between past history of major or acute knee injury and causing of knee osteoarthritis and also find the association between heavy activity and causing of knee osteoarthritis.
- To interpret and examine the association between stairs climbing and causing of knee osteoarthritis and the association between sitting on the floor for home activity and causing of knee osteoarthritis.

- To investigate and analyze the association between prolong standing and causing of knee osteoarthritis and the association between positive family history of knee or other joint diseases and causing of knee osteoarthritis.
- To recognize and review the association between regular weight bearing activity and causing of knee osteoarthritis and the association between sustain knee bending and causing of knee osteoarthritis.

1.6 Operational definition

Risk Factor: A risk factor is something that increases your chances of getting a disease. Sometimes, this risk comes from something you do. For example, smoking increases your chances of developing colon cancer. Therefore, smoking is a risk factor for colon cancer. Other times, there's nothing you can do about the risk. It just exists. For example, people 50 and older are more likely to develop colon cancer than people under 50. So, age is a risk factor for colon cancer.

Knee Osteoarthritis: Osteoarthritis of the knee is a degenerative joint condition characterized by discomfort in the knee that makes it difficult to conduct everyday tasks adequately, decreased joint range of motion, and difficulty doing daily activities (ADL).

Activities of daily living (ADL): The essential functional activities, those have to be done independently from morning to evening.

Stressful job pattern: Has to perform repetitive motions, bending work for more than 8 hours.

Posture: The pattern of sitting, standing status.

CHAPTER – II LITERATURE REVIEW

Osteoarthritis, a major contributor to functional impairment, is becoming increasingly prevalent worldwide due to its association with an aging population and due to a growing prevalence of obesity (Berenbaum, 2008). Knee osteoarthritis is a common cause of pain and disability (Lementowski et al., 2008).

Osteoarthritis (OA) of the knee is the most common cause of pain and impairment in the elderly (Wylde et al., 2016). When cartilage is lost in the knee, the bone develops to try to heal the injury. However, instead of making things better, the bone develops unnaturally and exacerbates the problem (Fransen & McConnell 2008). Osteoarthritis (OA) is a type of joint disease that results from breakdown of joint cartilage and underlying bone (Cyrus et al., 2014).

While age is strongly associated with the risk of knee osteoarthritis, overweight is arguably the most important modifiable risk factor. Obesity is consistently found to be a risk factor for knee osteoarthritis (Teichtahl et al., 2008). Body mass index (BMI) has been associated with the incidence and progression of knee osteoarthritis, independently of age and sex (Reijman et al., 2007). Even a moderate increase in BMI, within the normal range, was shown to be significantly related to knee osteoarthritis (Holmberg et al., 2005).

The mechanisms by which obesity is linked to the pathogenesis of knee osteoarthritis are not completely understood. Biomechanical factors (e.g., reduced physical activity and immobility, abnormal knee adductor moment, high pressure on the articular cartilage) and metabolic mechanisms (e.g., hormonal dysregulation, adipokines) have been suggested as possible mediating factors for this joint disorder (Teichtahl et al., 2008).

According to Glyn-Jones et al. (2015), osteoarthritis is a major source of pain, disability, and socioeconomic burden throughout the world. The disorder's epidemiology is multifaceted and complicated, including genetic, biochemical, and biomechanical components. Joint-specific etiological variables are also present. Although joint replacement is an effective therapy for symptomatic end-stage arthritis, functional results can be poor, and prostheses have a limited lifetime. As a result, the focus is turning to disease prevention and early osteoarthritis therapy. Joint space narrowing due to articular cartilage degradation and disappearance, sharpness of

articular edges and intra-articular structures (e.g., tibial tubercules), bony sclerosis, osteophytes, and marginal lapping, and bony cysts are the most common alterations in knee OA (Brandt., 2004).

Knee osteoarthritis is a major source of pain and impairment, particularly among the older age population (Coggon et al., 2001). It was the most common type (6% of all adults). The likelihood of developing osteoarthritis increases with age. Studies have shown that knee osteoarthritis in men aged 60 to 64 is more commonly found in the right knee (23%) than in the left knee (16.3%), while its distribution seems to be more evenly balanced in women (right knee, 24.2%; left knee, 24.7%) (Andrianakos et al., 2006).

The prevalence of osteoarthritis of the knee is higher among 70- to 74-year-olds, rising as high as 40%. When the diagnosis is based on clinical signs and symptoms alone, the prevalence among adults is found to be lower, at 10%. The radiological demonstration of typical signs of osteoarthritis of the knee is not correlated with symptoms: Only about 15% of patients with radiologically demonstrated knee osteoarthritis complain of knee pain. The incidence of the disorder among persons over 70 is estimated at 1% per year (Michael et al., 2010).

Osteoarthritis was once thought to be a normal part of the aging process, leading to the phrase degenerative joint disease. However, it is now understood that osteoarthritis is caused by a complex interaction of genetic and environmental factors, such as joint stability, local inflammation, mechanical forces, and cellular and biochemical processes. Inherited disorders can predispose people to osteoarthritis in rare cases. For the vast majority of patients, osteoarthritis is multifactorial and linked to one or more causes, such as aging, genetic predisposition, and environmental factors (Hunter et al., 2002).

In general, the disease manifests itself as a progressive loss of articular hyaline cartilage metabolic and mechanical function, with probable joint discomfort and dysfunction as a result. Joint space narrowing due to articular cartilage degeneration and disappearance, sharpness of articular edges and intra-articular structures (e.g., tibialtubercules), bony sclerosis, osteophytes, and marginal lapping, and bony cysts are the most common changes in knee OA (Brandt., 2004). The medial compartment is most commonly affected and leads to a varus deformity (Kumar and Clark, 2002). The

prevalence of osteoarthritis, especially knee osteoarthritis, has grown as the global population ages and the number of people over 60 years old rises. However, it is thought that the largest influence on the rising prevalence of knee osteoarthritis is not due to ageing, but rather to the rising prevalence of obesity (Lee & Kean., 2012).

Several recent large population-based studies conducted in China, Japan, Korea and Pakistan have confirmed an increased risk of symptomatic knee OA associated with older age, female gender and obesity (Kim et al., 2010).

An analysis of the ROAD study, conducted in Japan, 40 demonstrated that occupations involving squatting or kneeling more than 2 h per day were associated with an approximately two-fold significantly increased risk of moderate to severe radiographic knee OA. From the cohort study conducted among people aged 60 years or older in Beijing, prolonged squatting at 25 years of age (> 1 h per day) was a common activity and was found to be a strong risk factor for OA of the tibio-femoral joint of the knee (Muraki et al., 2009).

Among Japanese people aged 60 years or above, having an occupation involving climbing more than 1 h a day, standing more than 2 h a day, lifting weights of 10 kg or more at least once a week and walking more than 3 km a day were each associated with a 1.4–2.0 increased odds of radiographic knee OA, after adjustment for age, sex and body mass index (BMI) (Muraki et al., 2009).

The Hallym Ageing Study, 28 conducted in Korea among people aged 50 years or over, demonstrated an increased likelihood of radiographic knee OA with reporting a manual occupation in multivariate analysis. It was demonstrated that the prevalence of symptomatic knee OA and knee pain was significantly higher in rural Wuchuan county, compared with urban Beijing among people aged 60 years or over and using identical disease case definitions.

Case-control studies have consistently shown a substantial link between obesity and knee osteoarthritis. Furthermore, an investigation of women revealed that obese women who lose weight had a lower incidence than those who do not these findings suggest that controlling obesity can reduce risk (Coggon et al., 2001).

A case–control study of hospitalized hip or knee OA patients conducted in Hong Kong demonstrated that a history of joint injury, frequent stair-climbing (15 or more flights

per day) or frequent lifting of heavy weights (10 kg or more) were all associated with knee OA. Somewhat in contrast, another study in China24 reported that people aged 35–64 years living in multistory buildings without elevators had a significantly higher prevalence of knee pain compared with those living in single-storey homes (10.1% and 6.5%, respectively) (Zeng et al., 2006), however no correlation between knee OA and climbing stairs could be demonstrated. Interestingly, data from the ROAD study suggest that living in a rural mountainous area doubled the likelihood of symptomatic knee OA (confirmed by radiographs) compared with living in a seaside or urban region (Muraki et al., 2009).

Martin et al., 2013 recently published a cohort study that found that BMI is positively associated with knee OA in women and that more active people have a decreased risk of knee OA. Salve et al., 2010 discovered that the prevalence of OA was higher in the lower socioeconomic population than the higher socioeconomic population in a house-to-house survey of 260 perimenopausal women in South Delhi. Patients with knee OA may be motivated to lose weight if it can be demonstrated that doing so not only relieves pain but also prevents the progression of structural damage (Niu et al., 2009).

The identified modifiable exposures were divided into six categories: (1) obesity and overweight, (2) comorbidity, (3) occupational factors, (4) physical activity, (5) biomechanical factors, and (6) food exposure (Georgiev & Angelovs., 2019). Previous trauma, meniscal and cruciate ligament injury and obesity are the main risk factors for developing knee OA (Kumar and Clark., 2002).

Some researchers have linked increased C-reactive protein levels to a higher frequency and incidence of knee OA, this has not been documented in all investigations (Yousif., 2012). Osteoarthritis is a leading cause of pain, disability, and socioeconomic burden globally (Glyn-Jones et al., 2015). The cost of OA in terms of intangible, direct, and indirect costs can be calculated. Because the cause of increased mortality in OA patients is unknown, the intangible cost of OA may be best conveyed by its impact on quality of life. The current treatment for KOA is palliative, consisting primarily of pain medication and watchful waiting, with total joint replacement in the end-stage. This is why the disease burden of KOA is quickly increasing. Palliative care accounts for a considerable percentage of the direct cost of KOA, and hospital admission costs alone, which are primarily for joint replacement, account for almost half of the direct cost (Lee

& Kim., 2015). According to hospital activity data, 1.5 percent of persons in the United Kingdom will have surgery for the disorder (typically total knee arthroplasty) at some stage in their live. (Coggon et al., 2001). Deep, throbbing pain is defined by people who have symptomatic OA of the knee. Pain is intermittent and most often associated with joint usually in the early stages of the disease. Symptomatic disease progresses for many individuals, and pain becomes more chronic and may occur at any time during the day and at night. Crepitus or deep 'creaking' sounds may be noticed when moving, and movement is often restricted. Daily functional activities become increasingly challenging. Knee OA is the major cause of disability in walking, stair climbing, and other tasks (Davis., 2011).

Chitnavis and Carr (2007) classified OA based on etiology which is familiar to clinicians and subdivided OA into' Primary' for which the cause of disease production in unknown and 'Secondary' which is related to some factors such as injury and deformity. OA classified into 'Primary' (when there is no obvious antecedent factor) and 'Secondary' (when it follows a demonstrable abnormality) in somewhat artificial.

This is less common type of osteoarthritis. It is also called nodal generalized osteoarthritis (NGOA). It occurs without any cause. It predominantly affects women. In the human body, the knee joint is commonly affected by osteoarthritis. Thomson, Skinner and Piercy (2006) stated that secondary osteoarthritis arises as consequences of various conditions. These are as follows:

Trauma after severe injury, resulting in fractures of the joint surfaces.

Dislocation

Infection

Though exact cause is not known the following factors are suspected to , causation of primary OA are age, obesity , genetics, occupation involving prolonged standing, sports, multiple metabolic disorders (Ebnezer, 2008). Another study shows the factors that are responsible for primary osteoarthritis are crystals in joint fluid or cartilage, high bone mineral density, injury to the joint, peripheral neuropathy, joint hyper mobility.

The causes of secondary osteoarthritis of the knee are as valgus and varus deformities of the knee, Rheumatoid arthritis, infection, TB, hyperparathyroidism, over use of intra

articular steroid therapy (Ebnezer, 2008). Repeated minor trauma may lead to micro fractures and subsequent OA. Occupational factors are thought to be important in the development of secondary OA. Hemophillia, acromegaly and hyperthyroidism all predispose joints to secondary OA (Elahee, 2012).

In OA, the entire joint structure is affected. The cartilage, synovial, and bone can all be major sites for production of cytokines, growth factors, chemokines, and mediators classically associated with inflammation, which eventually promote progressive joint destruction (Loeser, 2006).

These catabolic molecules, in each of the joint compartments, can be considered targets for disease modification. Most interest in DMOAD development has focused on molecular events within articular cartilage. These include not only the production of metalloproteinase's, collagenases, and aggrecanases that lead to cartilage breakdown in chondrocytes, but also the production of cytokines, such as interleukin 1(IL-1), tumor necrosis factor (TNF), IL-6, IL-8, and nitric oxide (NO). These act on other chondrocytes to cause this catabolic state, creating a positive amplification loop leading to more protease production. Eventually, many of these cells, via NO and other oxygen species production, undergo apoptosis and die. The synovial compartment is also regarded as important in OA. Some patients undergo acute episodes of synovitis, and at surgery and arthroscopy one can find synovial proliferation and inflammatory changes. Activated synovium can release proteases and cytokines that may accelerate deterioration of adjacent cartilage lesions. Synovitis in end-stage OA can even resemble the pannus seen in RA, with neovasculature, fibroblasts, and macrophage infiltration seen on pathology (Ayral et al., 2008).

The role of bone in OA is least well understood but is an area of great interest and investigation. Subchondral bone remodeling is increased early in the course of the disease, especially in areas that underlie damaged cartilage. Biomechanical and biochemical factors seem to influence the remodeling process, but the underlying Pathogenesis is not yet identified. Osteophyte formation, also an early feature of OA, appears to result from local production of anabolic factors such as transforming growth factor beta (TGF-β) and insulin-like growth factor (IGF-1). The increase in bone turnover can be measured by biomarkers such as urinary N-terminal cross linking

telopeptide of type I collagen (NTx) which is a marker of bone resorption (Wieland et al., 2006).

The American College of Rheumatology (ACR) criteria for OA of the knee has been published by Altman et al. These classification criteria, used typically as inclusion criteria in clinical trials worldwide, are mostly the combination of clinical and radiographic findings. They include one of the following three findings, age above 50, stiffness less than 30 min, and crepitus, together with structural changes i.e. osteophytes and joint space narrowing (Kellgren II on standardized radiographs). These classification criteria display 91 % sensitivity and 86 % specificity. Recently, in an attempt to harmonize studies addressing the underlying genetic basis of OA (Kerkhof et al. 2011) published recommendations on standardization of OA phenotypes, suggesting that at least one definite osteophyte with possible joints space narrowing is needed to establish the diagnosis of radiological knee OA. Additional issues around the OA knee phenotype have been reported in other publications, highlighting the pitfalls in defining symptomatic and radiological OA (Felson et al., 2011).

Defining classification criteria of symptomatic early knee OA is certainly challenging, but is obviously based on the fact that the patient cannot be classified as established OA. To make it clinically relevant, and to help classifying patients for clinical trials, would still imply the combination of symptoms, signs, and structural changes. However, strict radiographic criteria as defined by Kellgren will not suffice to capture an early OA population. Therefore, a more comprehensive classification allowing other methods of structural assessment such as arthroscopy and MRI are proposed. As suggested above, and in view of the existing classification criteria for OA, the following criteria are proposed. A patient can be classified as having early OA of the knee based on clinical and imaging findings and should fulfill the following three criteria:

1) Pain in the knee.

2) Standard radiographs: Kellgren-Lawrence grade 0 or I or II (osteophytes only).

3) At least one of the two following structural criteria: Arthroscopic findings of cartilage lesions, MRI findings demonstrating articular cartilage degeneration and/or meniscal degeneration, and/or subchondral BMLs.

More detailed description of classification criteria:

1) Knee pain**:** at least two episodes of pain for >10 days in the last year.

2) Standard radiographs: Kellgren-Lawrence scoring up to II (osteophytes only) in standing weight-bearing position with knees in approximately 20° of flexion and the feet in 5° of external rotation. The radiographs should be done bilaterally from a posteroanterior view in the frontal plane. Kellgren-Lawrence grade 0 is no abnormalities. Kellgren-Lawrence I is defined as: doubtful narrowing of the joint space and possible osteophytic lipping. Kellgren-Lawrence II is defined as definite osteophytes with joint space narrowing. In agreement with a recent adjustment (Felson et al., 2011), osteophytes (osteophytes only, no joint narrowing) has been introduced into the category early OA.

3) Arthroscopic findings following the ICRS classification (Enea et al., 2012). ICRS grade I-IV in at least two compartments or grade II-IV in one compartment with at least surrounding softening and swelling of the cartilage.

4) MRI findings: evidence of degenerative changes of the cartilage**,** meniscus and/or BMLs. The definitions are based on the BLOKS and WORMS scores (Hunter et al., 2008) and their comparisons. Minimum two of the four following scores should be fulfilled:

A) Cartilage morphology scores grade 3 or higher (WORMS's grade 3 to 6): minimally multiple areas of partial thickness defects with intermittent areas of normal thickness to diffuse full thickness loss in region (more than 75 %).
B) Cartilage Score 1: minimally grade 2 (BLOKS grade 2 and 3): 10-75 % of cartilage loss in a region (medial, lateral, patellofemoral) to more than 75 % cartilage loss in a region.
C) Meniscal tears: Grade 3 or higher (BLOK's grade 3-4): from displaced tears or partial resection (grade 3) to complete maceration, destruction, resection.
D) BMLs, typically scored as BMLs size: minimally WORMS grade 2 i.e. 25 % or higher BMLs in any one compartment.

Stage 0

– No abnormality

Stage 1

– Incipient osteoarthritis, beginning of osteophyte formation on eminences.

Stage 2

– Moderate joint space narrowing, moderate subchondral sclerosis.

Stage 3

– >50% joint space narrowing, rounded femoral condyle, extensive subchondral sclerosis, extensive osteophyte formation.

Stage 4

– Joint destruction, obliterated joint space, subchondral cysts in the tibial head and femoral condyle, subluxed position The clinical features of OA include pain or aching and stiffness of the affected joints, while lower limb OA is associated with significant physical disability and a high level of utilization of healthcare services. The radiographic findings of OA include joint space narrowing, bony sclerosis, and osteophytosis. Population based studies have shown a significant discordance between symptomatic OA (defined as pain or aching on most days plus radiographic findings of the symptomatic joint) and radiographically defined OA. It has been found, for example, that only half of patients with radiographic knee OA reported knee pain (Dahaghin et al., 2007).

Patients suffering from osteoarthritis often complain of pain on movement, typically occurring when movement is initiated or when the patient begins to walk. The pain is often described as a dull ache. As osteoarthritis progresses, the pain becomes continuous, and the functionality of the joint is severely impaired. Historical criteria that are relatively specific for osteoarthritis, but can also be found in other joint diseases (Yang et al., 2008).

Pain

– Pain at the beginning of movement

– Pain during movement

– Permanent / nocturnal pain

– Need for analgesics

Loss of function

– Stiffness 14

– Limitation of range of movement

– Impairment in everyday activities

– Need for orthopedic aids

Other symptoms

– Crepitation

– Elevated sensitivity to cold and/or damp

– Stepwise progression

Physical examination is important in making the diagnosis. Pain on range of motion and limitation of range of motion are common to all forms of osteoarthritis, but each joint has a unique physical examination finding that shows a hand with typical changes of osteoarthritis.

Because osteoarthritis is primarily a clinical diagnosis, physicians can confidently make the diagnosis based on the history and physical examination. Plain radiography can be helpful in confirming the diagnosis and ruling out other conditions (Sinusas, 2012). Advanced imaging techniques, such as computed tomography or magnetic resonance imaging, are rarely needed unless the diagnosis is in doubt and there is a strong suspicion for another etiology, such as a meniscal injury.

Laboratory testing usually is not required to make the diagnosis. Markers of inflammation, such as erythrocyte sedimentation rate and C-reactive protein level, are typically normal. Immunologic tests, such as antinuclear antibodies and rheumatoid factor, should not be ordered unless there is evidence of joint inflammation or synovitis, which makes autoimmune arthritis a more likely diagnosis. A uric acid level is recommended only if gout is suspected. Because false-positive results are possible, ordering some of these tests may add unnecessary confusion if the pretest probability of gout or an autoimmune arthritis is low (Jackson, 2008).

Rheumatic panels (e.g., erythrocyte sedimentation rate, rheumatoid factor, antinuclear antibodies, uric acid, Lyme serology in some areas) have an especially high rate of false-positive results in primary care populations. An American College of Rheumatology clinical guideline recommends against the routine ordering of arthritis panels for patients with joint problems.

There have been few longitudinal epidemiological studies documenting the natural course of OA and participants of clinical trials are rarely followed for more than six months. The studies that have been performed, and anecdotal reports, suggest that OA has a very variable course. Most patients experience a slow, progressive deterioration, characterized by episodic exacerbations of pain that insidiously increase in frequency, intensity and length, resulting in muscle weakness and fatigue, joint stiffness and reduced function. The risk factors for progression have not been identified (Elahee, 2012).

Treatment choices fall into four main categories: nonpharmacologic, pharmacologic, complementary and alternative, and surgical. In general, treatment should begin with the safest and least invasive therapies before proceeding to more invasive, expensive therapies. All patients with osteoarthritis should receive at least some treatment from the first two categories. Surgical management should be reserved for those who do not improve with behavioral and pharmacologic therapy, and who have intractable pain and loss of function (Sinusas, 2012).

The conservative treatment of knee osteoarthritis is based on a stepwise therapeutic scheme, which is to be applied individually depending on the severity and distribution of symptoms as well as any possible accompanying illnesses. A guideline for the treatment of osteoarthritis of the knee (Michael, 2010) has been issued jointly by the German Society for Orthopedics and Orthopedic Surgery and the German Professional Association of Orthopedists and Trauma Surgeons. The goals of treatment, as stated in the guideline, are:

1. Pain relief

2. Improved quality of life

3. Improved mobility

4. Improved walking

5. Delayed progression of osteoarthritis

The guideline does not contain any assessment of the individual conservative measures mentioned, nor does it contain stage-specific recommendations for conservative treatment. A summary of published studies on the non-pharmacological treatment of knee osteoarthritis, with their results and levels of evidence according to the criteria of evidence-based medicine. An extensive discussion of each type of conservative treatment would be beyond the scope of this article, which is intended to provide an overview of all potentially applicable treatments.

The following classes of medications are currently used to treat osteoarthritis of the knee:

-Analgesics/anti-inflammatory agents

-Glucocorticoids

-Opioids

-Symptomatic, slow-acting drugs for osteoarthritis (SYSADOA)

-Anti-cytokines.

The specific risks associated with the use of classic non-steroidal anti-inflammatory drugs (NSAIDs) are due to their mechanism of action, i.e., the inhibition of prostaglandin secretion through the inhibition of cyclooxygenase (COX) in one or both of its two isoforms, COX-1 and COX-2. Specific inhibitors of COX-2 have a selective anti-inflammatory effect but are still markedly nephrotoxic. Nonselective COX inhibitors also have renal side effects (Watson et al., 2006)); yet, despite the large number of studies, injections. Their guidelines are currently being updated.

On the other hand, the current guidelines of the American Academy of Orthopedic Surgeons (AAOS) was recommended that intra-articular corticosteroid injections for the treatment of osteoarthritis should be performed in the short term only (Richmond et al., 2006). Septic arthritis is a serious potential complication. In a retrospective study from Iceland, the risk of septic arthritis was calculated to be 0.037% per corticosteroid

injection (Geirsson et al., 2008). Thus, in Iceland, the frequency of joint infection complicating intra-articular corticosteroid injection is 1 case per 2633 injections.

Physiotherapy for knee osteoarthritis includes exercise therapy as well as physical measures, including the following:

-Ultrasound application (to relieve pain and support endogenous healing processes)

-Electrotherapy

-Muscle stimulation

-Application of heat and cold

-Transverse friction (a special massage technique)

-Acupuncture

-Stretching/walking Traction.

Pollard et al. showed that manual therapy reduces pain and improves function significantly, (Pollard et al., 2008). It is showed that pain could be relieved, and function improved, by either individualized or group therapy (Devos-Comby et al., 2006). No particular treatment program was found to yield better results than the others.

CHAPTER – III METHODOLOGY

3.1 Study design:

The purpose of the study was to find out the risk factors of developing knee osteoarthritis for Bangladeshi people. Investigator used unmatched case control study design to identifying the risk factors of developing knee osteoarthritis. All individual cases were unmatched with a control. The entire sample was then searched for the exposure.

3.2 Study site:

Musculoskeletal unit of the Centre for the Rehabilitation of the Paralysed (CRP) – Savar was selected as the study site. The investigator thought that this place was easy to obtain desire data for this study.

3.3 Study area:

The study conducted on musculoskeletal area.

3.4 Study population and sample population:

All patients with knee osteoarthritis in Bangladesh were the target population and sample population were those who came to CRP to receive treatment during the investigator study time.

3.5 Sampling procedure:

The investigator used the convenient sampling technique because considering the inclusion – exclusion criteria and the number of patients coming to musculoskeletal unit. It would be difficult to find the expected number of subjects. This technique was more feasible, less time consuming and expensive for the investigator to obtain relevant information.

3.6 Inclusion criteria:

- Patient with knee osteoarthritis who were attending in CRP for treatment as a case.
- Knee osteoarthritis that was confirmed diagnosed by X-Ray or MRI.

3.7 Exclusion criteria:

- Patient with knee osteoarthritis and others serious associated diseases.
- Any previous or current history of psychiatric or psychological treatment.
- Patient with severe psychological problem.

3.8 Sample size:

There were 30 cases and 30 controls, were selected as sample in the study.

Formula:

$$q = 1 - p$$

$$P1 = \frac{PoR}{1 + Po(R - 1)}$$

$$P = \frac{P1 + Po}{2}$$

$$n = \frac{2pq(Za + Zb)^2}{(P1 - Po)^2} = 386$$

Here,

The quantities Za and Zb are values from the standard normal distribution.

Relative frequency of exposure among control in the target population, Po was 5%

Hypothesized minimum relative risk to detected by the study, R = 2

Level of significance, a = 0.05% (Za = 1.96)

Power of the study, = 80% (Zb = 0.84)

Number of the calculated sample = n

Finishing the calculating estimated sample size was 543

The investigator taken 60 participants that were 30 cases and 30 were controls due to time limit and able ability of the participants in this time.

3.9 Data collection methods and tools:

Data were collected by direct interview using the questionnaire and from the reports of knee osteoarthritis. The questions were divided into four sections which almost covered all issues regarding risk factors of knee osteoarthritis including age, occupation, educational status, residential area, family income, using high heeled shoe, past history of painful knee swelling, bare foot walking, BMI, comorbidities, heavy activity more than four hour, stair climbing, sitting on the floor for home activity, prolong standing, positive family history of knee or other joint diseases, regular weight bearing and sustained knee bending. Beside this, paper, pen, pencil, computer, printer and calculator comprehensive field note would be used as the materials of data collection.

3.10 Data management and analysis:

Measurement of association

Exposure	Knee Osteoarthritis	
	Yes (Case)	No (Control)
Yes	a	b
No	c	d
Odds of exposure = ad/bc		

Table-01: Measurement of Odds ratio

In the case-control study, there was not calculate the incidence rate of the disease so actual relative could not be obtained. The measure of the association between exposure and occurrence of the disease of the case-control study was odds ratio. The ratio of odds of then exposure in diseased participants to the odds of the exposure in the non-disease participants was calculated as an odds ratio. According to the above mention was an

example of a calculated Odds ratio. SPSS 22 version was used to analyze data. Data was analyzed in the form descriptive statistics for demographic data. Odds ratio was computed to determine how much risk there was in presence of certain exposure compared to those who did not have that exposure.

3.11 Quality control and assurance

The investigator had enough knowledge in the study; hence the study area and underneath issue would be keenly explored by him. The format of the questionnaire was purely structured; thus, it enabled a definitive answer. The questionnaire was developed according to the literature search and peer review for reliable questionnaire. The investigator tried to avoid selection bias due to strictly maintained inclusion and exclusion criteria.

Both cases and control were well defined in this study to the avoid conflict the selection the case and control. The data were collected when the experience physiotherapist who was identify knee osteoarthritis patients as a case.

3.12 Informed consent

The aims and objectives of this study was informed to the subjects verbally. The investigator gave the consent form to the subject and explained them. The subjects had the rights to withdraw themselves from the research at any times. It was assured the participant that her name or address would not be used. The information of the subjects might be published in any normal presentation or seminar or writing but they would not be identified. The participant was also being informed or gave notice that the research result would not be harmful for them. It was being keep confidential. Every participant had the right to discuss about her problem with senior authority.

3.13 Ethical consideration

- The proposal of the study was approved by the ethical committee of the member of faculty of Physiotherapy Department.

- The investigator would follow the guideline given by local ethical review committee.
- Followed the WHO & BMRC guidelines.
- Strictly maintained the confidentiality.
- Informed consent was taken**.**

3.14 Limitations of the study

The limitation of this study was as followed

- The study did not represent the total population of the condition because
    - This was a hospital based study which also is not a ideal sample because people with special characteristics (e.g. severe condition, people living closer to the hospitals, referred by others etc) arrives is that particular hospital.
- The study site is a specialized rehabilitation center where usually patients with special characteristics such as severe condition, referred by other etc come.
- Sample was drawn with convenient sampling technique which had possible chance to selection bias

CHAPTER – IV RESULTS

In this study there were 60 participants. Among them 30 participants were in case group and 30 participants were in control group. The analysis was done by the the SPSS 22 version.

Socio-demographic Information

4.1 Age of the participants

Among the 60 participants 12 were between 20-37 years, 18 were between 40-50 years, 30 were between 51-71 years. There mean age 49.31 years and minimum age was 20 years and maximum age was 71 years. In percentage 20% participants were between 20-37 years, 30% participants were between 40-50 years and 50% participants were 51-71 year (Figure-1).

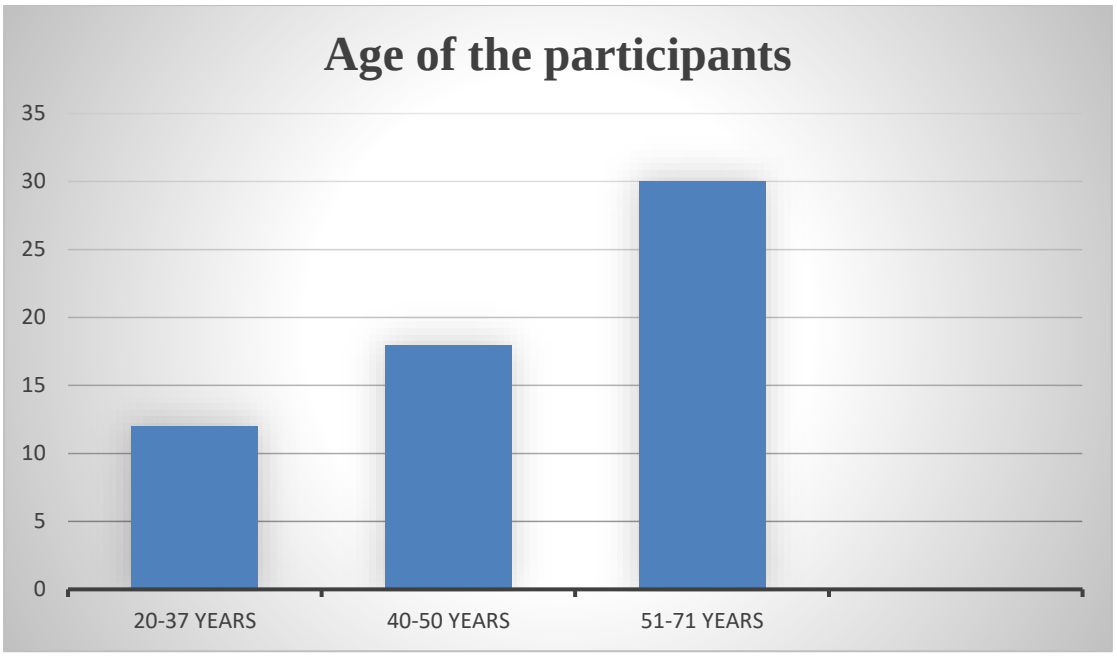

Figure-1: Age of the participants

4.2 Educational status of the participants

Among the 60 participants, 2 (3.33%) participants have no formal schooling, 6 (10%) participants have the less than primary education, 12 (20%) participants have the primary education, 19 (31.66%) participants completed the SSC, 16 (26.6%) participants completed the HSC and 5 (8.3%) participants completed the Bachelor or higher degree (Figure-2).

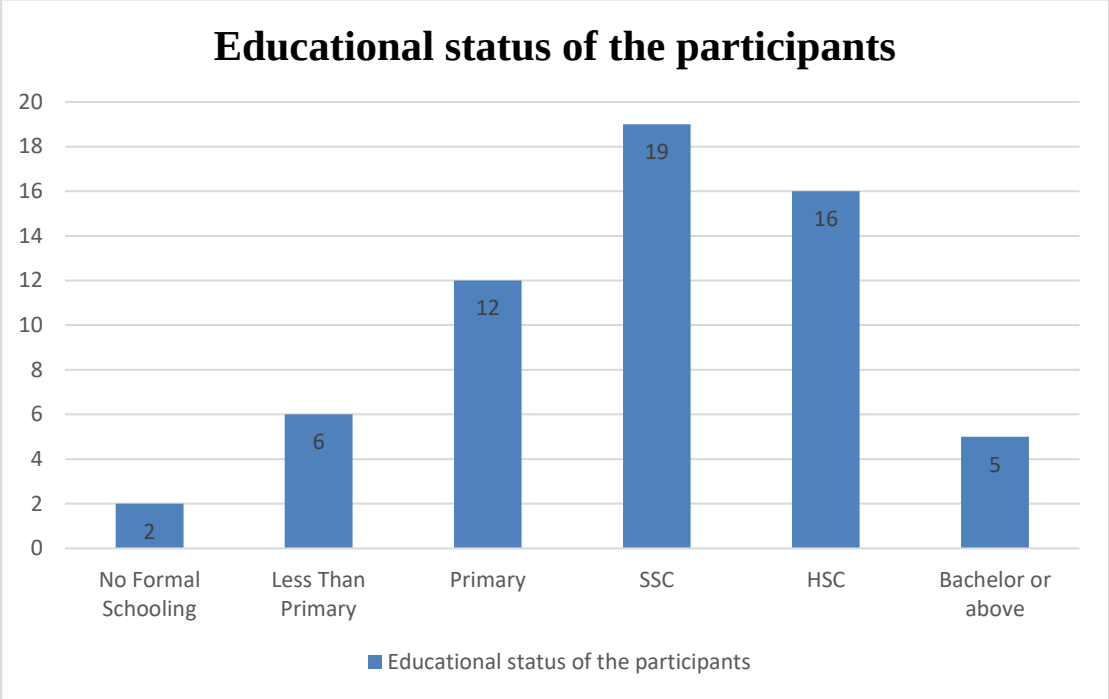

Figure-2: Educational status of the participants

4.3 Occupation of the Participants

Among the 60 participants, 42 (70%) participants were housewife, 5 (8.3%) participants were teacher, 3 (5%) participants were health worker, 8 (13.3%) participants were garments worker and 2 (3.3%) participants were businesswomen (Figure-3).

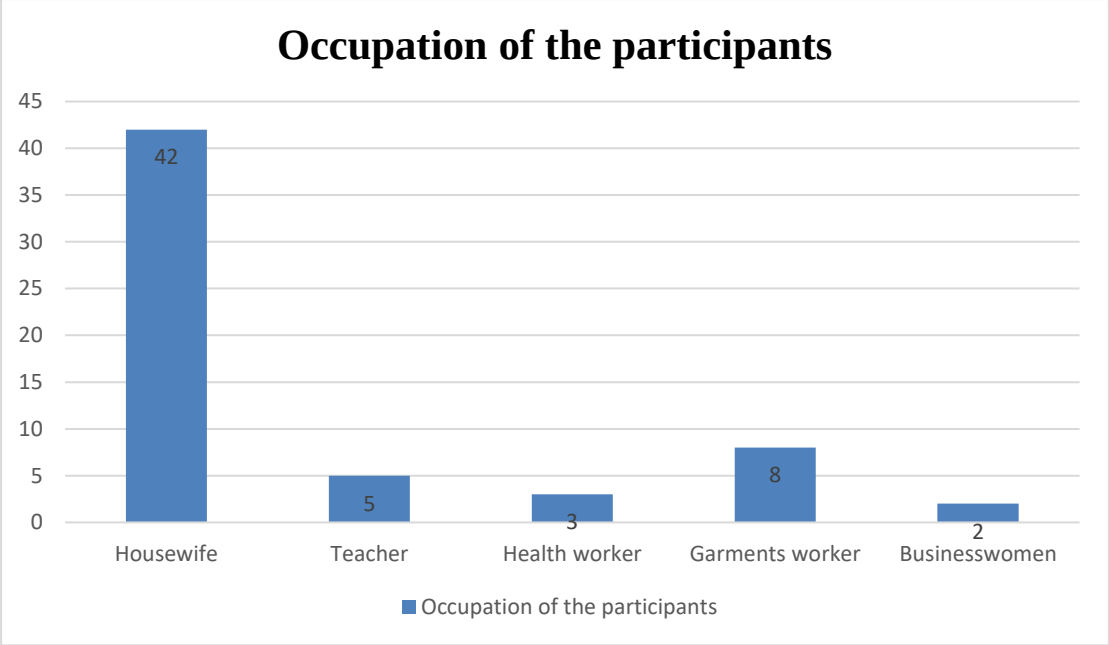

Figure-3: Occupation of the participants

4.4 Monthly income of the participants

Among the 60 participants, 8 participants' monthly income below 10000 Tk, 48 participants' monthly income is between 10000-30000 Tk and 4 participants' monthly income is more than 30000 Tk (Figure-4)

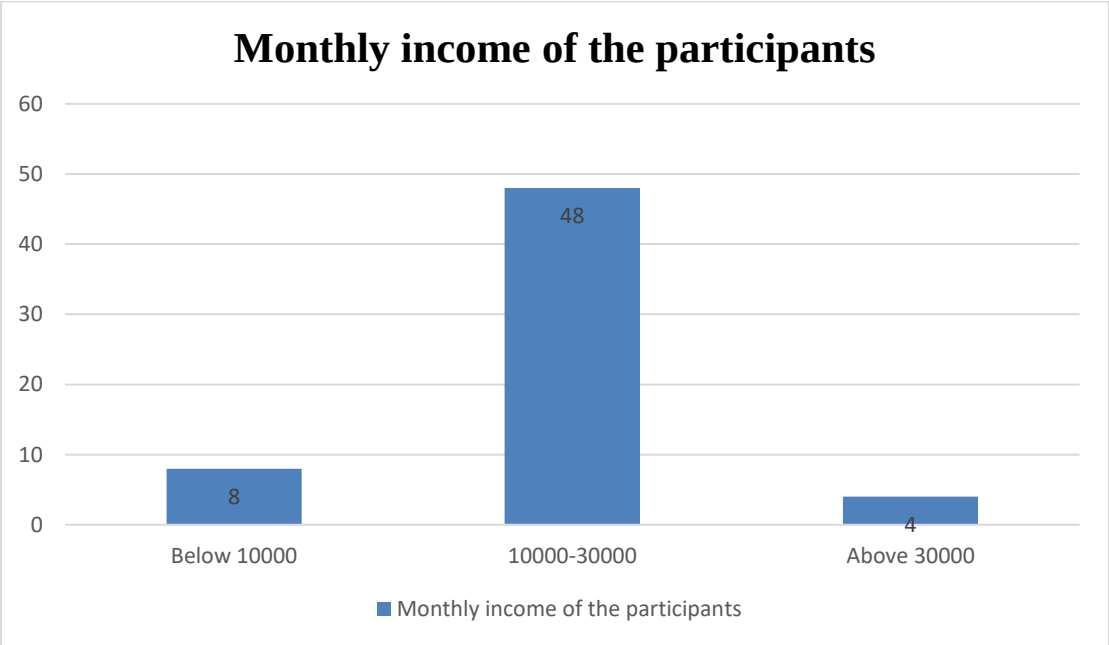

Figure-4: Monthly income of the participants

4.5 Residential area of the participants

In this study among the 60 participants, 25 (41.6%) participants were from the urban area and 35 (58.3%) participants were from the rural area (Figure-5).

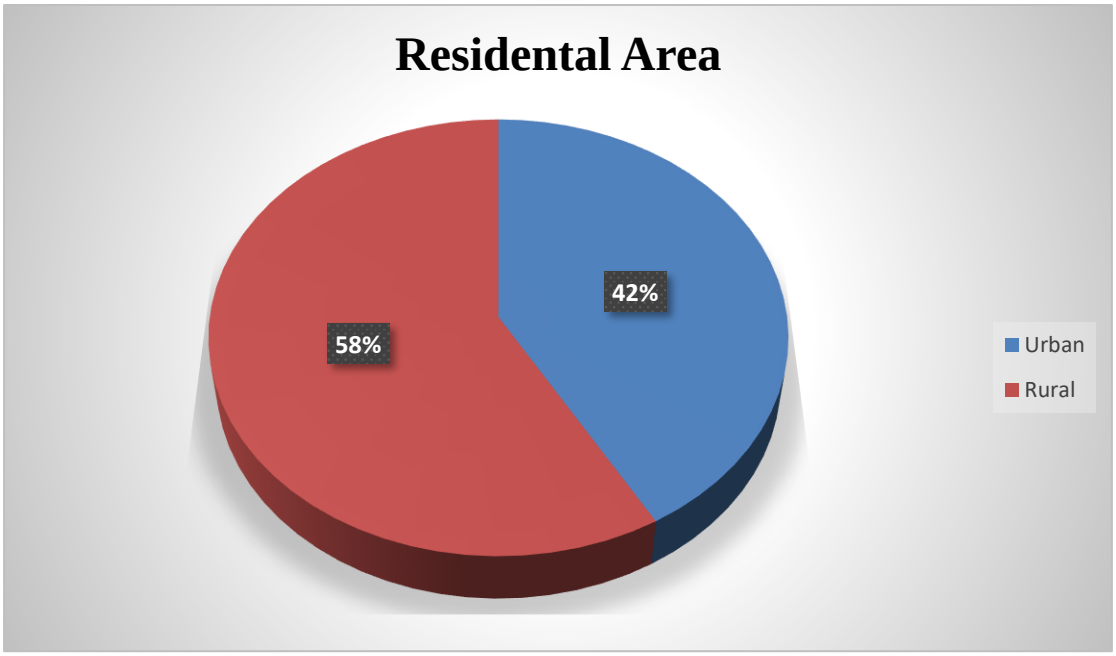

Figure-5: Residential area of the participants

The individual factors of knee osteoarthritis results were shown this table as below-

Name of the Factors	Number of Cases	Number of Controls	ODD Ratios (OR)	95% CI
Past history of a major or acute knee injury	13	10	1.529	0.536, 4.361
Past history of painful swelling of the knee	24	12	6.000	1.890, 19.043
Positive Family history of knee or other joint disease	19	12	2.591	0.914, 7.342
BMI	24	20	2.000	0.619, 6.465
Sustained knee bending	20	15	2.000	0.705, 5.677
Stair climbing	21	19	1.351	0.460, 3.968
Duration of daily physical activities	15	13	1.308	0.473, 3.615
Prolong standing	18	8	4.125	1.387, 12.270
Barefoot walking	16	9	2.667	0.924, 7.699
Use of high heeled shoes	13	9	1.784	0.616, 5.169
Regular weight bearing	8	5	1.818	0.518, 6.382
Sitting on the floor for home activity	18	12	2.250	0.801, 6.321

Table-02: The individual factors of knee osteoarthritis

Past history of a major or acute knee injury

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 13 had past history of a major or acute knee injury and 17 have no past history of a major or acute knee injury in the case group. On the other hand, 10 participants had the past history of a major or acute knee injury and 20 had no past history of a major or acute knee injury in the control group. Calculated odds ratio for past history of a major or acute knee injury is 1.529 (Table-3) which means there was association between the past history of a major or acute knee injury and knee osteoarthritis that is 1.529 times more possible chance to occur knee osteoarthritis due to past history of a major or acute knee injury and 95% CI was 0.536 and 4.361.

Past history of painful swelling of the knee

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 24 had past history of painful swelling of the knee and 6 have no past history of painful swelling of the knee in the case group. On the other hand, 12 participants had the past history of painful swelling of the knee and 18 had no past history of painful swelling of the knee in the control group. Calculated odds ratio for past history of painful swelling of the knee is 6.000 (Table-3) which means there was association between the past history of painful swelling of the and knee osteoarthritis that is 6.000 times more possible chance to occur knee osteoarthritis due to past history of painful swelling of knee and 95% CI was 1.890 and 19.043.

Positive Family history of knee or other joint disease

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 19 had positive family history of knee or other joint disease and 11 have no positive family history of knee or other joint disease in the case group. On the other hand, 12 participants had positive family history of knee or other joint disease and 18 had no positive family history of knee or other joint disease

in the control group. Calculated odds ratio for past history of a major or acute knee injury is 2.591 (Table-3) which means there was association between positive family history of knee or other joint disease and knee osteoarthritis that is 2.591 times more possible chance to occur knee osteoarthritis due to positive family history of knee or other joint disease and 95% CI was 0.914 and 7.342.

BMI

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 24 had overweight and 6 had not in the case group. On the other hand, 20 participants had overweight and 10 had not in the control group. Calculated odds ratio for BMI is 2.000 (Table-3) which means there was association between BMI and knee osteoarthritis that is 2.000 times more possible chance to occur knee osteoarthritis due to overweight in BMI and 95% CI was 0.619 and 6.465.

Sustained knee bending

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 20 had bent their knees for a long time and 10 had not in the case group. On the other hand, 15 participants had bent their knees for a long time and 15 had not in the control group. Calculated odds ratio for sustain knee bending is 2.000 (Table-3) which means there was association between sustain knee bending and knee osteoarthritis that is 2.000 times more possible chance to occur knee osteoarthritis due to sustained knee bending and 95% CI was 0.705 and 5.677.

Stair climbing

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 21 had stair climbing regularly and 9 had not in the case group. On the other hand, 19 participants had stair climbing regularly and 11 had not in the control group. Calculated odds ratio for stair climbing is 1.351

(Table-3) which means there was association between stair climbing and knee osteoarthritis that is 1.351 times more possible chance to occur knee osteoarthritis due to stair climbing and 95% CI was 0.460 and 3.968.

Prolonged standing

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 18 had the history of prolong standing and 12 had not in the case group. On the other hand, 8 participants had the history of prolonged standing and 22 had not in the control group. Calculated odds ratio for prolonged standing is 4.125 (Table-3) which means there was association between prolong standing and knee osteoarthritis that is 4.125 times more possible chance to occur knee osteoarthritis due to prolong standing and 95% CI was 1.387 and 12.270.

Barefoot walking

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 16 participants was walking with barefoot and 14 had not in the case group. On the other hand, 9 participants was walking on barefoot and 21 had not in the control group. Calculated odds ratio for barefoot walking is 1.351 (Table-3) which means there was association between barefoot walking and knee osteoarthritis that is 1.351 times more possible chance to occur knee osteoarthritis due to barefoot walking and 95% CI was 0.460 and 3.968.

Sitting on the floor for home activity

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 18 participants were doing their home activity sitting on the floor and 12 had not in the case group. On the other hand, 12 participants were doing their home activity sitting on the floor and 12 had not in the control group. Calculated odds ratio for sitting on the floor for home activity is 2.250 (Table-3) which means there was association between doing home activity on sitting on the floor and knee osteoarthritis that is 2.250 times more possible chance to occur knee osteoarthritis due to sitting on the floor for home actvity and 95% CI was 0.801 and 6.321.

Regular weight bearing

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 8 participants were doing regular weight bearing and 22 had not in the case group. On the other hand, 5 participants were doing regular weight bearing and 25 had not in the control group. Calculated odds ratio for regular weight bearing is 1.818 (Table-3) which means there was association between regular weight bearing and knee osteoarthritis that is 1.818 times more possible chance to occur knee osteoarthritis due to regular weight bearing and 95% CI was 0.518 and 6.382.

Use of high heeled shoe

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 13 participants were using high heeled shoe and 17 had not in the case group. On the other hand, 9 participants were using high heeled shoe and 21 had not in the control group. Calculated odds ratio for using high heeled shoe is 1.784 (Table-3) which means there was association between using high heeled shoe and knee osteoarthritis that is 1.784 times more possible chance to occur knee osteoarthritis due to using high heeled shoe and 95% CI was 0.616 and 5.169.

Duration of physical activity

From the table 3 it is observed that the total participants of this study were 60 where 30 were case and 30 were control, among them 15 had the duration of physical activities more than four hours and 15 had not in the case group. On the other hand, 13 participants had the duration of the physical activities more than four hours and 17 had not in the control group. Calculated odds ratio for duration of physical activities more than four hour is 2.000 (Table-3) which means there was association between duration of physical activity more than four hours and knee osteoarthritis that is 2.000 times more possible chance to occur knee osteoarthritis due to duration of physical activity more than four hours and 95% CI was 0.705 and 5.677.

CHAPTER – V DISCUSSION

In this study there were 30 number of cases and 30 number of controls that means case:control was 1:1 and hospital based unmatched setting. Intention of this study was to determine the possible of risk factors of osteoarthritis at knee joint for the female attended at CRP. With considering the variables like socio-demographic variables, using high heeled shoe, past history of a major or acute knee injury, past history of a painful swelling of knee joint, positive family history of knee joint injury, BMI, sustained knee bending, stair climbing, prolonged standing, barefoot walking, sitting on the floor for home activity, regular weight bearing, duration of physical activity.

This study claimed that, there was an association between past history of acute or major knee injury of the participants and knee osteoarthritis that is 1.529 times more possible chance to occur knee osteoarthritis. Dulay et al., (2015) agreed that the previous acute or major injury of knee joint such as surrounding muscles or ligaments or meniscus is likelihood to progression of knee osteoarthritis.

Chitnavis and Carr cited in Bustrode et al., (2002) claimed that, there are varieties of risk factor for the development of OA acquired deformity, injury, pain, swelling and joint uses have all been implicated in disease production. The present study stated that, there was association between the past history of painful swelling of knee and knee osteoarthritis that is 6.000 times more possible chance to occur knee osteoarthritis due to past history of painful swelling of the knee joint. According to Hurley (2002) previous joint injury leading to muscle weakness and joint instability are the causes of OA. There is a strong association between biomechanical insults sustained and result of previous injuries. There is a strong association between biomechanical insults and knee osteoarthritis. According to Porter (2003) repeated minor trauma leads to micro fractures and subsequent OA.

Osteoarthritis is the most prevalent of the rheumatic diseases, affects more than 40% of western world adults with the knee being one of the most commonly afflicted joints (Markset al., 2000). In United Kingdom an estimated 34% of populations have radiographic osteoarthritis of the knees whilst 19% have radiographic osteoarthritis of

the hips. Up to two-third of those with knee Osteoarthritis and one-third of those wit hip Osteoarthritis (Bulstrod et al., 2002). In this study, it was estimated that, there was association between the positive family history of knee or other joint diseases that was, 2.591 times more possible chance.

Kneeling is also be a risk factor of developing knee osteoarthritis (Braunwald et al., 2001). The investigator found that, 2.000 times more possible chance to occur knee osteoarthritis due to Sustained knee bending.

Braunwald et al., (2001) claimed that, climbing stairs with the degenerative changes is a cause of knee osteoarthritis. Ascending and descending stairs frequently is a risk for developing knee osteoarthritis (Australian Physiotherapy Association, 2001). This study found that, there was association between the stair climbing and knee osteoarthritis. That was 1.351 times more possible chance to occur knee osteoarthritis due to stair climbing regularly.

In this study, it was stated that, there was association between the BMI and knee osteoarthritis. People with overweight according to BMI 2.000 times more possible chance to occur knee osteoarthritis. In a study Felson et al., (1997) found that, greater body mass index (BMI) and increased body weight have been associated with greater risk of developing osteoarthritis. According to Hurley (2002) excess body weight is a risk for developing knee osteoarthritis. Obesity has been identified as a significant risk factor for knee OA in Britain (Coggon et al., 2000). One twin study found a 9– 13% increased risk for the onset of the disease with every kilogram increase in body weight (Cicuttini et al., 1996). In addition, obesity is also a risk factor for the progression of radiological OA (Cooper et al., 2000). Higher baseline body mass index increased the risk of OA (Felson et al., 1997).

This study showed that, there was association between the duration of daily physical activity for more than 4 hours and knee osteoarthritis that is 1.308 times more possible chance to occur knee osteoarthritis due to the duration of daily physical activity for more than 4 hours. According to Hurley (2002) abnormal use of a normal knee joint, e.g., due to occupation or recreational activities is a factor of knee osteoarthritis. There is evidence that the synovial joints specially knee joint most commonly affected to OA

due to evolved for the activities they are routinely subjected to do. According to Felson et al., (1997) Increase physical activity increased the risk of knee OA.

In this study, it was state that 4.125 times more possible chance to occur knee osteoarthritis due prolong standing. Hurley (2002) stated that, prolong standing in occupation or recreational activities are a factor of knee osteoarthritis.

In this study, it was stated that 2.667 times more chances or possibility to occur knee osteoarthritis due to walking in barefoot. Shakoor et al., (2010) stated that without footwear or walking in barefoot makes the different load in the knee joint and it is a factor of knee osteoarthritis.

Knee flexion excursion is calculated by subtracting the knee flexion angle at heel contact from the peak knee flexion angle during the first half of stance. A decrease in knee flexion excursion has been associated with knee instability and pain. The potential risks associated with OA of knee include trips and falls while walking. High heeled shoes increase the risk of fall and are a cause of developing OA of knee in future life (Cicuttini et al., 1996). In this study, it was found that, there was association between use high heeled shoe and knee osteoarthritis. That was 1.784 times more possible chance to occur knee osteoarthritis due to use high heeled shoe.

Felson (1996) stated that, the stress and amount of force on the weight-bearing joints are increased in overweight subjects. This additional physical load could cause cartilage breakdown leading to knee OA. In a study in London Solomon et al., (2001) mentioned that, in the majority of cases the precipitating causes of knee OA is increasing mechanical stress in some part of the articular surface. This may be due to increase load that affecting the lever system. This study showed that, there was association between the regular weight bearing and knee osteoarthritis. That was 1.818 times more possible chance to occur knee osteoarthritis due to regular weight bearing.

The knee osteoarthritis causes disabling people of difficulty in rising from floor due to abnormalities of motor activity (Braunwald et al., 2001). The investigator claimed that, sitting on the floor for home activity is 2.250 times more possible risk for developing knee osteoarthritis.

CHAPTER – VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In this study there were 30 cases and 30 number of controls that means case: control was 1:1 and hospital based unmatched setting. Intended of this study to determine the risk factors of developing osteoarthritis with considering the variables like socio-demographic and socio-economic variables, using high heeled shoe, past history of painful knee swelling, bare foot walking, BMI, occupation, heavy activity more than four-hour, stair climbing, sitting on the floor for home activity, prolong standing, positive family history of knee or other joint diseases, regular weight bearing and sustained knee bending. The investigator found the strong positive association of the knee osteoarthritis using high heeled shoe, past history of painful knee swelling, bare foot walking, BMI, occupation, heavy activity more than four-hour, stair climbing, sitting on the floor for home activity, prolong standing, positive family history of knee or other joint diseases, regular weight bearing and sustained knee bending. The important way for prevention of knee osteoarthritis including the modification daily activity for reduces risk factors. The investigator suggested careful about the occupational posture during work which might be reduced the risk of knee osteoarthritis. Always maintain the correct working position during daily living activities and correct the faulty ergonomics design of the house which also reduces the risk of knee osteoarthritis, because investigator found that sitting on the floor for home activity one of the risk factors of the knee osteoarthritis in the study. So, the investigator wishes to correct the BMI, faulty posture in occupation, regular weight bearing activity; modify sustained knee bending, stair climbing, prolong standing, bare foot walking, high heeled shoe. It is crucial to develop research-based findings about the risk factors of knee osteoarthritis. This study can be considered as a ground work for the physiotherapy service provision for knee osteoarthritis. Proper physiotherapy can reduce the complication of knee osteoarthritis.

6.2 Recommendation

Like other countries, knee osteoarthritis patients are likely to be an upcoming burden for Bangladesh. For this reason, it is important to develop research-based evidence of physiotherapy practice in this area. Physiotherapist's practice which is evidence based in all aspect of health care. There are few studies on musculoskeletal area in the knee region. These cannot cover all aspect of the vast area. So, it is recommended that the next generation of physiotherapy members continue study regarding this area, this may involve-use of large sample size and participants form different districts of Bangladesh. Conduct research on other musculoskeletal problems on knee area where physiotherapist can work. So, it is very important to conduct such type research in this area.

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Appendix

Consent Form

Assalamualaikum/Namashkar,

I am Sabrina Tanjim, 4th Professional B.Sc. in Physiotherapy student, Bangladesh Health Professions Institute (BHPI) under the Faculty of Medicine, University of Dhaka. To obtain my Bachelor degree, I have to conduct a research project and it is a part of my study. My research title is **"Possible of the Risk Factors of Osteoarthritis at Knee Joint for Female patient attended at CRP"**. To fulfill my research project, I need to some information from you to collect data. So, you can be respected participants of this research and the convenient time will be 20-30 minutes. I would like inform you that is a purely academic study and the information will not to be used for any purpose. I assure that all data will be kept confidential. Your participation will be voluntary. You may have the rights to withdraw consent and discontinue participation at any time of the experiment. You also have the rights to reject a particular question that you don't like.

May I start the interview? (Put the tick mark)

Yes ☐

No ☐

Signature of the participant and Date……..

Signature of the interviewer and Date…….

Personal details:

Identification number:
Mobile number:
Address:

Questionnaire

Section 1: Demographic Questions

QN	Questions and filters	Responses	Code
01	Age (in a year):	|__|__|	
02	Educational status	No formal schooling ..... Less than Primary…….. Primary …..... S.S.C …..... H.S.C ..... Bachelor ..... Masters ..... Others	01 02 03 04 05 06 07 08
03	Residential area	Rural…….. Urban…….	01 02
04	Average monthly family income	……...(Taka)	01

Section 2: Disease and Family history

QN	Questions and filters	Responses	Code
05	Past history of a major or acute knee injury	Yes……... No……	01 02
06	Past history of painful swelling of the knee	Yes……..... No……	01 02
07	Positive Family history of knee or other joint disease	Yes……..... No…….....	01 02
08	Comorbidities	Diabetes…….. Depression…….. Cardiovascular disease…….....	01 02 03
09	Weight	……Kilogram	01
10	Height	……Centimeters	01
11	BMI	……Kilogram per Meter square	01

Section 3: Occupational activity

QN	Questions and filters	Responses	Code
12	Occupation	Housewife…….. Teaching…….... Health worker…….....	01 02 03

		Garment worker…….	04
		Businesswoman…….	05
		Unemployment……..	06
		Others (Specify)…….	07

Section 4: Leisure and Physical activities

QN	Questions and filters	Responses	Code
13	Sustained knee bending	Yes…….	01
		No…….....	02
14	Stair climbing	Yes……	01
		No……...	02
15	Duration of daily physical activities	Less than four hours…..	01
		More than four hours….	02
		Others (Specify)…….	03
16	Prolong standing	Yes…….	01
		No……...	02
17	Barefoot walking	Yes…….	01
		No……...	02
18	Use of high heeled shoes	Yes…….	01

		No…….	02
19	Heavy weight bearing	Yes…… No……	01 02
20	Sitting on the floor for home activity (eating, watching TV, reading, etc).	Yes…….. No……...	01 02

অনুমতিপত্র

আসসালামুআলাইকুম/নমস্কার,

আমি সাবরিনা তানজিম, ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন ফ্যাকাল্টির অধীনস্ত বাংলাদেশ হেলথ প্রফেশন ইন্সটিটিউটের ৪র্থ বর্ষের শিক্ষার্থী। আমার ব্যাচেলর ডিগ্রী সম্পন্ন করার জন্য একটি গবেষণা করতে হয় যেটি আমার কোর্সের একটি অংশ। আমার গবেষণা টাইটেলটি হচ্ছে **"সি আর পি তে আগত মহিলা রোগীদের হাঁটুতে গেঁটে বাতের সম্ভাব্য ঝুঁকিসমূহ।"** গবেষণার জন্য আমার কিছু তথ্য প্রয়োজন। আপনি আমার গবেষণায় অংশগ্রহণ করতে পারেন এবং এতে ২০-৩০ মিনিট সময় লাগতে পারে। আপনার প্রদত্ত তথ্য শুধুমাত্র এই গবেষণায় ব্যবহৃত হবে এবং এর গোপনীয়তা অক্ষুণ্ন থাকবে। আপনি এতে ঐচ্ছিকভাবে অংশগ্রণহ করতে পারেন এবং যেকোনো মুহুর্তে নিজেকে সরিয়ে নিতে পারেন। আপনি চাইলে যেকোনো প্রশ্ন এড়িয়েও যেতে পারেন।

আমি কি সাক্ষাৎকার শুরু করতে পারি? (টিক দিন)

হ্যাঁ ☐

না ☐

অংশগ্রহণকারীর সাক্ষর ও তারিখ……..

সাক্ষাৎকার গ্রহণকারীর সাক্ষর ও তারিখ……

ব্যক্তিগত তথ্য:

আইডেন্টিফিকেশন নাম্বার:
মোবাইল নাম্বার:
ঠিকানা:

প্রশ্নাবলী

শাখা ১: জনসংখ্যা তাত্ত্বিক প্রশ্ন

প্রশ্ন নং	প্রশ্ন সমূহ	উত্তর	কোড
০১	বয়স	..... বছর	
০২	শিক্ষাগত যোগ্যতা	কোনো প্রাতিষ্ঠানিক শিক্ষা নেই.....	০১
		প্রাথমিকের নীচে.....	০২
		প্রাথমিক সম্পন্ন.....	০৩
		মাধ্যমিক	০৪
		উচ্চ মাধ্যমিক.....	০৫
		স্নাতক	০৬
		স্নাতকোত্তর অথবা অধিক.....	

		অন্যান্য	০৭ ০৮
০৩	আবাসিক এলাকা	গ্রাম..... নগরস্থ	০১ ০২
০৪	পারিবারিক মাসিক আয়	..... টাকা	

শাখা ২: রোগ এবং পারিবারিক ইতিহাস

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
০৫	পুর্বে কখনো হাঁটুতে বড় কোনো আঘাত ছিলো?	হ্যাঁ ..... না.....	০১ ০২
০৬	পূর্বে কখনো ব্যাথার কারনে আপনার হাঁটু ফুলে গিয়েছিল?	হ্যাঁ ..... না.....	০১ ০২
০৭	আপনার পরিবারে অন্য কারো হাঁটু বা জোড়ার রোগ আছে বা ছিল?	হ্যাঁ..... না.....	০১ ০২

০৮	অন্যান্য রোগ	ডায়াবেটিস.....	০১
		ডিপ্রেশন.....	০২
		কার্ডিওভাস্কুলার রোগ.....	০৩
০৯	ওজন	.....কে.জি.	০১
১০	উচ্চতা	..... সে.মি.	০১
১১	বিএমআই	.....কেজি/মিটার^২	০১

শাখা ৩: পেশাগত কার্যকলাপ

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
১২	পেশা	গৃহিণী	০১
		শিক্ষিকা.....	০২
		স্বাস্থ্যকর্মী	০৩
		পোশাককর্মী	০৪
		ব্যবসায়ী	০৫
		বেকার	০৬

		অন্যান্য (নির্দিষ্ট)	০৭

শাখা ৪: অবসর এবং শারীরিক কার্যকলাপ

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
১৩	আপনি কি দীর্ঘসময় হাঁটু ভাঁজ করে রাখেন?	হ্যাঁ ..... না.....	০১ ০২
১৪	আপনি কি সিঁড়ি দিয়ে উঠানামা করেন?	হ্যাঁ..... না.....	০১ ০২
১৫	ভারী পরিশ্রমের সময়কাল?	চার ঘণ্টার কম..... চার ঘণ্টার বেশি ..... অন্যান্য (নির্দিষ্ট)	০১ ০২ ০৩
১৬	আপনাকে কি দীর্ঘসময় দাঁড়িয়ে থাকতে হয়?	হ্যাঁ ..... না.....	০১ ০২
১৭	আপনি কি খালি পায়ে হাঁটেন?	হ্যাঁ..... না.....	০১ ০২

১৮	আপনি কি উঁচু গোড়ালির জুতো পরেন?	হ্যাঁ ..... না	০১ ০২
১৯	আপনি কি প্রতিদিন ভারী বস্তু বহন করেন?	হ্যাঁ..... না.....	০১ ০২
২০	আপনি কি মেঝেতে বসে ঘরের কাজ করেন? (খাওয়া,টিভি দেখা,পড়াশোনা ইত্যাদি)	হ্যাঁ ..... না	০১ ০২

04 March, 2020

To

Head of the department

Department of Physiotherapy

Center for the Rehabilitation of the Paralysed (CRP)

Savar, Dhaka-1343

Subject: Application for permission to collect data to conduct a research project

Sir,

With due respect and humble submission to state that I am Sabrina Tanjim student of 4th year, B.Sc.in Physiotherapy at Bangladesh Health Professions Institute (BHPI). According to the course curriculum, I have to conduct a research project for the partial fulfillment to complete of the degree of B.Sc. in Physiotherapy. The tittle of my research project is "**Possible of the Risk Factors of Osteoarthritis at Knee Joint for Female Patients Attended AtCRP"**. My research project will be conducted under the supervision of Mohammad Anwar Hossain, Associate professor & Head of Department of Physiotherapy, CRP. For this reason, I need to permission for collect data from the unit of Musculoskeletal, unit of Physiotherapy Department CRP at Savar, Dhaka.

So, I, therefore pray and hope that you would be kind enough to grant my application and give me the permission for collect data from the Musculoskeletal unit of Physiotherapy Department CRP and oblige thereby.

Yours sincerely

Sabrina Tanjim

Sabrina Tanjim

4th year, B.Sc. in Physiotherapy

Session: 2012-13

Bangladesh Health Professions Institute (BHPI)

CRP, Chapain, Savar, Dhaka-1343

Approved

4/03/2020

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