

# **RISK FACTORS OF DEVELOPING KNEE OSTEOARTHRITIS**

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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

## **RISK FACTORS OF DEVELOPING KNEE OSTEOARTHRITIS**

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## **DECELERATION**

I declare that the work presented here is my own. All source used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of the study. I would be bound to take written consent from my supervisor.

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# CONTENTS

	<b>Page No.</b>
Acknowledgement	i
Abbreviations	ii
List of Tables	iii
List of Figures	iv
Abstract	v
<b>CHAPTER-I: INTRODUCTION</b>	<b>1-6</b>
1.1 Background	1-2
1.2 Justification of the study	3
1.3 Research Question	4
1.4 Objectives	4
1.4.1 General objective	4
1.4.2 Specific	4
1.5 List of variables	5
1.6 Operational definition	6
<b>CHAPTER-II: LITERATURE REVIEW</b>	<b>7-16</b>
<b>CHAPTER-III: METHODOLOGY</b>	<b>17-22</b>
3.1 Study design	17
3.2 Study site	17
3.3 Study area	17
3.4 Study population and sample population	17
3.4.1 Sampling procedure	17
3.4.2 Inclusion criteria	18
3.4.3 Exclusion criteria	18
3.5 Sample size	18-19
3.6 Data collection method and tools	19
3.7 Data management and analysis	19-20
3.8 Quality control and assurance	21
3.9 Inform consent	21

	<b>Page No.</b>
3.10 Ethical consideration	21
3.11 Limitation of the study	22
<b>CHAPTER-IV: RESULTS</b>	23-33
<b>CHAPTER-V: DISSCUSSION</b>	34-37
<b>CHAPTER-VI: CONCLUSION AND RECOMENDATION</b>	38-39
<b>REFERENCES</b>	40-44
<b>APPENDIX</b>	45-53

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## Abbreviations

<b>ADL:</b>	Activity of Daily Living
<b>BHPI:</b>	Bangladesh Health Professions Institute
<b>CRP:</b>	Centre for Rehabilitation for the Paralyzed
<b>CI:</b>	Confidence interval
<b>NSAIDs:</b>	None Steroidal Anti-Inflammatory Drugs
<b>SPSS:</b>	Statistical Package for the Social Sciences
<b>WHO:</b>	World Health Organization
<b>BMI:</b>	Body Mass Index
<b>OA:</b>	Osteoarthritis
<b>NGOA:</b>	Nodal Generalized Osteoarthritis
<b>MMPS:</b>	Matrix Metalloproteinase
<b>GI:</b>	Gastro Intestinal

## List of Tables

	<b>Page No.</b>
<b>Table - 1</b> Measurement of Odds ratio	19
<b>Table - 2</b> The individual factors of knee osteoarthritis	20
<b>Table - 3</b> The individual factors of knee osteoarthritis result	29

## List of Figures



	<b>Page No.</b>
<b>Figure - 1</b> Age group of the participants	23
<b>Figure - 2</b> Sex of the participants	24
<b>Figure - 3</b> Educational Status of the participants	25
<b>Figure - 4</b> Occupation of the participants	26
<b>Figure – 5</b> Monthly income of the participants	27
<b>Figure - 6</b> Residential areaof the participants	28

## Abstract

*Purpose:* To identify the risk factors of developing knee osteoarthritis in Bangladesh. *Objective:* To explore the socio-demography information, to identify the vulnerable age group, occupation, traumatic and non-traumatic injury for developing risk of knee osteoarthritis in Bangladesh. *Methodology:* The study was hospital based unmatched case control Study. Convenience sampling technique was used to carry out the study. Total sample was 70 among them 35 were cases and 35 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 and Mirpur, Dhaka. Descriptive statistics were used for data analysis. *Result:* Investigator found the risk of knee osteoarthritis increased in female rather than male, odds ratio (OR) = 6.303 (95% confidence interval [CI] = 2.225-17.852), using high heeled shoe, OR = 5.167 (95% CI = 1.493-27.883), past history of painful knee swelling, OR = 3.674 (95% CI = 1.369-9.858), bare foot walking, OR = 2.750 (95% CI = 0.496-15.246), high body mass index, OR = 2.250 (95% CI = 0.796-6.306), occupation, OR = 2.25 (95% CI = 0.865-5.855), heavy activity more than four hour, OR = 2.061 (95% CI = 0.178-23.826), stair climbing, OR = 2.029 (95% CI = 0.775-5.314), sitting on the floor for home activity, OR = 1.933 (95% CI = 0.615-6.074), prolong standing, OR = 1.304 (95% CI = 0.474-3.509), positive family history of knee or other joint diseases, OR = 1.269 (95% CI = 0.487-3.309), regular weight bearing, OR = 1.241 (95% CI = 0.341-4.518), and sustained knee bending, OR = 1.122 (95% CI = 0.439-2.868). *Conclusion:* The result of research is including the all general people who have the past history of knee injury or any occupational measure or physical problem and or any faulty functional activity. Acknowledging these risk factors are useful for the prevention of knee osteoarthritis in Bangladesh.

### 1.1. Background

In Bangladesh, knee osteoarthritis is one of the familiar disabling diseases affecting both elderly male and female (Rashid et al., 1997). Osteoarthritis has a significant impact on our society because it is the most prevalent musculoskeletal disorder. The knee joint is most frequently affected by osteoarthritis and the number of patients with disabling osteoarthritis of the knee is rapidly increasing day by day. Most of the available literature shows that there is no effective treatment for osteoarthritis, and individuals with this disease have little benefit from prescribed medications (Holman and Lorig, 2004). It is known that knee joint probably is the most complicated joint in the human body (Cailliet, 1992). Functionally, the knee joint is a condyler and modified hinge joint (Datta, 2000). Osteoarthritis of the knee is the most often occurring disease of all other joint diseases (Felson, 2005). In Bangladesh, there is no real statistics that how many patients are affected by osteoarthritis. But, one statistics give a general indication to the prevalence of osteoarthritis and that is 10,392,681 people are affected by osteoarthritis in 2004 (Statistics by Country Osteoarthritis, 2005).

Knee osteoarthritis is a prevalent musculoskeletal condition affecting older people, producing pain, physical disability, and reduced quality of life. It also imposes a considerable economic burden on the health care system (Bennell et al., 2005). Osteoarthritis is the most ordinary types of joint disease and a frequent cause of pain and physical disability which is the fourth most frequent predictor of health problems worldwide in women and the eighth in men (Pascual, 2003). Osteoarthritis is the one of the common disorder of synovial joints. Survey from the United States suggests that osteoarthritis is ten times more common then rheumatoid arthritis, the second most prevalent joint diseases. Osteoarthritis affects 12% of the population aged 25 to 74 years. Over the 70 years, radiographic osteoarthritis in the small joint of the hand is present in more than 80% of the population. An estimated 34% of United Kingdom populations over 45 years of age have radiographic osteoarthritis of the knees and 19% of those over 55 years have radiographic osteoarthritis of the hips. Up to two-third of those with knee osteoarthritis and one-third of those with hip osteoarthritis

have symptoms related to their disease (Bulstrode et al., 2002). Osteoarthritis is also a frequently appeared joint disease of human. In developed countries knee osteoarthritis is the most leading causes of chronic disability among the elderly. Osteoarthritis is a widespread, slowly developing disease, with a high prevalence increasing with age. The knees are mainly the large joints involved in the osteoarthritis, where the disease is particularly disabling because of difficulty in rising from chair, climbing stairs, kneeling, standing, and walking (Braunwald et al., 2001). As a result of the degenerative changes the disease may also be accompanied by abnormalities in excitability of the nerve endings located in and around the joint tissue and by abnormalities of motor activity. Local vascular changes accompanied by ischemia of subchondral and juxta chondral bone. The profound anatomical and physiological alterations may produce signs of inflammation. 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 (Marks, Ghanagaraja and Ghassemi, 2000). Disease prevalence is estimated at 15.8 million American adults (15-74 years old) or 12% of the population. The overall incidence of newly diagnosed osteoarthritis of the hip and knee is estimated at 200 per 100000 person years (Larry, 1996). In 1990, an estimated 15% (37, 9 million persons) of the U.S. population had arthritis. Estimated prevalence rates were 49.4% for persons aged greater than or equal to 65 years (Arthritis prevalence and Activity Limitation-United States, 2001). Osteoarthritis is particularly prevalent among older people, and their number is predicted to increase in all countries in the developing ones (Pauls and Saadullah, 1991). This encouraged the researcher to know the risk factors of knee joint osteoarthritis.

## **1.2. Justification of the study**

Knee osteoarthritis is one of the most prevalent rheumatic disorders in the Asia-Pacific region. Identification of risk factors is very important for development of strategies for primary and secondary prevention of knee osteoarthritis (Haq et al., 2010). 5-10% of the total Australian populations are affected by osteoarthritis which is the most ordinary type of arthritis. The development of osteoarthritis is determined by age, genetic predisposition, previous injury, chronic stress across the joint, and abnormal mechanical forces caused primarily by obesity (Foley et al., 2003). Statistics by Country Osteoarthritis (2005) stated that in Bangladesh 10,392,681 people was affected by osteoarthritis in 2004. The prevalence of knee osteoarthritis is rapidly increasing day by day. Some studies have shown that obesity is associated with osteoarthritis in non weight-bearing joints such as the small joints of the hand, which might indicate metabolic effects of overweight involved in the arthritic process and did not find any association between metabolic factors such as serum cholesterol, blood pressure or diabetes, and the development of knee osteoarthritis (Mounach, Nouijai and Ghojlani, 2008). The Framingham study showed that weight control significantly affected the risk of developing knee Osteoarthritis and demonstrated the reaction between joint injury and osteoarthritis of the knee as early as 1958 (Felson et al., 2008). The number of sufferer of knee osteoarthritis is increasing day by day due to lack of awareness. It affects a large number of individual who become a burden for themselves and make a devastating effect on their family and society as well as in whole country. Research on this area can establish the skills of physiotherapist and be a base for spreading the profession in a new dimension in this country. So, investigator wanted to conduct the study with the title ‘risk factors of developing knee osteoarthritis’ for Bangladeshi people. Other health professional will get update knowledge about factors which causing knee osteoarthritis. By this knowledge also mass of population will be benefited.

### **1.3. Research Question**

What are the risk factors associated with developing knee osteoarthritis?

### **1.4. Objective**

#### **1.4.1. General objective**

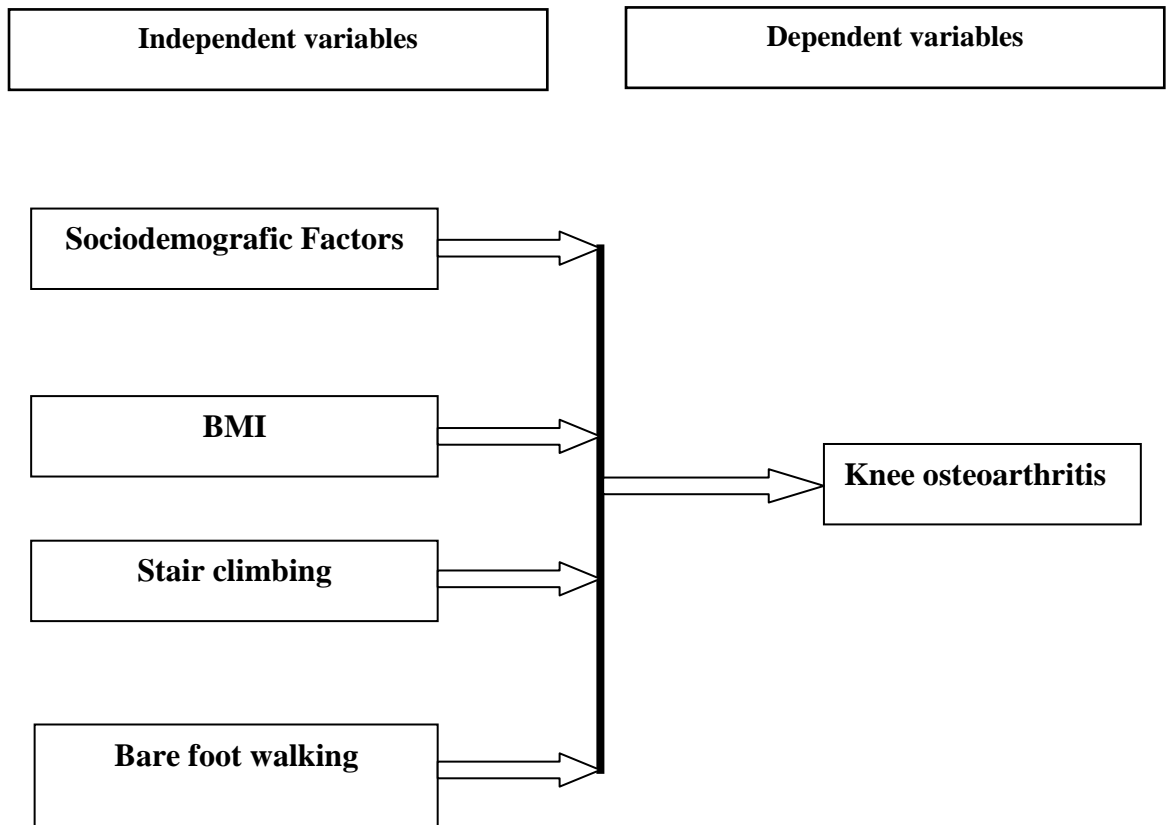
To identify the risk factors of developing knee osteoarthritis in Bangladesh.

#### **1.4.2. Specific Objective**

- To explore the socio-demographic factor of patient with knee osteoarthritis.
- To identify the association between ganders (female) and causing of knee osteoarthritis.
- To find out the association between using of high heeled shoe and causing of knee osteoarthritis.
- 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.
- To collect the association between overweight and causing of knee osteoarthritis.
- To determine the association between occupation and causing of knee osteoarthritis.
- To clarify the association between heavy activity and causing of knee osteoarthritis.
- To interpret the association between Stairs climbing and causing of knee osteoarthritis.
- To examine the association between sitting on the floor for home activity and causing of knee osteoarthritis.
- To analyze the association between prolong standing and causing of knee osteoarthritis.
- To investigate the association between positive family history of knee or other joint diseases and causing of knee osteoarthritis.
- To recognize the association between regular weights bearing activity and causing of knee osteoarthritis.
- To review the association between sustained knee bending and causing of knee osteoarthritis.

### 1.5. List of Variables

#### CONCEPTUAL FRAMEWORK



## **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.

**Osteoarthritis:** A type of arthritis marked by progressive cartilage deterioration in synovial joints and vertebrae. It is degenerative joint disease characterized by destruction of articular cartilage.

**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.



**Osteoarthritis**

Osteo means bones (Thomas, 1998) and arthritis mean inflammation of a joint (Hilt and Cogburn, 1994) or “osteoarthritis (OA) = can also be called O- old age, A- arthritis” (Ebnezer, 2003). It is a chronic joint disorder (Solomon, Warwick and Nayagam, 2001). But it is considered to be a degenerative and progressive condition affecting synovial joints (Chadwick, 1998) characterized by focal loss of articular hyaline cartilage simultaneous proliferation of new bone with remodeling of joint contour (Doherty, 2002). According to Solomon, Warwick and Nayagam (2001), osteoarthritis is a chronic joint disorder in which there is progressive softening and disintegration of articular cartilage accompanied by new growth of cartilage and bone at the joint margins (osteophytes) and capsular fibrosis. In its most common form, it is with age, in the majority of cases the precipitating causes of OA is increasing mechanical stress in some part of the articular surface. This may be due to increase load e.g. in deformities that affecting the lever system around the joint or to a reduction of the articular contact area e.g. with joint in congruity or instability (Solomon, Warwick and Nayagam, 2001). Osteoarthritis is a type of arthritis that occurs due to the breakdown and eventual loss of the cartilage of one or more joints. (William and Shiel, 1996). OA commonly affects the hands, feet, spine and large weight bearing joints such as the hips and knees (William, 1996). Lower limb is the most common site for OA. Patient with knee OA report pain and difficulty with every day activities such as prolonged sitting, ascending and descending stairs, squatting, kneeling, rising from a chair and getting in and out of a car (Australian Physiotherapy Association, 2001).

**Risk factor**

Risk factors were evaluated: age (in years), sex, education (in years), BMI (kg/m<sup>2</sup>), physical work load, smoking, leisure time physical activity and injury history (yes/no). The leisure physical activity was classified into three categories on the basis of responses to the questionnaire as follows: Group 1: little physical exercise that do not require much physical exertion. Group 2: physical exercise in connection with some hobbies or irregularity: as the main pastime. Fairly regularly, or taking some

other form of exercise occasionally. Group 3: regular physical exercise as the main past times some kind of physical exercise regularly or fairly regularly. Physical workload was similarly classified into six categories on the basis of responses to the questionnaire as follows: Group 1: light sedentary work-mainly consisting sitting at a table, by a machine, etc. and involving only light manual work, e.g. intellectual work, studying, sedentary office work, handling light objects. Group 2: other sedentary work: mainly sedentary, but involves handling fairly heavy objects, e.g. industrial work on a production line. Group 3: physically light standing work or light work involving movement, mostly standing work without cumbersome movement or moving from one place to another without carrying heavy burdens, e.g. shop assistant, crane operator, laboratory work, office work or teaching work requiring much moving about. Group 4: fairly light or medium-heavy work involving movements-involves a great deal of moving about and a fair amount of stooping down the stairs or fairly rapid motion over rather long distances, e.g. light industrial work, forest surveying, messenger's work. Group 5: heavy manual work mostly standing work involving much lifting of light objects or lifting or carrying of heavy objects, drilling, excavating, hammering.etc. But with some sitting or standing, e.g. work in the heavy engineering manufacturing, construction work, using machines. Group 6: very heavy manual work-mostly consisting of continuous or fairly continuous heavy movements, often done without interruption for long periods, e.g. carrying furniture, forestry work (felling trees), heavy non mechanized agriculture work, fishing with heavy tackle, heavy construction work, manual excavation (Juhakoski et al., 2009).

## **Epidemiology**

OA is the commonest of all degenerative joint diseases. It is truly universal disorder. Men and women are equally likely to develop OA, but more joints are affected in women than in man (Solomon, Warwick and Nayagam, 2001). There is a steady rise in overall prevalence from age 30 such that by 65. 80% of people have some radiographic evidence of OA, though only 25-30% has associated symptoms (Doherty, 2002). Radiographic surveys suggest that the prevalence rises from 1% below the age of 30 years to over 50% in people above the age of 60 years. OA of the joints of hands is particularly common in elderly women, affecting more than 70% of those over 70 years (Solomon, Warwick and Nayagam, 2001). The prevalence of knee

OA is 40% in individuals aged over 75 years. The medial compartment is most commonly affected and leads to a varus deformity. Previous trauma, meniscal and cruciate ligament injury and obesity are the main risk factors for developing knee OA. It is common in women than men. Hip OA affects 7-25% of white adult cautions but less common in black African populations. It is often occur in men and affect the weight bearing upper surface of the femoral head and adjacent acetabulum (Kumar and Clark, 2002).

### **Aetiology**

According to Osteoarthritis 2006 the exact cause of the osteoarthritis in knee is unknown. The chances of getting osteoarthritis seem to increase with age. Overweight can increase the risk of getting osteoarthritis. Injury to a joint or repeated overuse can damage the cartilage and leading to osteoarthritis. Other types of arthritis can also damage joints and lead to osteoarthritis. Chitnavis and Carr (2002) claimed that OA are idiopathic in most of cases. There are varieties of risk factor for the development of OA which are ageing, gender, race, obesity, congenital and acquired deformity, inheritance, injury and joint uses have all been implicated in disease production.

According to Hurley (2002) stated that related to the age, joint and muscles, hormonal changes (particularly in women following menopause), excess body weight, congenital abnormalities and previous joint injury leading to muscle weakness and joint instability are the causes of OA. Although the incidence and prevalence of OA increase with age, OA is not an evitable consequence of ageing. There is a strong association between biomechanical insults sustained during normal use of an abnormal joint, as a result of previous injuries or malformation and abnormal use of a normal joint, e.g. due to occupation or recreational activities. There is some evidence that the synovial joints most commonly affected are under evolved for the activities they are routinely subjected to, i.e. knees and hips for weight bearing and joints of the hands for pincer grip activities. The most obvious thing about OA is that it increases in frequency with age, in the majority of cases the precipitating causes of OA is increasing mechanical stress in some part of the articular surface. This may be due to increase load, e.g. in deformities that affecting the lever system around the joint or to

a reduction of the articular contact area, e.g. with joint incongruity or instability (Solomon, Warwick and Nayagam, 2001).

### **Classification of Osteoarthritis**

Chitnavis and Carr (2002) classified OA based on etiology which is familiar to clinicians and subdivided OA into 'Primary' for which the cause of disease production is unknown and 'Secondary' which is related to some factors such as injury and deformity. OA is classified into 'Primary' (when there is no obvious antecedent factor) and 'Secondary' (when it follows a demonstrable abnormality) in somewhat artificial (Solomon, Warwick and Nayagam, 2001).

#### **Primary osteoarthritis:**

This is a 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, 1991).

#### **Secondary osteoarthritis:**

Thomson, Skinner and Piercy (1991) stated that secondary osteoarthritis arises as a consequence of various conditions. These are as follows:

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

### **Cause of primary osteoarthritis in knee**

Though the exact cause is not known (Hinton et al., 2002) the following factors are suspected to be causes of primary OA: age, obesity, genetics, occupation involving prolonged standing, sports, multiple metabolic disorders (Ebnezer, 2003). 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 hypermobility (Hinton et al., 2002).

### **Cause of secondary osteoarthritis of knee**

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, 2003). Repeated minor trauma may lead to micro fractures and subsequent OA. Occupational factors are thought to be important in the development of secondary OA. Hemophilia, acromegaly and hyperthyroidism all predispose joints to secondary OA (Porter, 2003).

### **Pathology**

The pathophysiology involves a combination of mechanical cellular and biochemical process (Hinton et al., 2002).

### **Biochemical changes on articular cartilage**

While the cartilage is still morphologically intact (Solomon, Warwick and Nayagam, 2001) the glycosaminoglycans are decrease including chondroitin sulfate, hyaluronic acid and keratin sulfate; increase water contents as water diffuse into the cartilage due to loss of glycosaminoglycans; and increased enzymatic activity from matrix metalloproteinase (MMPS). The MMPS play an important role to changes the quality of collagen fibre (Carfagno and Ellenbecker , 2002). Collagen fibres split and there is a disorganization of the normal proteoglycan collagen relationship. As a result water is attracted into the cartilage matrix, because further softening and flaking. These flakes of cartilage break off, float freely within the joint, and may be impacted between the joint surfaces causing locking, inflammatory and synovial irritation. Proliferation occurs at the periphery of the cartilage and chondrocyte attempt damage repair (Porter, 2003).

### **Effect on bone**

As degenerative changes progress, sub articular bone is exposed and appears polished as there is complete loss of articular cartilage (Chadwick, 1998). The bone ends become hard and abnormally dense. Cysts may form in the subcondral bone and because eburnated bone is brittle, micro fractures occur, allowing the passage of synovial fluid into the deeper bone. Venous congestion occurs in the subcondral bone and osteophyte form at the margins of the articular surfaces (Porter, 2003).

### **Effect on synovial membranes**

Inflammatory reaction initiated in response to intra articular disruption and synovial changes can cause a 50% reduction in tensile strength of tissue. There may also be an associated deterioration in the synovial membrane which can become fibrotic and possibly atrophic (Chadwick, 1998). The flakes of cartilage which have broken off act as an irritant to the synovial membrane and cause repeated effusions (Porter, 2003).

### **Effect on the joint capsule and ligaments**

Ligaments undergo the same changes as the capsule and according to the aspect of the joint, become either contracted or elongated. They are no longer able to support the joint or provide adequate proprioceptive feedback (Porter 2003, p.201). Hypertrophy of the capsule, tendon and ligaments are also seen which decreases joint range of movement (Chadwick, 1998).

### **Clinical features**

OA principally involves with the patelo-femoral and medial tibiofemoral compartments of the knee (Doherty, 2002). There are several inter related features common to osteoarthritic joints (Chadwick, 1998). Predominant symptoms to osteoarthritis are pain (Ebnezer, 2003). Most knee OA pain is well localized to the anterior or medial aspects of the knee and upper tibia (Doherty, 2002). It is aggravated by prolongation of work or exertion and relieved by taking rest. Pain occurs due fibrosis of capsule, stretching the shrunken capsule , muscular fatigue, bone pressure due to vascular congestion and intraosseous hypertention (Solomon, Warwick and Nayagam, 2001). Patelo-femoral pain is usually worse going up and down stairs (Doherty, 2002). In late stage pain as being worse at night and after rest, due to raised pressure in subchondral bone (Doherty, 2002).

Swelling may be intermittent (suggesting an effusion) or continues (with capsular thickening or large osteophytes) (Solomon, Warwick and Nayagam, 2001). Stiffness is present after rest and a little time to wear off with movement (Porter, 2003). There is a reduction in compliance of soft tissue as a result of degenerative change and secondary inflammatory process. In addition as the subchondral micro fractures heal and formation of callus that causes a loss of joint mobility and stiffness follows. The

combination of joint pain, stiffness and possible effusion will often cause patients to limit their activities and consequent loss of end of range movement (Chadwick, 1998). Minimal tenderness and coarse crepitus can be elicited (Ebnezer, 2003). Crepitus can be increased from mild cracking to loud sounds in advanced disease (Porter, 2003). Loss of proprioception, loss of ligamentous control and loss of negative pressure within the joint as a result of effusions all contribute to joint instability in OA (Porter, 2003).

Chronic muscle inhibition is often linked to chronic pain and will lead to atrophy and ensuing muscle weakness (Chadwick, 1998). Especially weakness and wasting of the quadriceps muscle which is responsible for the knee extension (Doherty, 2002). Chronic oedema of synovial membrane and capsule makes the joint appear large. Muscle atrophy may also make the joint look bigger (Porter, 2003).

The warning signs of osteoarthritis in knee are:

- Steady or intermittent pain in the joint
- Stiffness in the joint after getting out of bed or sitting for a long time
- Swelling or tenderness in one or more joints ( National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2002)

## **Diagnosis**

Definitive diagnosis is mainly accomplished through careful analysis of the history of the patient and observation of joint alterations by X-ray and physical examination (Hilt and Cogburn, 1994). Osteoarthritis of the knee can be diagnosed mainly in two ways:

- Radiological
- Pathological

## **Radiological diagnosis includes**

Plain radiographs or X-rays: X-rays can help in the diagnosis and may be the only special test required in the majority of cases.

X-ray shows:

- Narrowing joint space
- Sub-articular sclerosis
- Bone cysts
- Bone density is either normal or increased (Osteoarthritis, 2006).

Arthroscopy: Arthroscopy may show cartilage damage long before X-ray changes appear (Solomon, Warwick and Nayagam, 2001).

MRI: It can demonstrate early cartilage change (Kumar and Clark, 2002).

### **Pathological diagnosis includes**

Blood test: In OA the white blood cell count is usually less than 500 cells mm<sup>2</sup> and is composed predominantly of mononuclear cells. In inflammatory aspirates the white blood cell count is usually greater than 2,000 per mm<sup>2</sup> and the predominant cell type is usually the neutrophil (Hinton et al., 2002). The ESR and Rheumatoid factor and antinuclear antibodies are negative (Kumar and Clark, 2002).

Physiotherapy diagnosis: Physiotherapist use Clarke's sign. This test assesses the presence of patello-femoral dysfunction and use of Apprehension test for patellar subluxation and dislocation (Magee, 1997).

### **Prognosis**

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 (Hurley et al., 2002).



## **Management of osteoarthritis**

**Medical management:** The American College of Rheumatology (2001) emphasizes that drug therapy for OA is best used as an addition to non pharmacological treatment. Oral, topical and intra-articular agents are available for the treatment of OA. Initial approaches: Acetaminophen is comparable in efficacy to non steroidal anti-inflammatory drugs (NSAIDs) for controlling mild to moderate OA pain. Though Acetaminophen is the first line analgesics, many patients who may respond better to NSAID (Reilly, 2001). But GI (gestro-intestinal) complications are the side effects of greatest concern with NSAID therapy (Kwan and Papoushek, 2002). For the patients at high risk of GI complications a Cox-2 inhibitor may be considered. But it carries a risk of renal toxicity and is expensive (The American College of Rheumatology, 2001). For the patients with severe pain who do not respond to or have contraindications to other agents, tramadol or another opioid (e.g. codeine plus acetaminophen) may be considered (The American College of Rheumatology, 2001). Sometimes intra-articular steroids injection are given for OA of knee joint but it has serious side effects such as infection of the joint (Raily, 2001).

## **Physiotherapy management of osteoarthritis**

There is a good evidence to support the use of a number of physiotherapy interventions in the management of knee joint osteoarthritis (Australian Physiotherapy Association, 2001). The management of OA depends on the joint involvement, the stage of the disorder, the severity of the symptoms, age of the patient and his or her functional needs (Solomon, Warwick and Nayagam, 2001).

The major goal of physiotherapy are-

- Educate the patient , caregivers and relatives
- Relieve symptoms such as pain and stiffness
- Preserve joint motion and function by limiting disease progression (Larry, 1996)
- Strengthen weak muscles related to the arthritis joint
- Encourage correct function
- Minimize disability (Chamberlain, 1997).

### **Exercise program for osteoarthritis of the knee:**

The objectives of an exercise program are to protect joint, reduce stress on the involved joint, decreased pain improve active joint motion and activities of daily living (Brandt, 1997). Gucci one and Minor (2001) stated that the objectives of treatment Of OA are to maximize function and minimize musculoskeletal impairments. Thomson (2001) stated that exercises not only incorporates with basic fitness but also incorporates with specific management strategies (e.g. gait, dynamic posture, balance, co-ordination etc.). According to National Institute of Arthritis and Musculoskeletal and Skin Disease (2002), before starting any program people with arthritis should talk with physical therapists. In order to provide effective treatment physical therapists often recommended a combination of exercise program.

These are:

- Range of motion exercises
- Strengthening exercises
- Aerobic or endurance exercises

Both strengthening and endurance exercises provide beneficial effect for patients with mild and moderate OA (MacAuley, 2003). Home based exercises including range of motion exercise, strengthening exercise, aerobic or endurance exercise can produce significant pain reductions in knee pain over two years. Above all exercise programs, there were not clear identifications of the repetition and intensity. An effective exercise program should consist of appropriate type of exercises with adequate intensity, frequency and duration to find out beneficial effects from treatment (Stenmark, 1995).

**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 and Mirpur was selected as the study site. The investigator thought that this place was easy to obtain desire data for his study. Patient with knee osteoarthritis comes these places to for physiotherapy treatment from different area of Bangladesh, so the investigator selected this place.

**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 from February 2011 to January 2012.

**3.4.1. 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.

### 3.4.2 Inclusion criteria

- Patients with knee osteoarthritis who were attending in CRP for treatment as a case.
- Knee osteoarthritis that was confirmed was diagnosed by x-ray or MRI.
- All male and female were same priorities.

Male and female had different anatomical, physiological changes as well as different intensity, frequency and pattern of activity. Inclusion of males and females may be more comprehensive in identifying the risk factors.

### 3.4.3. Exclusion criteria

- Patients with knee osteoarthritis and other serious associated diseases.
- Subject who were unconscious, cognitive problem.

### 3.5. Sample size

There were 35 cases and 35 controls, were selected as sample in the study.

#### Formula:

$$q = 1 - p$$

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

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

$$n = \frac{2pq(Za + Zb)^2}{(P1 - Po)^2} = 543$$

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,  $\alpha = 0.05\%$  ( $Z_{\alpha} = 1.96$ )

Power of the study,  $= 80\%$  ( $Z_{\beta} = 0.84$ )

Number of the calculated sample  $= n$

Finishing the calculating estimated sample size was 543

The investigator taken 70 participants that were 35 cases and 35 were controls due to time limit and able ability of the participants in this time.

### 3.6. 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, sex, occupation, religious status, residential area, family income, 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. Beside this, paper, pen, pencil, computer, printer and calculator comprehensive field note would be used as the materials of data collection.

### 3.7. 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 16 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.

<b>Name of the factors</b>	<b>Number of Cases</b>	<b>Number of control</b>	<b>ODD Ratio (OR)</b>	<b>95% CI</b>
<b>Sex (female)</b>				
<b>Past history of painfull knee swelling</b>				
<b>Positive family history of knee or other joint diseases</b>				
<b>BMI (over weight)</b>				
<b>Occupation (knee use mostly)</b>				
<b>Sustained knee bending</b>				
<b>Stair climbing</b>				
<b>Duration of Heavy activity &gt; 4 hour</b>				
<b>Prolong standing</b>				
<b>Bare foot walking</b>				
<b>Use high heeled shoe</b>				
<b>Regular weight bear</b>				
<b>Sitting on the flore for home activity</b>				

**Table-2:** The individual factors of Knee osteoarthritis

### **3.8. 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 were 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 indentify knee osteoarthritis patients as a case.

### **3.9. Inform consent**

The aims and objectives of this study should be informed to the subjects verbally. The investigator should given the consent form to the subject and explained them. The subjects have the rights to withdraw themselves from the research at any times. It should be 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 will also be informed or gives notice that the research result will not be harmful for them. It will be kept confidential. Every participant has the right to discuss about her problem with senior authority.

### **3.10. Ethical considerations**

- The proposal of the study is 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 would be taken.

### **3.11 Limitation of the study**

The limitation of this study was as followed

- The study did not represent the total population of the condition because
  - There was lack of randomization.
  - 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.

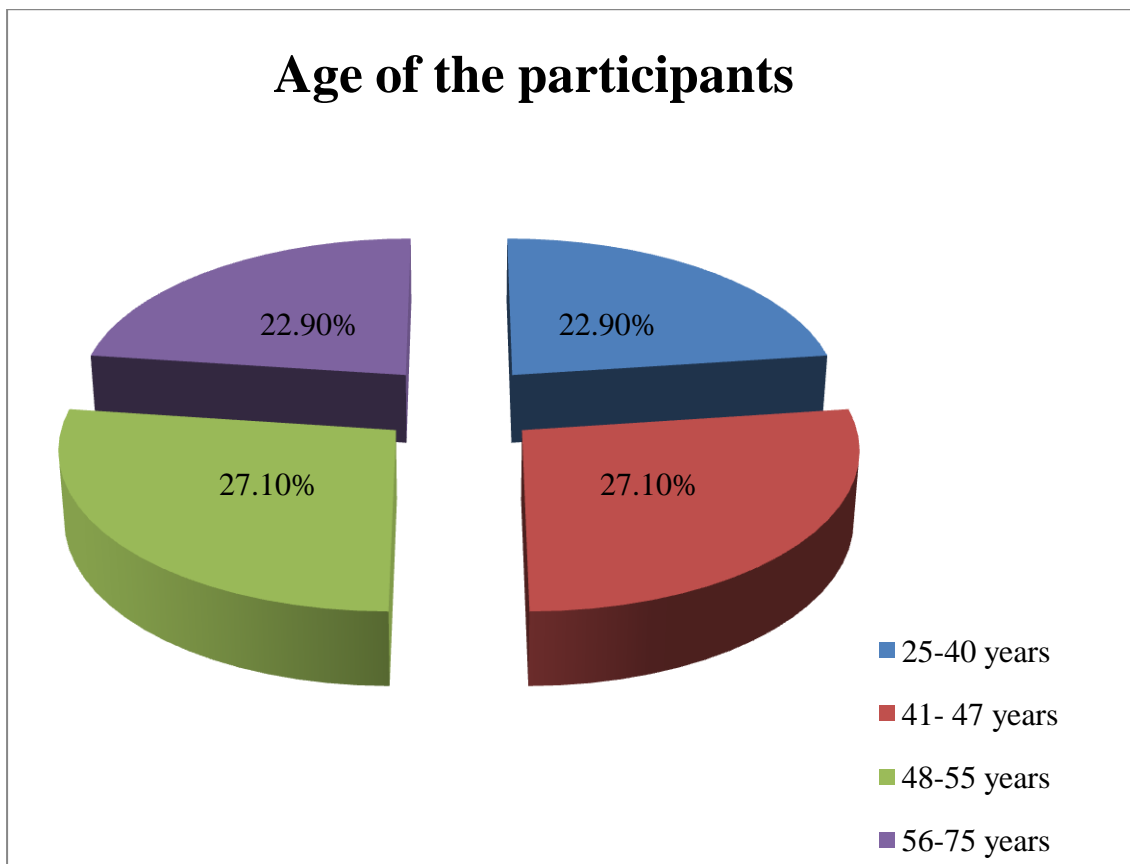


In this study there were 70 participants. Among them 35 participants were in case group and 35 participants were in control group. The analysis was done by the SPSS 16 version.

## Socio-demographic Information

### 4.1. Age of the participants

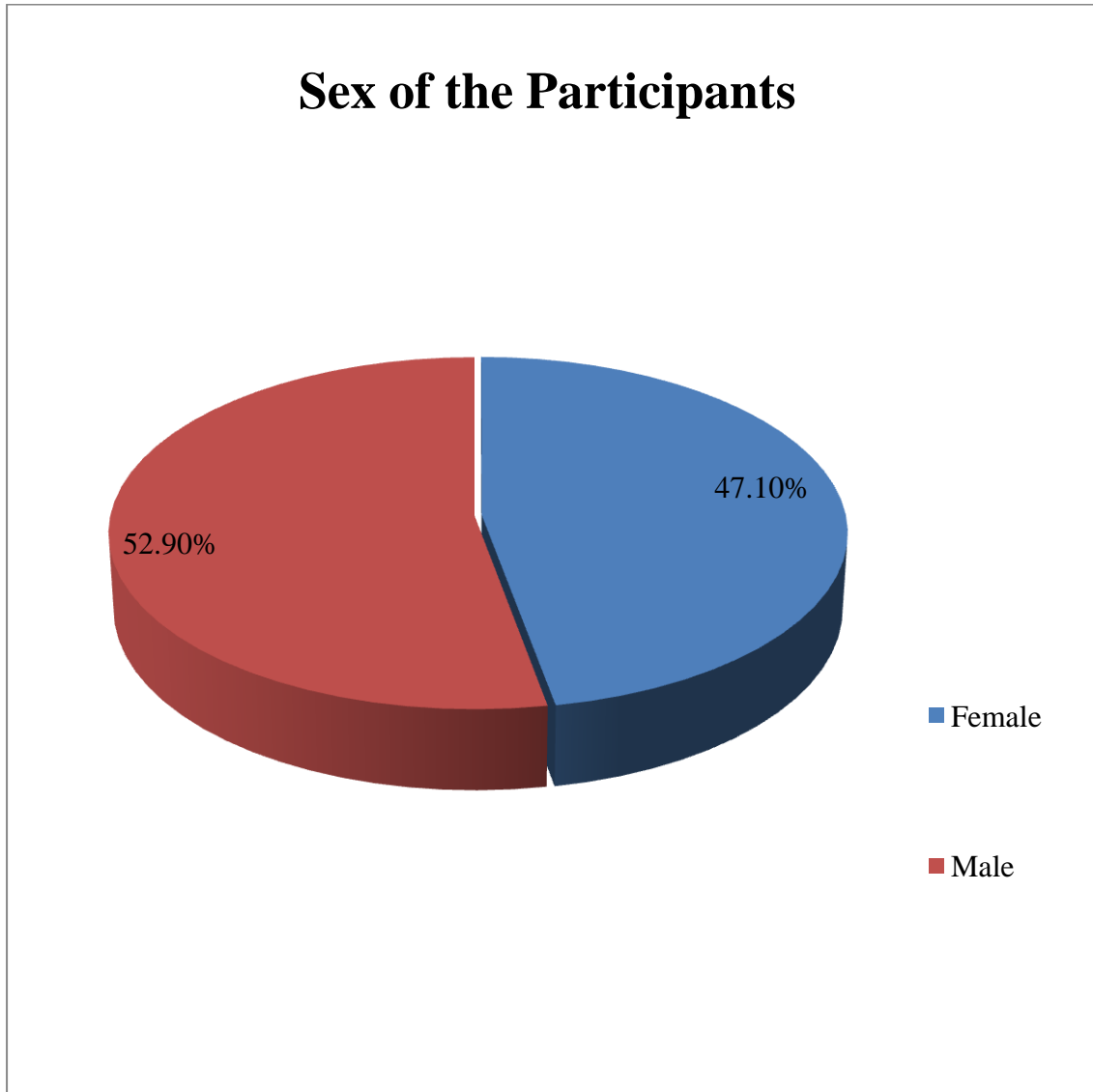
Among the 70 participants 16 participants were between 25-40 years, 19 were between 41-47 years, 19 were between years 48-55 years and 16 were 56-75 years. There mean age 48.41 years and minimum age was 25 years and maximum age was 75 years. In percentage 22.9% participants were between 25-40 years, 27.1% were between 41-47 years, 27.1% were between 48-55 years and 22.9% were 56-75 years (Figure-1).



**Figure-1:** Age of the participants

#### 4.2. Sex of the Participants

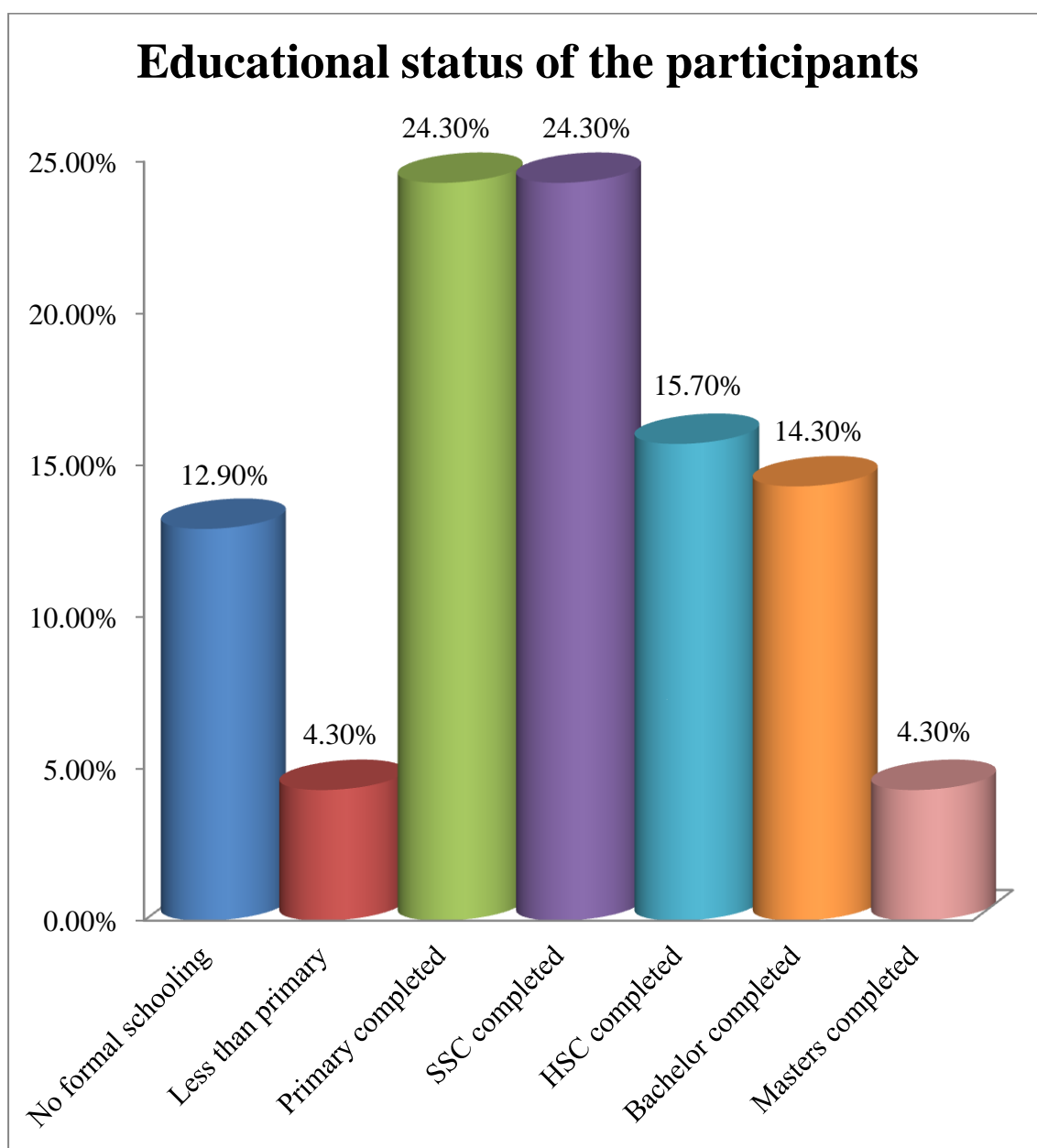
Among the 70 participants, female 33(47.1%) were less in number than male 37(52.9%) as shown in Figure-2.



**Figure-2:** Sex of the Participants

### 4.3. Educational status of the participants

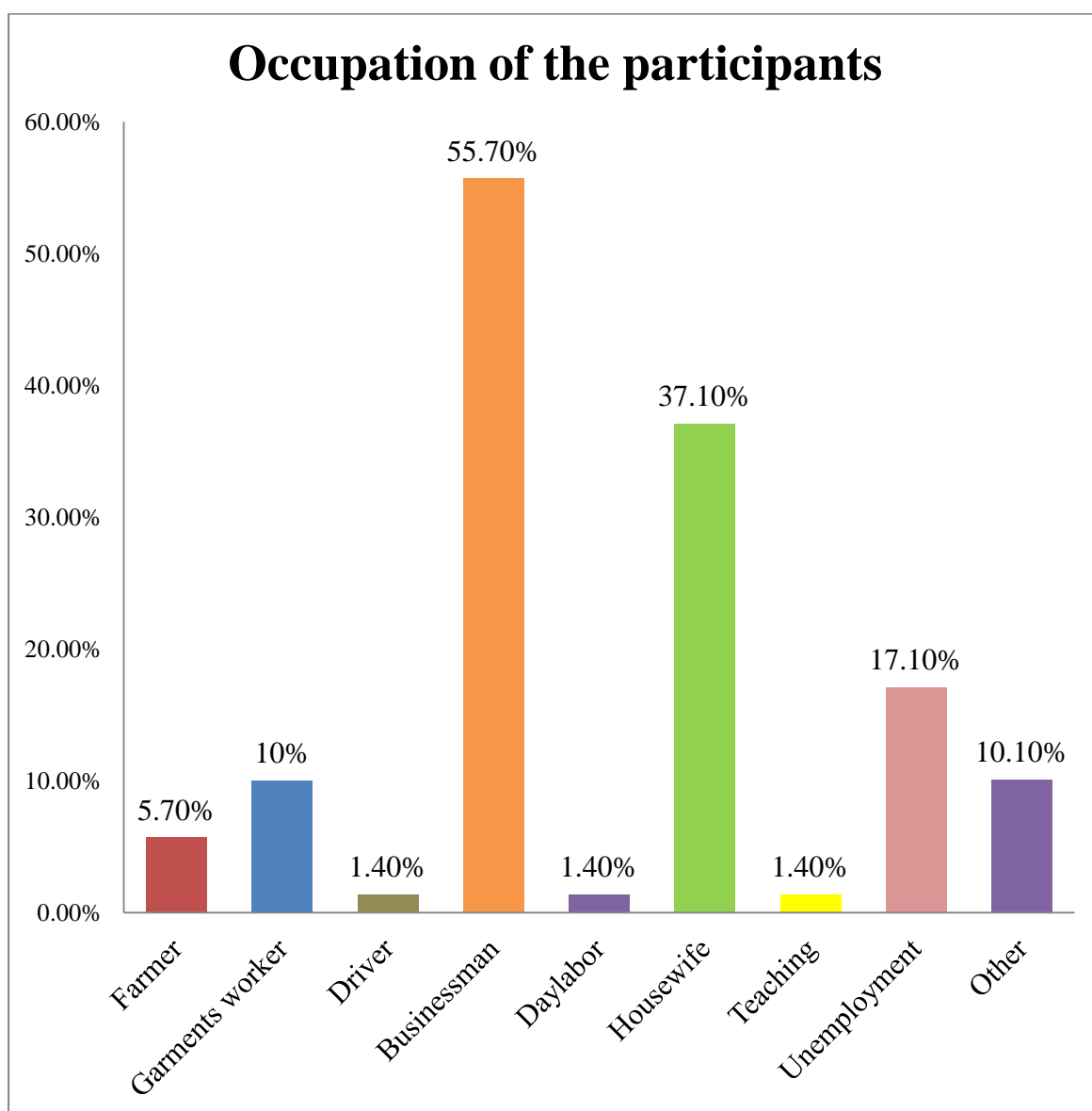
Among the 70 participants, 9 (12.9%) participants had no formal schooling, 3 (4.3%) participants had some primary education, 17 (24.3%) participants completed primary education, 17 (24.3%) participants completed secondary education, 11 (15.7%) participants completed higher secondary education, 10 (14.3%) participants completed Bachelor degree and 3 (4.3%) participants completed Masters Degree (Figure-3).



**Figure-3:** Educational status of the participants

#### 4.4. Occupation of the Participants

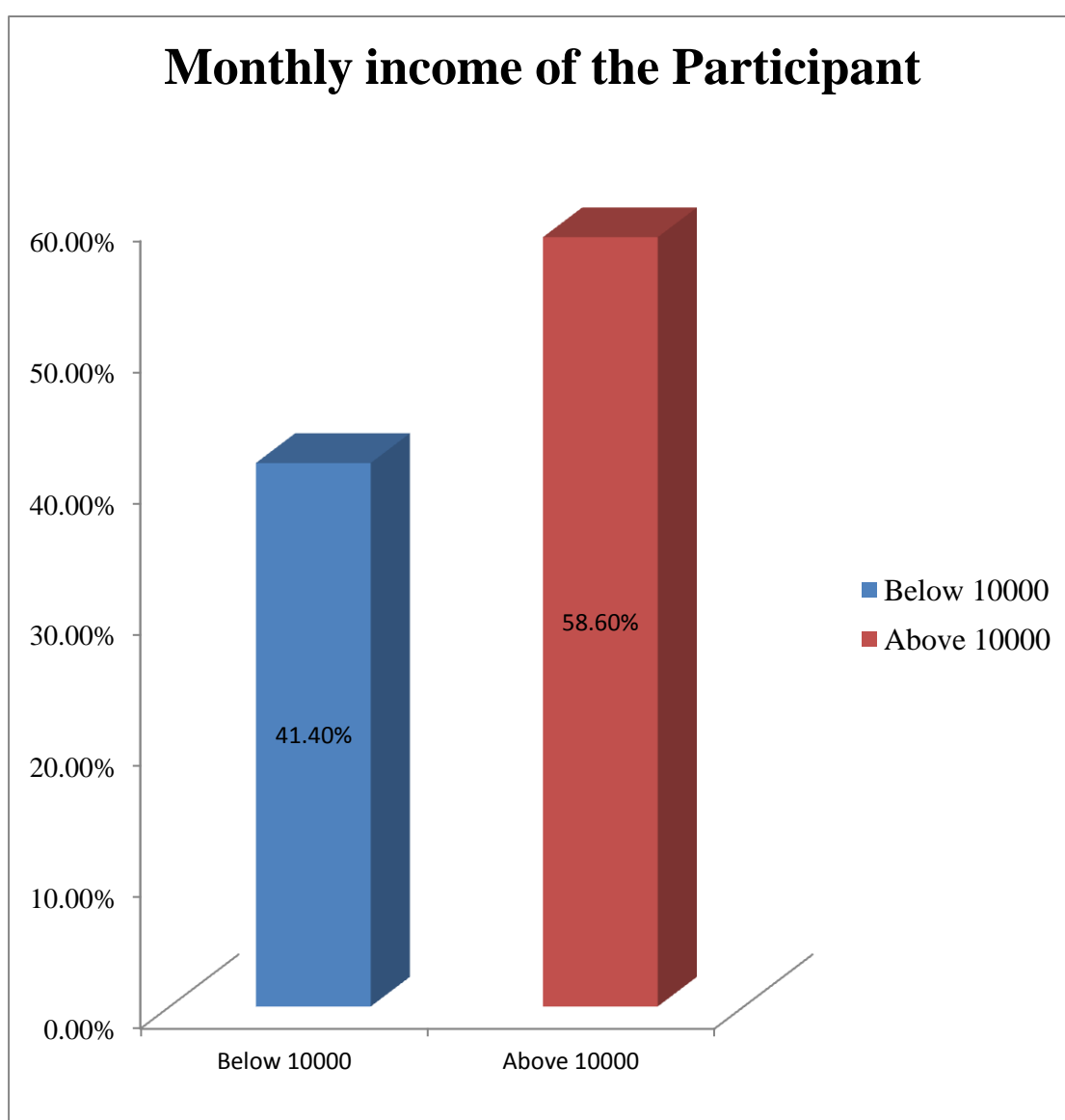
Among the 70 participants 4 participants were farmer, 7 were garments worker, 1 was driver and 11 were businessman, 1 was day labour, 26 were housewife, 1 was teacher, 12 were unemployment and 7 were in other occupation. In percentage 45.7% participants were farmer, 10% were garments worker, 1.4% was driver and 15.7% were businessman, 1.4% was day labour, 37.1% were housewife, 1.4% was teacher, 17.1% were unemployment and 10% were in other occupation (Figure-4).



**Figure-4:** Occupation of the participants

#### 4.5. Monthly income of the participants

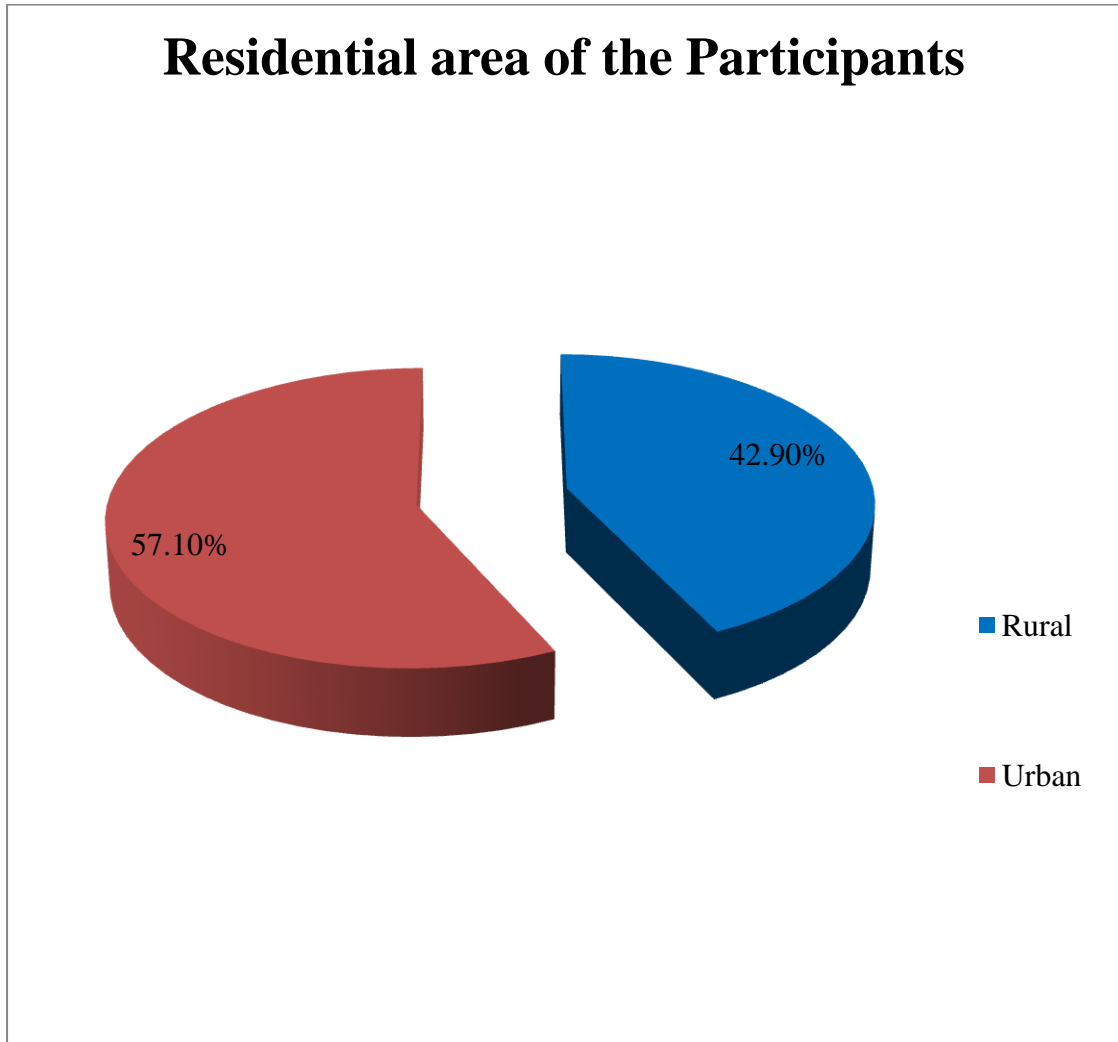
Among the participants more than half of the participants had above 10000 Tk monthly incomes which represent 58.6%, rest of them had below 10000 income category (Figure-5).



**Figure-5:** Monthly income of the Participant

#### 4.6. Residential area of the participants

In this study greater number of participants 40(57.1%) lived in urban area than rural area 30(42.9%) as shown in Figure-6.



**Figure-6:** 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 control	ODD Ratio (OR)	95% CI
Sex (female)	24	09	6.303	2.225, 17.852
Use high heeled shoe	14	02	5.167	1.493, 17.883
Past history of painful knee swelling	23	12	3.674	1.369, 9.858
Bare foot walking	05	02	2.750	0.496, 15.246
BMI (over weight)	14	08	2.250	0.796, 6.360
Occupation (knee use mostly)	21	14	2.25	0.865, 5.855
Duration of Heavy activity > 4 hour	34	33	2.061	0.178, 23.826
Stair climbing	23	17	2.029	0.775, 5.314
Sitting on the flore for home activity	10	06	1.933	0.615, 6.074
Prolong standing	12	02	1.304	0.474, 3.590
Positive family history of knee or other joint diseases	15	13	1.269	0.487, 3.309
Regular weight bear	06	05	1.241	0.341, 4.518
Sustained knee bending	17	16	1.122	0.439, 2.868

**Table-3:** The individual factors of knee osteoarthritis

## **Sex**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them had 24 female and 11 had male in the case group. On the other hand 9 participants had female and 26 had male in the control group. Calculated odds ratio for the sex of the participants is 6.303 (Table-3) which means there was association between sex of the participants and knee osteoarthritis that is 6.303 times more possible chance to occur knee osteoarthritis of female than male and 95% CI was 2.225 and 17.852.

## **Use high heeled shoe**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 14 participants was walking with high heeled shoe and 21 was not in the case group. On the other hand 2 participants walking with high heeled shoe and 33 were not in the control group. Calculated odds ratio for use high heeled shoe is 5.167 (Table-3) which means there was association between use high heeled shoe and knee osteoarthritis that is 5.167 times more possible chance to occur knee osteoarthritis due to use high heeled shoe and 95% CI was 1.493 and 17.883.

## **Past history of painful swelling of knee**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 23 had past history of painful swelling of knee and 12 had no past history of painful swelling of knee in the case group. On the other hand 12 participants had past history of painful swelling of knee and 23 had no past history of painful swelling of knee in the control group. Calculated odds ratio for past history of painful swelling of knee is 3.674 (Table-3) which means there was association between the past history of painful swelling of knee and knee osteoarthritis that is 3.674 times more possible chance to occur knee osteoarthritis due to past history of painful swelling of knee and 95% CI was 1.369 and 9.858.

## **Bare foot walking**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 5 participants was walking with bare



foot and 30 was not in the case group. On the other hand 2 participants walking with bare foot and 33 were not in the control group. Calculated odds ratio for the bare foot walking is 2.750 (Table-3) which means there was association between the bare foot walking and knee osteoarthritis that is 2.750 times more possible chance to occur knee osteoarthritis due to bare foot walking and 95% CI was 0.496 and 15.246.

### **BMI**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them, BMI of 14 participants had over weight and 21 had not in the case group. On the other hand, BMI of 8 participants had over weight and 27 had not in the control group. Calculated odds ratio for the BMI is 2.250 (Table-3) which means there was association between the BMI and knee osteoarthritis that is 2.250 times more possible chance to occur knee osteoarthritis due to overweight in BMI and 95% CI was 0.796 and 6.360.

### **Occupation**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 21 had use their knees in their occupation mostly and 14 were not in the case group. On the other hand 14 participants had used their knees in their occupation mostly and 22 were not in the control group. Calculated odds ratio for the participants those are using their knees in their occupation is 2.250 (Table-3) which means there was association between the using knees mostly in their occupation knee osteoarthritis that is 2.250 times more possible chance to occur knee osteoarthritis due to using knees mostly in their occupation and 95% CI was 0.865 and 5.855.

### **Duration of Heavy activity**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 34 participants was doing heavy activity for less than 4 hours and 1 was not in the case group. On the other hand 33 participants were doing heavy activity for less than 4 hours and 2 was not in the control group. Calculated odds ratio for the duration of heavy activity is 2.061 (Table-3) which means there was association between the duration of heavy activity for more

than 4 hours and knee osteoarthritis that is 2.061 times more possible chance to occur knee osteoarthritis due to heavy activity for more than 4 hours and 95% CI was 0.178 and 23.826.

### **Stair climbing**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 23 was stair climbing regularly and 12 was not in the case group. On the other hand 17 participants was stair climbing regularly and 18 were not in the control group. Calculated odds ratio for the Stair climbing is 2.029 (Table-3) which means there was association between the Stair climbing and knee osteoarthritis that is 2.029 times more possible chance to occur knee osteoarthritis due to stair climbing regularly and 95% CI was 0.775 and 5.314.

### **Sitting on the floor for home activity**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 10 participants was doing sitting on the floor for home activity regularly and 25 was not in the case group. On the other hand 6 participants were doing sitting on the floor for home activity regularly and 29 were not in the control group. Calculated odds ratio for the sitting on the floor for home activity regularly is 1.933 (Table-3) which means there was association between the sitting on the floor for home activity and knee osteoarthritis that is 1.933 times more possible chance to occur knee osteoarthritis due to sitting on the floor for home activity and 95% CI was 0.615 and 6.074.

### **Prolong standing**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 12 participants was doing prolong standing and 23 was not in the case group. On the other hand 33 participants were doing prolong standing and 2 was not in the control group. Calculated odds ratio for the prolong standing is 1.304 (Table-3) which means there was association between the prolong standing and knee osteoarthritis that is 1.304 times more possible chance to occur knee osteoarthritis due to prolong standing and 95% CI was 0.474 and 3.590.

### **Positive family history of knee or other joint diseases**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 15 had Positive family history of knee or other joint diseases and 20 had no positive family history of knee or other joint diseases in the case group. On the other hand 13 participants had positive family history of knee or other joint diseases and 22 had no positive family history of knee or other joint diseases in the control group. Calculated odds ratio for the positive family history of knee or other joint diseases is 1.269 (Table-3) which means there was association between the positive family history of knee or other joint diseases and knee osteoarthritis that is 1.269 times more possible chance to occur knee osteoarthritis due to positive family history of knee or other joint diseases and 95% CI was 0.487 and 3.309.

### **Regular weight bear**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 6 participants was doing regular weight bearing activity and 29 was not in the case group. On the other hand 5 participants were doing regular weight bearing activity and 30 were not in the control group. Calculated odds ratio for the regular weight bearing is 1.241 (Table-3) which means there was association between the regular weight bearing and knee osteoarthritis that is 1.241 times more possible chance to occur knee osteoarthritis due to regular weight bearing and 95% CI was 0.341 and 4.518.

### **Sustained knee bending**

From the table 3 it is observed that the total participants of this study were 70 where 35 were case and 35 were control, among them 17 had bending their knees for a long time and 18 had not in the case group. On the other hand 16 participants had bending their knees for a long time and 23 had no in the control group. Calculated odds ratio for Sustained knee bending is 1.122 (Table-3) which means there was association between the sustained knee bending and knee osteoarthritis that is 1.122 times more possible chance to occur knee osteoarthritis due to Sustained knee bending and 95% CI was 0.439 and 2.868.

In this study there were 35 cases and 35 number of control that means case: control was 1:1 and hospital based unmatched setting. Intention of this study was to determine the risk factors of developing osteoarthritis of knee. 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.

This study claimed that, there was association between sex of the participants and knee osteoarthritis that is 6.303 times more possible chance to occur knee osteoarthritis of female than male. Connor (2007) agreed that, the prevalence, incidence, and severity of osteoarthritis are different in women than in men. Women are more likely than men to suffer from osteoarthritis, and women experience more severe arthritis in the knee.

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 (Cicutini et al., 1996). In this study, it was found that, there was association between use high heeled shoe and knee osteoarthritis. That was 5.167 times more possible chance to occur knee osteoarthritis due to use high heeled shoe.

Chitnavis and Carr cited in Bustrade 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 3.674 times more possible chance to occur knee osteoarthritis due to past history of painful swelling. 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.

In this study, it was stated that, there was association between the BMI and knee osteoarthritis. People with overweight according to BMI 2.250 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) .

According to Porter (2003) occupational factors are important in the development of secondary OA of knee. The present study claimed that, there was association between the using knees mostly in their occupation and knee osteoarthritis. That was 2.250 times more possible chance to occur knee osteoarthritis due to using knees mostly in their occupation. Hurley (2002) stated that, occupation or recreational activities are a factor of knee osteoarthritis. In a study it was found that, a number of occupational risk factors are being related to the development and progress of knee OA, e.g. working in kneeling or squatting posture (Andre et al., 2008).

In this study, it was state that 1.304 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.

This study showed that, there was association between the duration of heavy activity for more than 4 hours and knee osteoarthritis that is 2.061 times more possible chance to occur knee osteoarthritis due to heavy 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.

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 2.029 times more possible chance to occur knee osteoarthritis due to stair climbing regularly.

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 1.933 times more possible risk for developing knee osteoarthritis.

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 with hip Osteoarthritis (Bulstrode 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, 1.269 times more possible chance.

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

1.241 times more possible chance to occur knee osteoarthritis due to regular weight bearing.

Kneeling is also be a risk factor of developing knee osteoarthritis Braunwald et al. (2001). The investigator found that, 1.122 times more possible chance to occur knee osteoarthritis due to Sustained knee bending.

**6.1. Conclusion**

In this study there were 35 cases and 35 number of control 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 with hormone replacement therapy, 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 factor 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 and hormone replacement therapy. 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 - : 1

### মৌখিক অনুমতি পত্র:

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম/নমস্কার আমার নাম মো: আশেক এলাহী। আমি এই গবেষণাটি “ বাংলাদেশ হেলথ প্রফেশনস্ ইনস্টিটিউট” (বি,এইচ,পি,আই) এ করছি যা আমার অধ্যয়নের অল্‌ডর্ভুক্ত। যার শিরোনাম হল “ হাঁটুতে গঁটে বাত হওয়ার বুকিসমূহ”। এজন্যে আমি কিছু ব্যক্তিগত এবং হাঁটুর সমস্যাজনিত আনুষঙ্গিক প্রশ্ন জানতে চাচ্ছি, যা আনুমানিক ২০-৩০ মিনিট সময় নেবে। আমি আপনাকে অবগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং অন্য কোন উদ্দেশ্যে এটি ব্যবহার হবে না। গবেষক সরাসরি এই অস্থিপেশী অংশটির সাথে জড়িত নয়। তাই এই গবেষণায় অংশগ্রহণ আপনার বর্তমান এবং ভবিষ্যৎ চিকিৎসার ক্ষেত্রে কোনরূপ প্রভাব ফেলবে না। আপনি যেসব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদন ঘটনাপ্রবাহে এটা নিশ্চিত করা হবে যে, এই তথ্যের উৎস অপ্রকাশিত থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছাপ্রনোদিত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। এছাড়াও সাক্ষাৎকারের সময় কোন প্রশ্ন অপছন্দ করার বা উত্তর দিতে না চাওয়ার সম্পূর্ণ অধিকার আপনার রয়েছে। এই অধ্যয়নে অংশগ্রহনকারী হিসেবে যদি আপনার কোন প্রশ্ন থাকে তাহলে আপনি আমাকে এবং মো: ওবায়দুল হক, কোর্স সমন্বয়কারী, ফিজিওথেরাপী বিভাগ, এর সাথে যোগাযোগ করতে পারেন।

গবেষণাটি আরম্ভ করার পূর্বে আপনার কোন প্রশ্ন আছে ?

আমি কি আপনার অনুমতি পেয়ে এই সাক্ষাৎকারটি আরম্ভ করতে পারি ?

হ্যাঁ

না

সাক্ষাৎকার প্রদানকারীর স্বাক্ষর : .....

“ হাঁটুতে গেঁটে বাত হওয়ার বুকিসমূহ”

সনাক্তকারী সংখ্যা :	সাক্ষাৎকার গ্রহণের তারিখ:
মোবাইল নম্বর:	

ঠিকানা:

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প্রশ্নাবলী:

শাখা-১ জনসংখ্যাতাত্ত্বিক প্রশ্ন:

প্রশ্ন নং-	প্রশ্ন সমূহ:	উত্তর	কোড
০১	বয়স	...../ ..... বছর	
০২	লিঙ্গ	পুরুষ..... নারী .....	০১ ০২
০৩	শিক্ষাগত যোগ্যতা	বিদ্যালয় ছাড়া ..... প্রাথমিক বিদ্যালয়ের নিচে ..... প্রাথমিক সম্পন্ন ..... মাধ্যমিক..... উচ্চমাধ্যমিক..... স্নাতক..... স্নাতোকোত্তর অথবা/অধিক..... অন্যান্য (নির্দিষ্টকৃত).....	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮
০৪	আবাসিক এলাকা	গ্রামীন ..... নগরস্থ .....	০১ ০২
০৫	পারিবারিক মাসিক গড় আয়	_____ টাকা	

শাখা-০২ রোগ এবং পারিবারিক ইতিহাস:

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
০৬	পূর্বে কখনো ব্যাথার কারণে আপনার হাঁটু ফুলে গিয়েছিল ?	হ্যাঁ..... না .....	০১ ০২
০৭	আপনার পরিবারের অন্য কারও হাঁটু বা জোড়ার রোগ আছে বা ছিল ?	হ্যাঁ..... না .....	০১ ০২
০৮	উচ্চতা	..... সে.মি.	০১
০৯	ওজন	.....কে.জি.	০১

শাখা-৩: পেশাগত কার্যকলাপ:

প্রশ্ন নং	প্রশ্ন সমূহ	উত্তর	কোড
১০	পেশা	কৃষক .....	০১
		পোষাক শ্রমিক .....	০২
		গাড়ী চালক.....	০৩
		ব্যবসায়ী .....	০৪
		দিনমজুর .....	০৫
		গৃহিনী .....	০৬
		শিক্ষকতা.....	০৭
		বেকার .....	০৮
		অন্যান্য (নির্দিষ্টকৃত).....	০৯

শাখা-৪: অবসর এবং শারীরিক কার্যকলাপ:

১১	আপনি কি হাঁটু ভাজ করে রাখেন ?	হ্যাঁ.....	০১
		না .....	০২
১২	আপনি কি সিঁড়ি দিয়ে উঠা নামা করেন ?	হ্যাঁ.....	০১
		না .....	০২
১৩	ভারী শারীরিক পরিশ্রমের সময় ?	চার ঘন্টার কম .....	০১
		চার ঘন্টার বেশি.....	০২
		অন্যান্য (নির্দিষ্টকৃত).....	০৩
১৪	আপনাকে কি দীর্ঘক্ষণ দাঁড়িয়ে থাকতে হয় ?	হ্যাঁ.....	০১
		না .....	০২
১৫	আপনি কি খালি পায়ে হাঁটেন ?	হ্যাঁ.....	০১
		না .....	০২
১৬	আপনি কি উঁচু গোড়ালির জুতা পরেন ?	হ্যাঁ.....	০১
		না .....	০২
১৭	আপনি কি প্রতিদিন ভারী বস্তু বহন করেন ?	হ্যাঁ.....	০১
		না .....	০২
১৮	আপনি কি মেঝেতে বসে ঘরের কাজ করেন? (খাওয়া,টিভি দেখা, পড়াশোনা করা ইত্যাদি)	হ্যাঁ.....	০১
		না .....	০২

**Appendix - :2**

**VERBAL CONSENT STATEMENT**

**(Please read out to the participant)**

Assalamu alaikum/nomosker, my name is *Md Ashek Elahee*, I am conducting a research project (dissertation) study which included in our course curriculum of Bangladesh health professions institute (BHPI). The title of the study is “Risk factors of developing knee osteoarthritis”. I would like to know about some personal and other related questions about knee problem. This will take approximately 20-30 minutes.

I would like to inform you that this is purely academic study and will not be used any other purpose. The researcher is not directly related with this musculoskeletal area, so your participation in the research will have no impact on your present or future treatment. All information provided by you will be treated as confidential and in the event of any report or publication. It will be insured that the sources of information remains anonymous.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any consequence. You also have a right not to answer a particular question that you do not like or do not want to answer during interview.

If you have any query about the study or your right as a participant you may contact with me and or Md. Obaidul Haque, Cours Coordinator, Department of Physiotherapy.

Do you have any question before you start?

So may have your consent to proceed with the interview?

YES

NO

Signature of the interviewer.....

## Risk factors of developing knee osteoarthritis

- **Identification number:**.....
- **Date of Interview:**.....
- **Contact number:**.....
- **Address:**.....  
.....  
.....

## Questioners

### Section 1: Demographic Questions

QN	Questions and filters	Responses	Code
01.	Age (in year):	_ _  yrs	
02.	Sex:	Female .....	01
		Male .....	02
03.	Educational status	No formal schooling .....	01
		Less than Primary .....	02
		Primary completed .....	03
		S.S.C completed .....	04
		H.S.C completed .....	05
		Bachelor completed .....	06
		Masters completed .....	07
		Others .....	08
04.	Residential area	Rural.....	01
		Urban.....	02
05.	Average monthly family income	.....( <i>Taka</i> )	01

### Section 2: Disease and Family history

QN	Questions and filters	Responses	Code
06	Past history of major or acute knee injury	Yes.....	01
		No.....	02
07	Past history of painful swelling of knee	Yes.....	01
		No.....	02
08	Positive Family history of knee or other joint disease	Yes.....	01
		No.....	02
09	Height	Centimeters.....	01
10	Weight	Kilograms.....	01

### Section 3: Occupational activity

11	Occupation	Farmer.....	01
		Garment worker.....	02
		Driver.....	03
		Businessman.....	04
		Day labor.....	05
		Housewife.....	06
		Teaching.....	07
		Unemployment.....	08
		Others (Specify).....	09

### Section 4: Leisure and Physical activities

12	Sustained knee bending	Yes.....	01
		No.....	02
13	Stair climbing	Yes.....	01
		No.....	02
14	Duration of heavy physical activities	Less than four hours....	01
		More than four hours....	02
		Others (Specify).....	03
15	Prolong standing	Yes.....	01
		No.....	02
16	Bare foot walking	Yes.....	01
		No.....	02
17	Use of high heeled shoes	Yes.....	01
		No.....	02
18	Sitting on the floor for home activity (eating, watching TV, reading etc)	Yes.....	01
		No.....	02

Appendix - :3

Permission Letter

April 13, 2011

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

**Subject:** Application for permission of data collection at Physiotherapy Orthopaedics outdoor patient.

Sir,

I respectfully to state that, I am Md. Ashek Elahee a student of 4<sup>th</sup> year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). In 4<sup>th</sup> year course curriculum we have to do a research project. I have chosen a research title that is "Risk factors of developing Knee Osteoarthritis". For this reason, I need permission for collect data from the CRP Physiotherapy Orthopaedics outdoor patient.

I therefore, pray and hope that you would be kind enough to grant my application and give me permission for collect data from Physiotherapy Orthopaedics outdoor patient.

Yours faithful

Md. Ashek Elahee.

Md. Ashek Elahee

4<sup>th</sup> year B.Sc. in Physiotherapy

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