WORK RELATED FACTORS THAT AFFECT DEVELOPMENT OF KNEE OSTEOARTHRITIS

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Session: 2011-2012

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Bangladesh

August' 2016

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

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Submitted by **Farzana Kuddus,** for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B. Sc. PT).

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Declaration

I declare that the work presented here is my own. All 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 the Department of Physiotherapy, Bangladesh Health Professions Institute (BHPI).

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Content

Acronyms

AAOS:	American of Orthopedic Surgeons
ACR:	American College of Rheumatology
ADL:	Activity of Daily Living
BHPI:	Bangladesh Health Professions Institute
BMI:	Body Mass Index
BMRC:	Bangladesh Medical Research Council
COPCORD:	Community Oriented Programme for Control of Rheumatic Disease
CRP:	Centre for Rehabilitation for the Paralysed
DMOAD:	Disease-Modifying Osteoarthritis Drug
ICRS:	International Society for Reef Studies
IRB:	Institutional Review Board
NGOA:	Nodal Generalized Osteoarthritis
NSAIDs:	None Steroidal Anti-Inflammatory Drugs
OA:	Osteoarthritis
ROAD:	Research on Osteoarthritis Against Disability
SPSS:	Statistical Package for the Social Sciences
SYSADOA:	Symptomatic Slow- Acting Drug for Osteoarthritis
WHO:	World Health Organization
WORMS:	Whole-Organ Magnetic Resonance Imaging Score

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Abstract

Purpose: To identify the work related factors affecting the development of osteoarthritis at knee joint attended at CRP in Bangladesh.

Objective: To explore the socio-demography information, to identify the vulnerable age group, occupation and factors for developing risk of knee osteoarthritis in Bangladesh.

Methodology: The study was a quantitative research model in the form of a cross sectional type survey. 50 samples were selected as convenience sampling from CRP, Savar. A closed type of questionnaire was used to collect data. Frequency statistics were used for data analysis which focused through figure and bar chart.

Result: Most commonly affected age were around (46-55) years. About (n=33; 66%) female were more affected than (n=17; 34%) male. Almost (n=32; 64%) housewife were more affected. About (n=29; 58%) rural people are more affected. Mean weight of the affected group was 64.46 kg (SD ± 8.192). About (n=21; 42%) participants had swelling sometimes. About (n=26; 52%) participants felt pain always. Almost (n=18; 36%) participants felt severe pain during knee banding. About (n=17; 34%) participants felt severe pain during up and down stairs. About (n=17; 34%) participants felt moderate pain during sitting. About (n=16; 32%) participants felt mild pain during standing. About (n=39; 78%) participants felt extreme pain during on/off toilet. Almost (n=23; 46%) participants felt severe pain during doing heavy domestic work. Around (n=27; 54%) participants felt extreme pain during kneeling.

Conclusion: The investigator found the strong positive association of the knee osteoarthritis with using painful knee swelling, obesity, occupation, heavy activity more than four hour, stair climbing, sitting on the floor for home activity, prolong standing, sustained knee bending, squatting and kneeling. The important way for prevention of knee osteoarthritis including the modification daily activity for reduces risk factors.

1.1. Background

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).

The prevalence of OA increases with age and generally affects women more frequently than men. 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)

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).

Cross-sectional studies have shown that the risk of knee osteoarthritis is 1.9 to 13.0 times higher among underground coal miners than in a control population; presumably, the main risk factor in this occupational group is frequent work in the kneeling or squatting position. Construction workers, too, particularly floorers, have a significantly elevated prevalence of knee osteoarthritis. In another epidemiological study, Grotle et al. found a significant dose-effect relationship for overweight (BMI >30) as a risk factor for knee osteoarthritis (Pollard et al., 2008).

1.2. Rational 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). 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., 2011). 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 (Elahee et al., 2012).

1.3. Research Question

What are the works related factors associated with developing knee osteoarthritis?

1.4. Objective

1.4.1. General objective

To identify the work related factors of developing knee osteoarthritis attended at CRP.

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 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 analyze the association between prolong standing 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 knees bending and causing of knee osteoarthritis.

1.5. 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

Osteoarthritis is a joint disease that mostly affects cartilage. Cartilage is the slippery tissue that covers the ends of bones in a joint. Healthy cartilage allows bones to glide over each other. It also helps absorb the shock of movement. In osteoarthritis, the top layer of cartilage breaks down and wears away. This allows bones under the cartilage to rub together. The rubbing causes pain, swelling, and loss of motion of the joint. Over time, the joint may lose its normal shape. Also, bone spurs may grow on the edges of the joint. Bits of bone or cartilage can break off and float inside the joint space, which causes more pain and damage.

Activities of daily living (ADL)

The essential functional activities, those have to be done independently from morning to evening.

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). The scientific literature on the association between physical workload (e.g., kneeling/squatting, lifting/carrying of loads) and knee osteoarthritis has been summarized by Jensen (2008). Currently, knee osteoarthritis is not mentioned in the European Commission's recommendation 2003/670/EC of 19 September 2003 concerning the European schedule of occupational diseases. However, some European countries (e.g., Denmark, Germany) have introduced knee osteoarthritis into their national lists of occupational diseases.

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).

Physical activity is another controversially discussed risk factor related to the development of knee osteoarthritis. Whereas some studies reveal no association between physical activity and the risk of knee osteoarthritis, others again show a significant association (Urquhart et al., 2008). Overweight and physical workloads independently have been shown to be risk factors for knee osteoarthritis (Teichtahl et al., 2008). This study also sought to examine the combined impact of the two parameters BMI and physical workload (kneeling/squatting and lifting/carrying of loads) on the risk of knee osteoarthritis, as well as to examine their mode of interaction.

Knee osteoarthritis 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).

Many causes of osteoarthritis have been discussed, such as age, weight, and mechanical loading (Weiss, 2006). Anthropologists working on reconstructing activity patterns have focused especially on the role of repetitive mechanical loading. Defining the cause of osteoarthritis as resulting from repetitive mechanical loading has led to conclusions that severe osteoarthritis scores on specific joints are the result of continued use of specific muscles and joints in daily and repetitive tasks. Such an approach has led several researchers to consider osteoarthritis as ideal for reconstructing lifestyles.

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.

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).

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 then 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

– 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.

Methodology

This section outlines the method of the study design by the researcher to meet the study aim and objectives.

3.1 Study design

This study aimed to find out the possible work related factors of developing knee osteoarthritis in Bangladesh. For this reason the investigator used a quantitative research model in the form of a cross sectional type survey in design. The investigator chose the design in quantitative research method because in this way investigator was able to use a large number of participants and therefore collected the data objectively through this way data was reduced to numbers for statistical analysis in order to draw conclusion. The study was Cross sectional survey in design. Cross sectional study is one of the forms of observational study it is one of the most commonly used survey research design (Park, 2007). Levin (2006) stated that Cross-sectional studies are carried out at one time point or over a short period.

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 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 March 2016 to October 2016.

3.5.1. 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.

3.5.2. 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 priories.
  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.
- Willingly to participate in the research.

3.5.3. Exclusion criteria

- Subjects who were unconscious, cognitive problem.
- Those who will not fulfill the criteria will be excluded.
- Subjects who have severe general illness are excluded.

3.6. Sample size

Formula:

$$n = \left\{ \frac{Z\left(1 - \frac{\alpha}{2}\right)}{d} \right\}^2 \times pq$$

Here,

$Z\left(1 - \frac{\alpha}{2}\right) = 1.96$

p= Prevalence of OA in = 6.8%= 0.68

q = 1-P

 =1-0.68

=0.32

d=0.05

The actual sample size for this study was calculated as 334, but as the study performed as a part of academic research project and there were some limitation, so that 50 OA patients was taken as the sample of this study from musculoskeletal unit at CRP.

3.7. Method of data collection

In this study data were collected by structured type of questionnaire. This type of questionnaire includes close ended questions. Following that the investigator was gone to the osteoarthritis patients of musculoskeletal unit at CRP to take permission if they are interested in this study or not. Firstly, the investigator introduced him and the research project as well as its purpose. Then investigator met with individual subject to find out if they were interested in participating. For data collection, Bengali version of question was used because of participant easy understanding. Consent form and additional information will be provided with the questionnaire. After that a face to face interview was taken.

3.8. Data collection materials

The investigator provide structured questionnaire for data collection. Questions were set in a logical order. Bengali version of question was used because of participant

easy understanding. Also papers, pen, pencil, computer, internet modem, pen drive, clip board and consent forms were used for data gathering.

3.9. Data analysis

Descriptive statistics was used to analyze data. Descriptive statistics refers methods of describing a set of results in terms of their most interesting characteristics. Data was analyzed with the software named Statistical Package for the Social Science (SPSS) version 20. The variables were labeled in a list and the researcher established a computer based data definition record file that consist of a list of variables in order. The researcher put the name of the variables in the variable view of SPSS and defined the types, values, decimal, label alignment and measurement level of data. The next step was cleaning new data files to check the inputted data set to ensure that all data has been accurately transcribed from the questionnaire sheet to the SPSS data view. Then the raw data was ready for analysis in SPSS. Data was analyzed by descriptive statistics and calculated as percentages and presented by using table, bar graph, pie charts etc. Microsoft office Excel 2010 was used to decorating the bar graph and pie charts. The result of this study was consisted of quantitative data. By this study a lot of information was collected.

3.10. Informed consent

For this study researcher has taken permission during interview from every single participant with signature on a written consent form of the participants who were interested. The participants were informed about their role in the research process. The researcher had informed the participant about the aim of the research and procedures involved in the study. They had also informed that if they wish they were free to withdraw from the study any time. The researcher had also mentioned the participants that the information provided by the particular might be published but their name and address would not be used in research project. The study information only discusses with supervisor but this would not share with any other person. These materials were disposed off after completion of the research project. The study results might not have any direct effects on them but the Physiotherapy professional may be benefited from the study in future. Participants were also informed that they would not get any harmful things from the study.

At first to conduct this study, the research project was submitted to the IRB, Bangladesh Health Professions Institute and obtained approval. During the course of this study, interested subjects were given consent forms and the purpose of the research and the consent form were explained to them verbally in Bengali. The participants were informed that their participation would be fully voluntary and they had the right to withdraw or discontinue from the research at any time without any hesitation or risk. They were also informed that confidentiality would be maintained. Information might be published in any presentations or writing, but their personal identity such as their name and address will not be mention in the study. The participants were informed that the data was collected by written questionnaire. The supervisor also checked the consent form and questionnaire. The WHO and BMRC guidelines were followed.

This is a cross sectional study. The main objective of the study was to explore work related factors developing of OA. Convenience sampling was done to select samples. Total 50 data were collected from the OA patients. Data were numerically coded and captured in Microsoft Excel, using an SPSS 20 version software program. The investigator collected the descriptive data and calculated as percentages and presented by using bar charts.

Socio-demographic Information

4.1. Age of the participants

Among the 50 participants 12 participants were between 35-45 years, 20 were between 46-55 years, 18 were between years 56-70 years. There mean age 2.12 years, minimum age was 35 years and maximum age was 70 years. In percentage 24% participants were between 35-45 years, 40% were between 45-55 years, 36% were between 56-70 years (Figure-1).
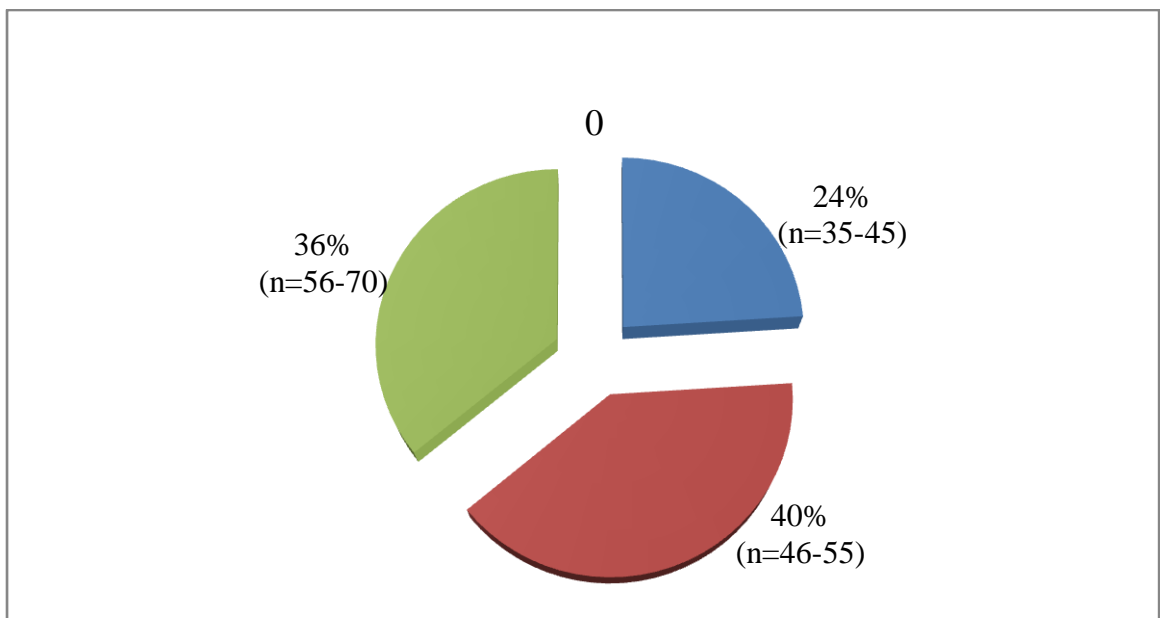
Figure 1: Age of the participants

4.2. Sex of the Participants

Among the 50 participants, female 33 (66%) were more in number than male 17 (34%) as shown in (Figure-2).
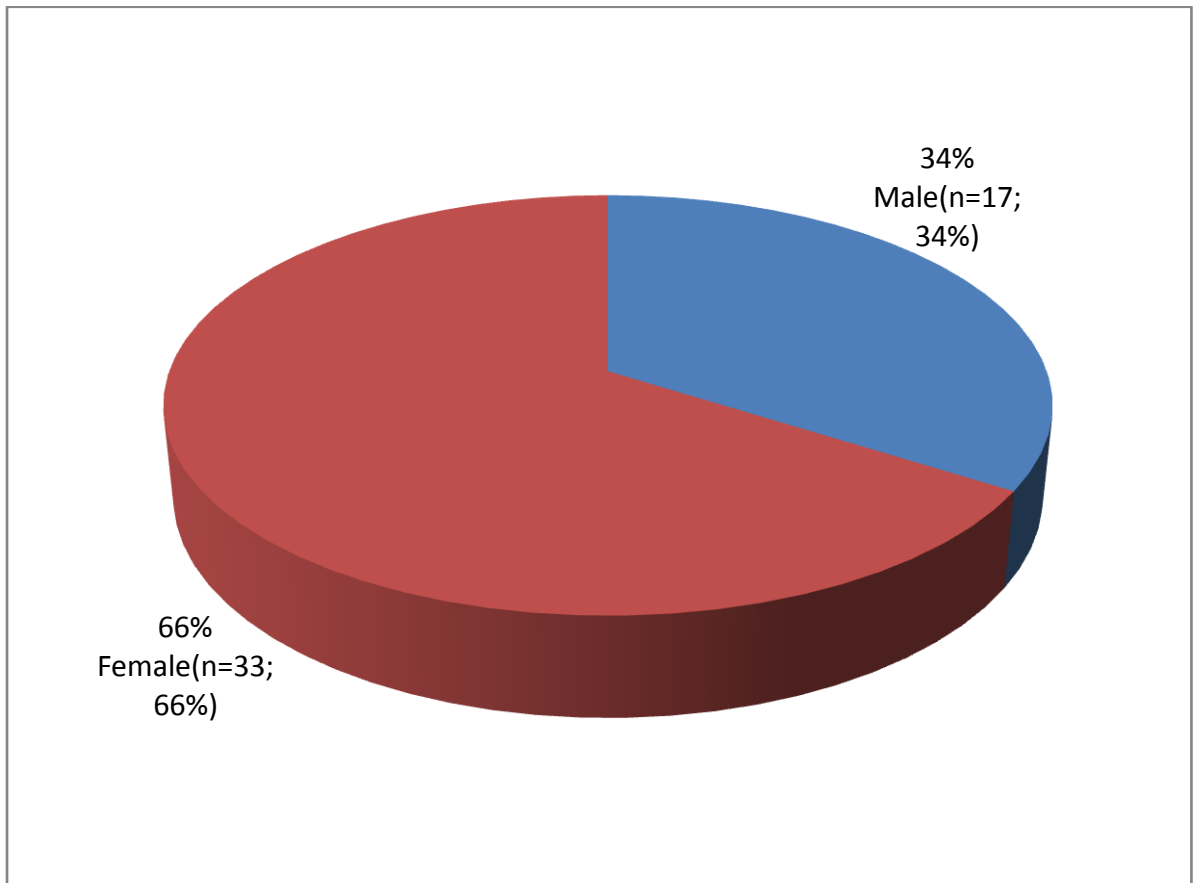
Figure 2: Sex of the participants

4.3. Occupation of the Participants

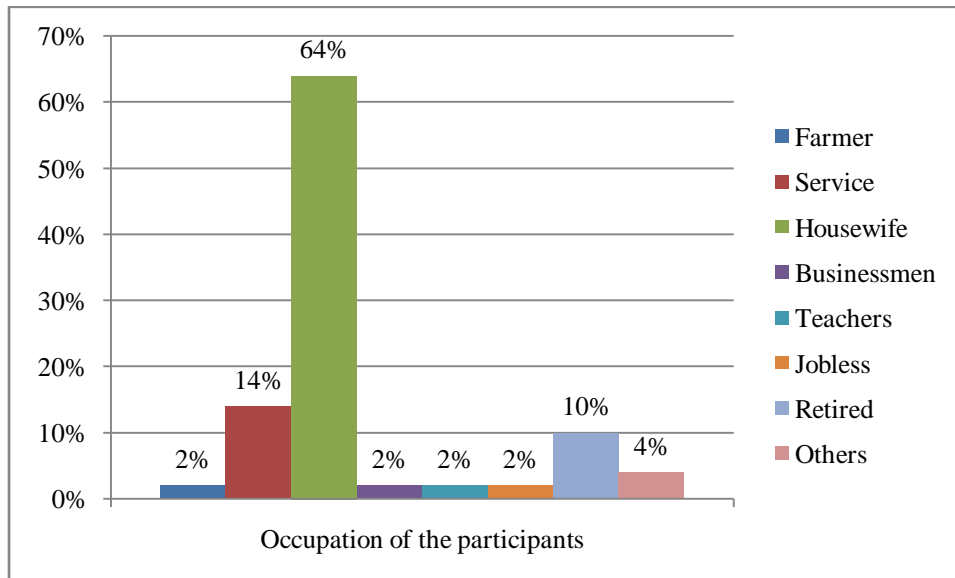Among the 50 participants 1 participants was farmer, 7 were service holder, 32 were housewife, 1 was businessmen, 1 was teacher, 1 was jobless, 5 were retired and 2 were others. In percentage 2% participants was farmer, 14% were service holder, 64% were housewife, 2% was businessman, 2% was teacher, 2% was jobless, 10% were retired, and 4% were others (Figure-3).

Figure 3: Occupation of the participants

4.4. Educational status of the participants

Among the 50 participants, 12 (24%) participants had no formal schooling, 10 (20%) participants had some primary education, 18 (36%) participant's secondary education, 7 (14%) participants had graduation and 3 (6%) participants were others (Figure-4).
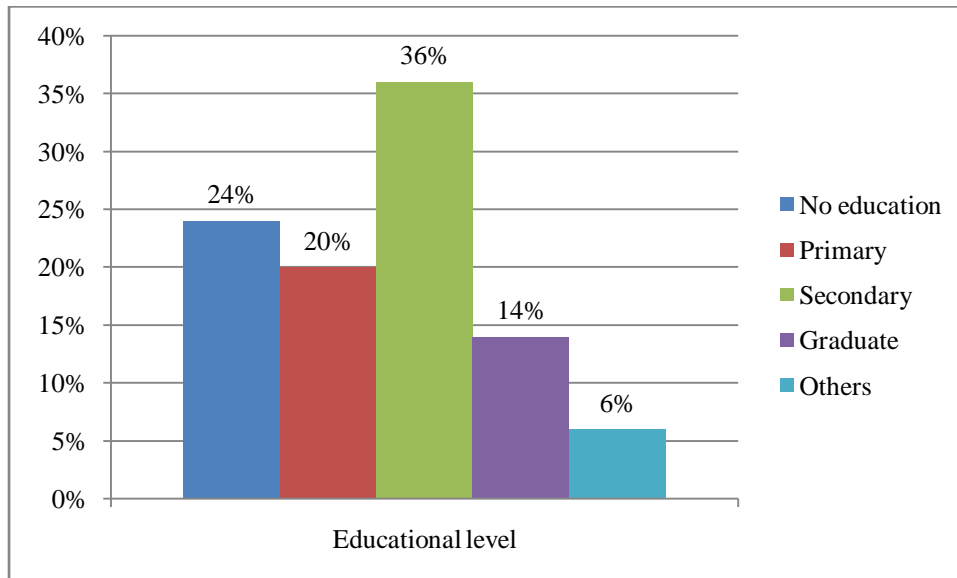
Figure 4: Educational level of the participants

4.5. Residential area of the participants

In this study greater number of participants 29 (58%) lived in rural area than urban area 21 (42%) as shown in (Figure-5).
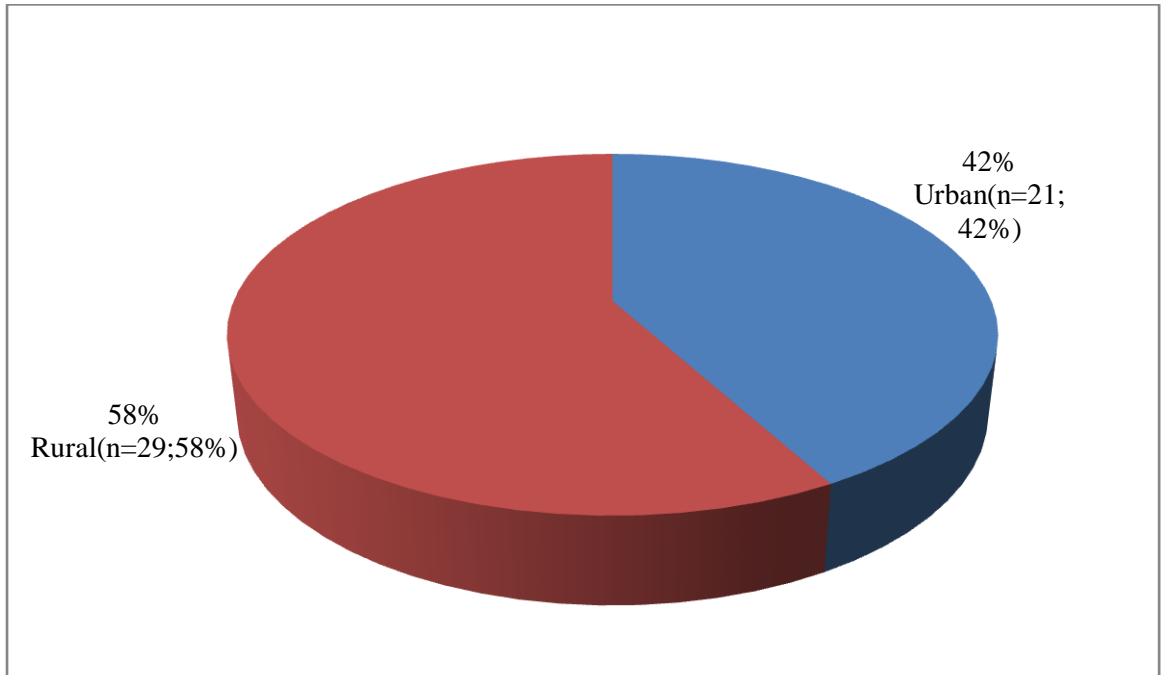
Figure 5: Residential area of the participants

4.6. Weight of the participants

Outcome demonstrated that among the 50 participants the lowest weight was 40 kg and the highest weight was 80 kg. Mean weight of the affected group was 64.46 kg (SD ± 8.192) (Figure-6).
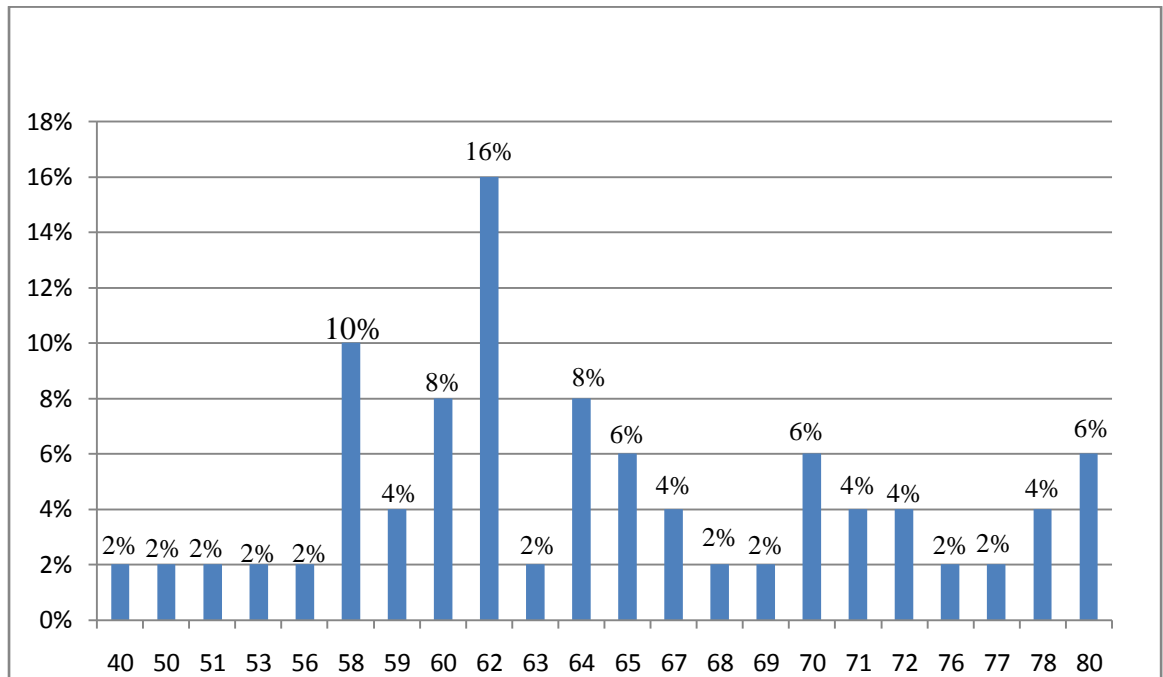

Figure 6: Weight of the participants

4.7. Presence of swelling

Among the 50 participants, 25 (50%) participants never had swelling, 1 (2%) participants rarely had swelling, 21 (42%) participants had swelling sometimes and, 3 (6%) participants often had swelling (Figure-7).
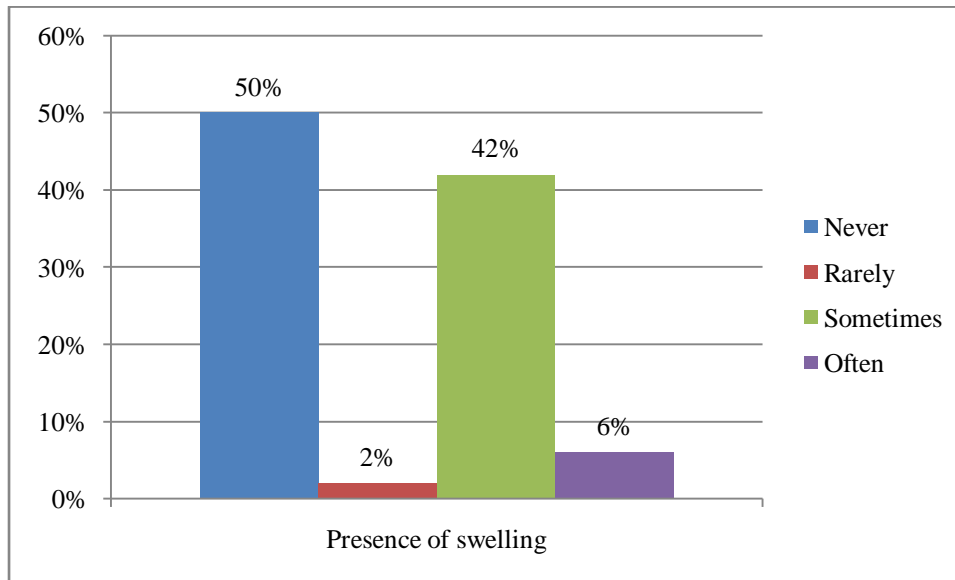

Figure 7: Presence of the swelling at knee

4.8. Time of experiencing of knee pain

Among the 50 participants, 1 (2%) participants felt no pain, 23 (46%) participants felt pain daily and 26 (52%) participants felt pain always (Figure-8).
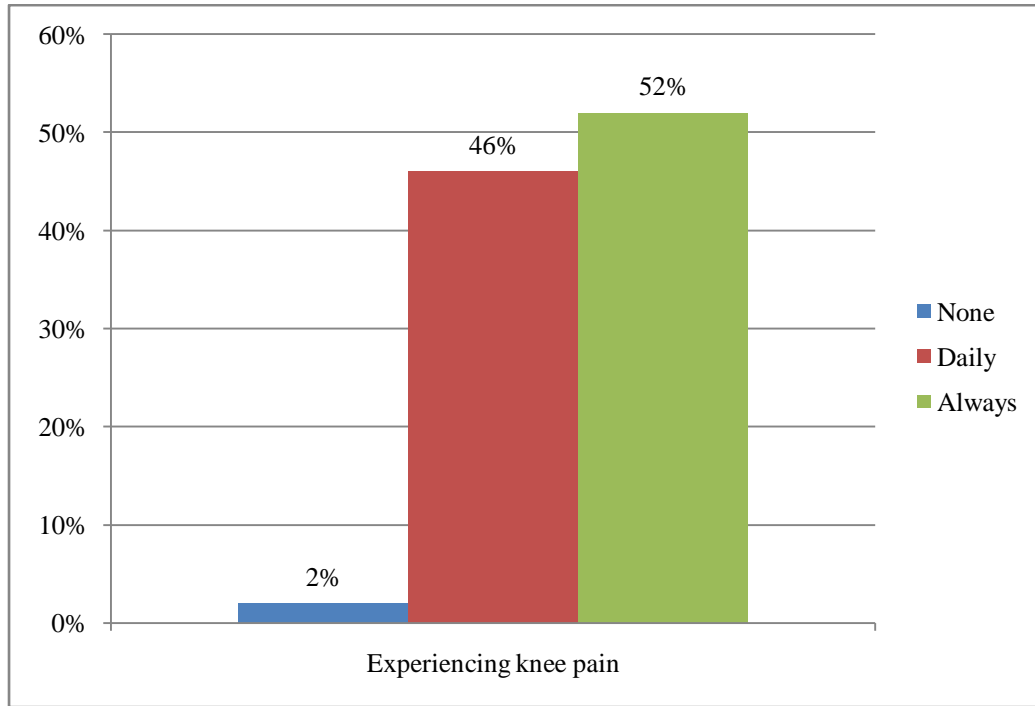

Figure 8: Time of experiencing knee pain

4.9. Pain during bending knee fully

Among the 50 participants, 7 (14%) participants felt no pain during knee bending fully, 8 (16%) participants felt mild pain , 12 (24%) participants felt moderate pain, 18 3(6%) participants felt severe pain and 5 (10%) participants felt extreme pain (Figure-9).
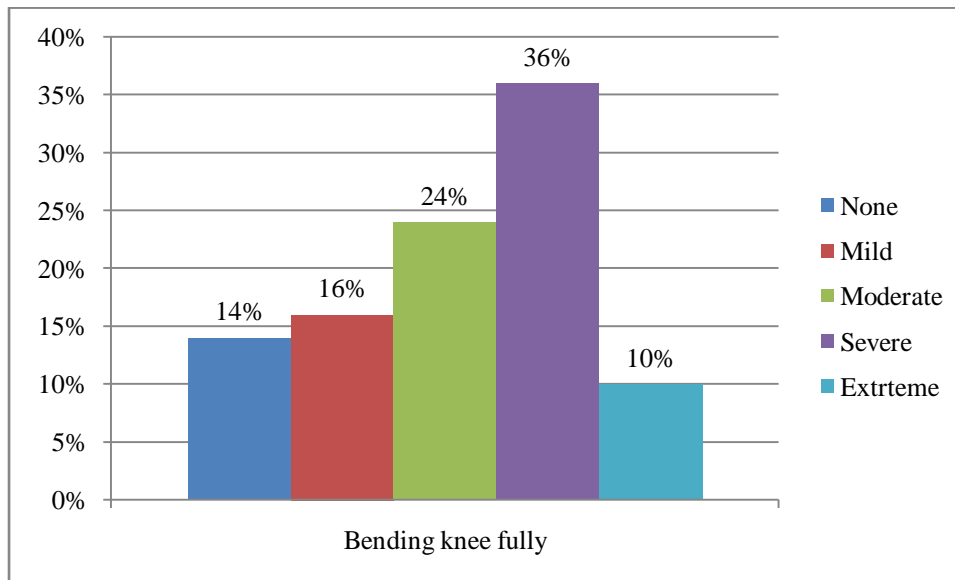

Figure 9: Pain during knee bending fully

4.10. Pain during going up and down stairs

Among the 50 participants, 1 (2%) participants felt no pain during going up down stairs, 3 (6%) participants felt mild pain, 15 (30%) participants felt moderate pain, 17 (34%) participants felt severe pain and 14 (28%) participants felt extreme pain (Figure-10).
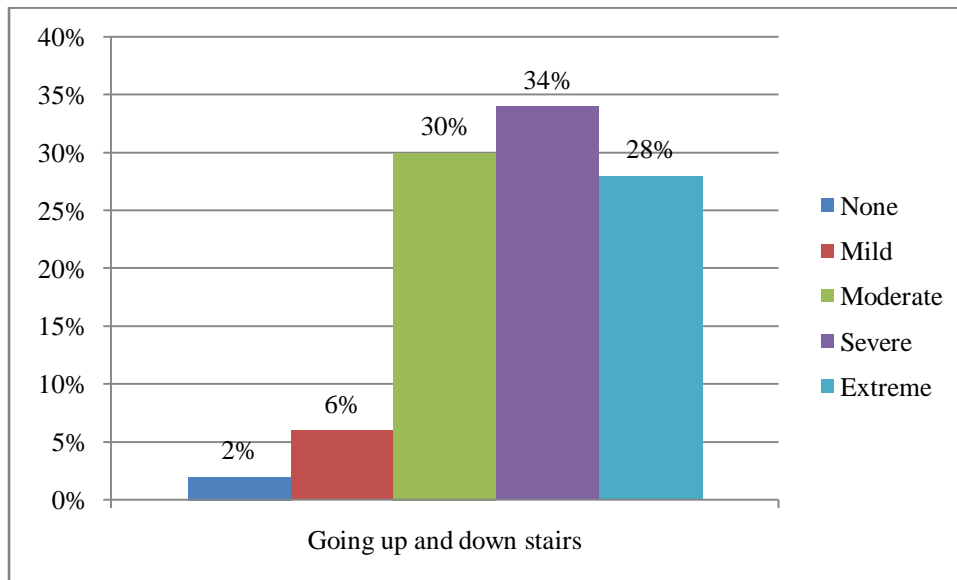

Figure 10: Pain during going up and down stairs

4.11. Pain at night while in bed

Among the 50 participants, 12 (24%) participants felt no pain while in bed, 14 (28%) participants felt mild pain, 13 (26%) participants felt moderate pain, 8 (16%) participants felt severe pain and 3 (6%) participants felt extreme pain (Figure-11).
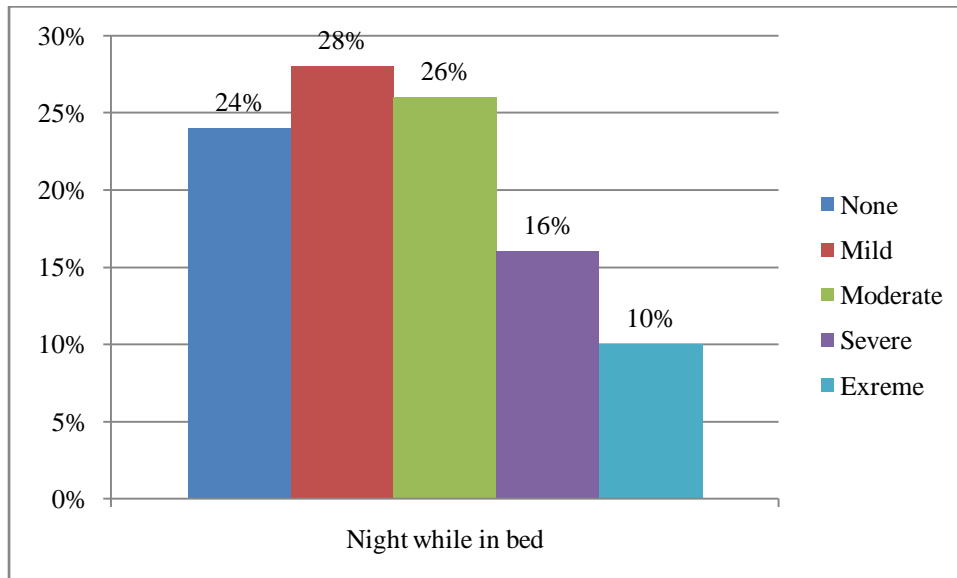

Figure 11: Pain at night while in bed

4.12. Pain during sitting or lying

Among the 50 participants, 6 (12%) participants felt no pain during sitting, 13 (26%) participants felt mild pain, 17 (34%) participants felt moderate pain, 13 (26%) participants felt severe pain and 1 (2%) participants felt extreme pain (Figure-12).
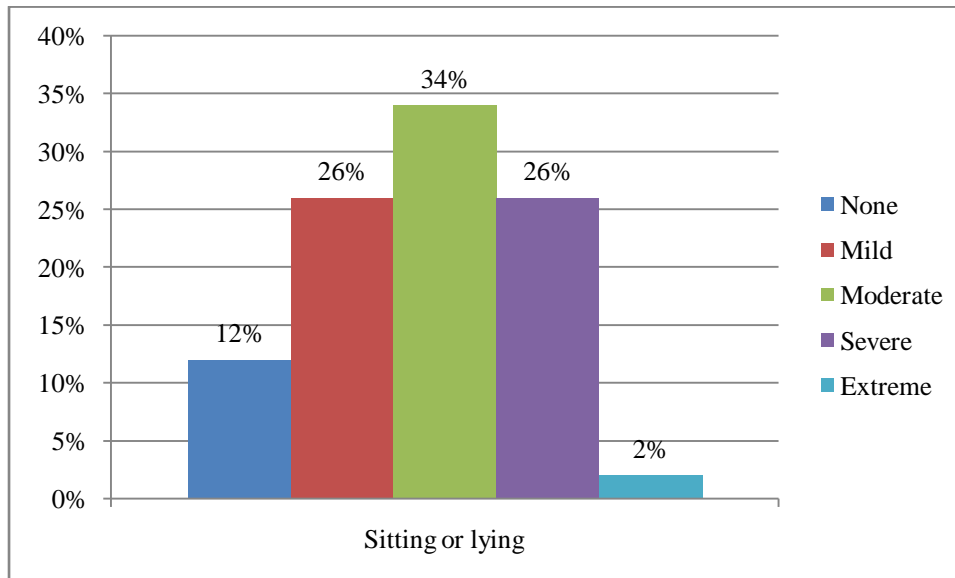

Figure 12: Pain during sitting or lying

4.13. Pain during standing upright

Among the 50 participants, 10 (20%) participants felt no pain during standing upright, 12 (24%) participants felt mild pain, 16 (32%) participants felt moderate pain, 9 (18%) participants felt severe pain and 3 (6%) participants felt extreme pain (Figure-13).
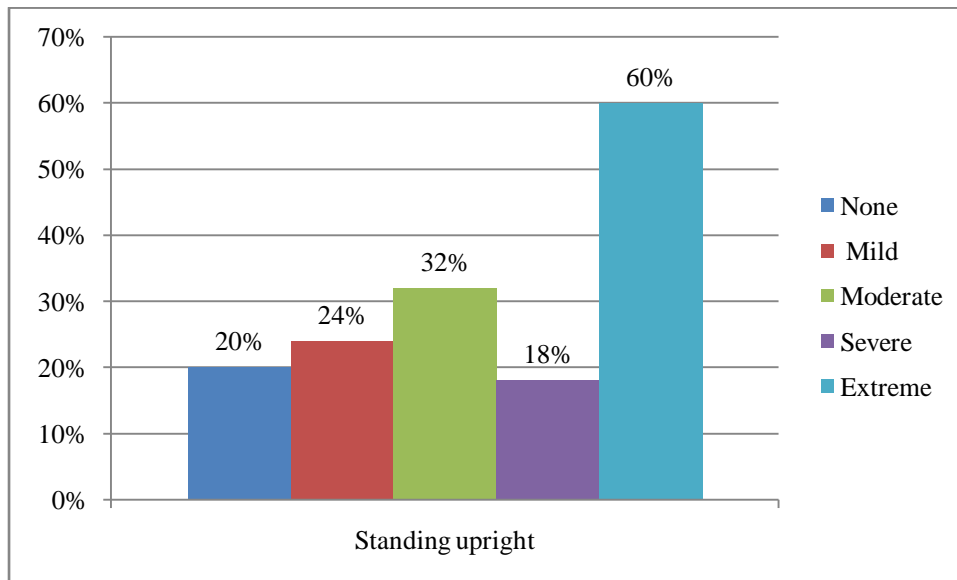
Figure 13: Pain during standing upright

4.14. Experiencing difficulty during standing

Among the 50 participants, 6 (12%) participants felt no difficulty during standing, 16 (32%) participants felt mild pain, 18 (36%) participants felt moderate pain, 7 (14%) participants felt severe pain and 3 (6%) participants felt extreme pain (Figure-14).
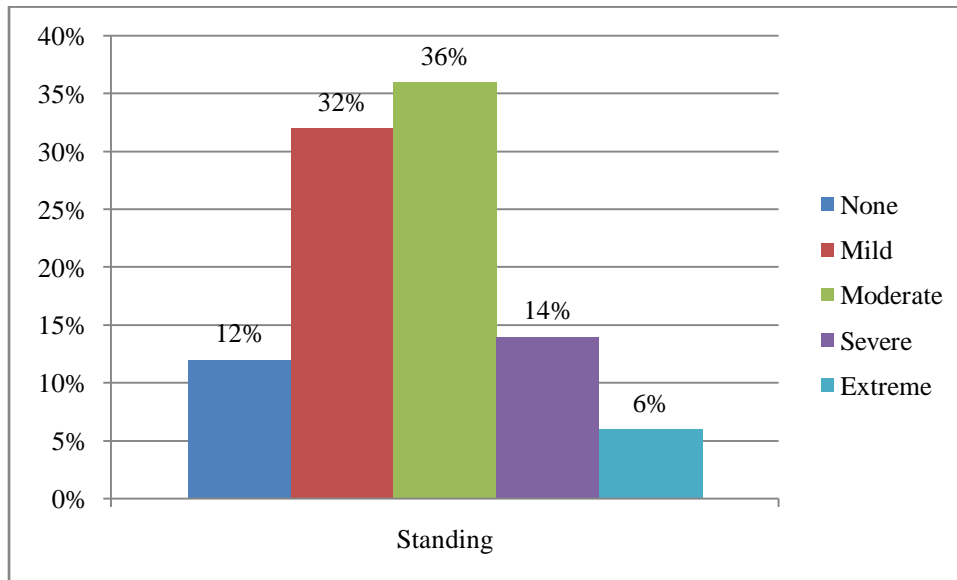
Figure 14: Experiencing difficulty during standing

4.15. Experiencing difficulty during picking up an object

Among the 50 participants, 7 (14%) participants felt no difficulty during standing, 22 (44%) participants felt mild pain, 7 (14%) participants felt moderate pain, 10 (20%) participants felt severe pain and 4 (8%) participants felt extreme pain (Figure-15).
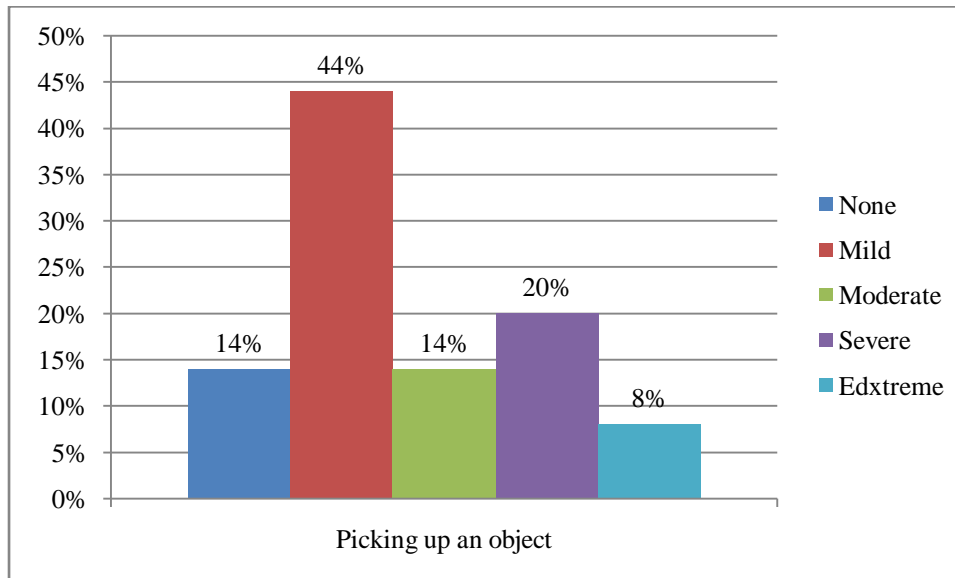

Figure 15: Experiencing difficulty during picking up an object

4.16. Experiencing difficulty during getting in /out car

Among the 50 participants, 4 (8%) participants felt no difficulty during standing, 6 (12%) participants felt mild pain, 12 (24%) participants felt moderate pain, 23 (46%) participants felt severe pain and 5 (10%) participants felt extreme pain (Figure-16).

Figure 16: Experiencing difficulty during getting in /out car

4.17. Experiencing difficulty during sitting

Among the 50 participants, 0 (0%) participants felt no difficulty during standing, 5 (10%) participants felt mild pain, 7 (14%) participants felt moderate pain, 26 (52%) participants felt severe pain and 12 (24%) participants felt extreme pain (Figure-17).
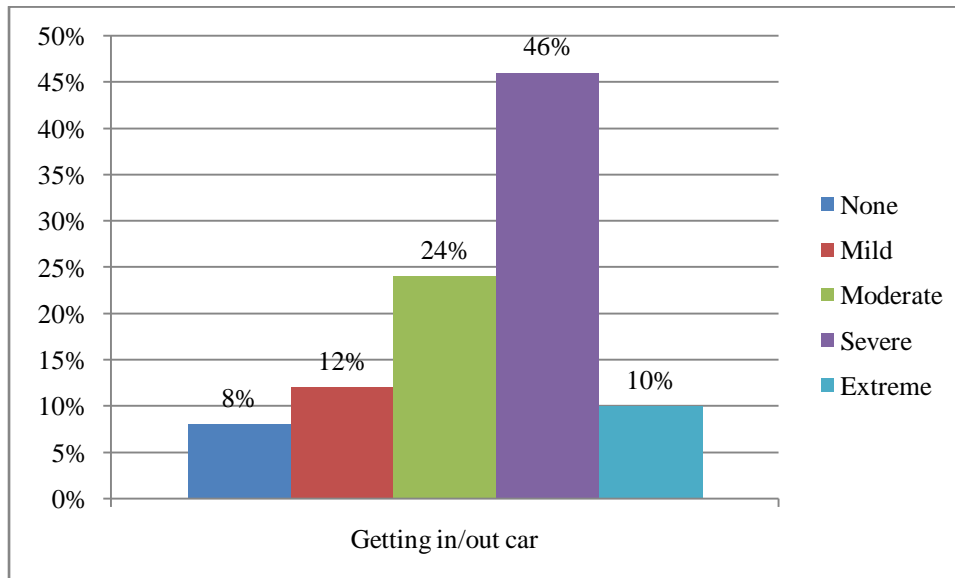

Figure 17: Experiencing difficulty during sitting

4.18. Experiencing difficulty during getting on/off toilet

Among the 50 participants, 0 (0%) participants felt no difficulty during getting on/off toilet, 1 (2%) participants felt mild pain,4 (8%) participants felt moderate pain, 6 (12%) participants felt severe pain and 39 (78%) participants felt extreme pain (Figure-18).

Figure 18: Experiencing difficulty during getting on/off toilet

4.19. Experiencing difficulty during doing heavy domestic duties

Among the 50 participants, 2 (4%) participants felt no difficulty during doing heavy domestic activities, 1 (2%) participants felt mild pain, 11 (22%) participants felt moderate pain, 23 (46%) participants felt severe pain and 13 (26%) participants felt extreme pain (Figure-19).
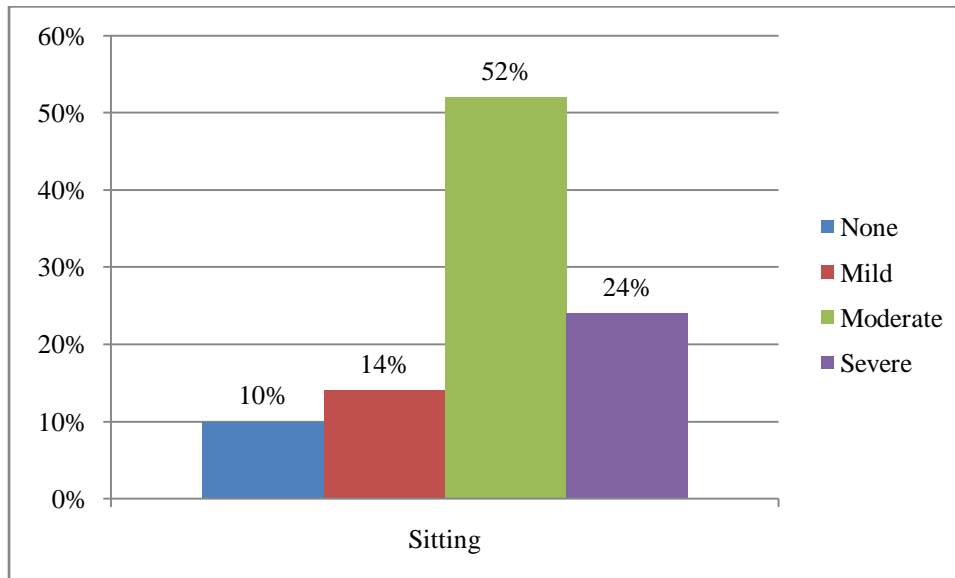

Figure 19: Experiencing difficulty during doing heavy domestic duties

4.20. Experiencing difficulty during kneeling

Among the 50 participants, 0 (0%) participants felt no difficulty during kneeling, 3 (6%) participants felt mild pain, 2 (4%) participants felt moderate pain, 18 (36%) participants felt severe pain and 27 (54%) participants felt extreme pain (Figure-20).
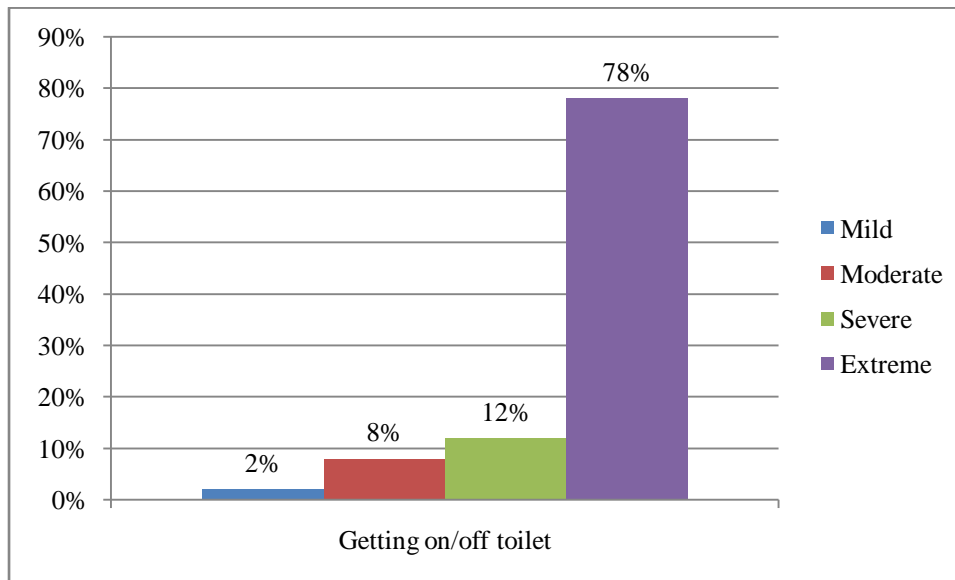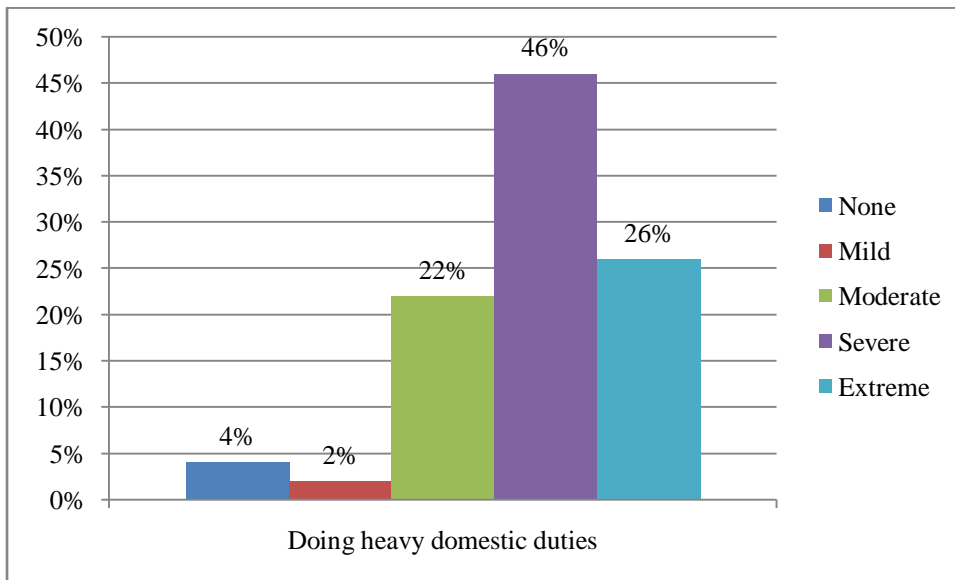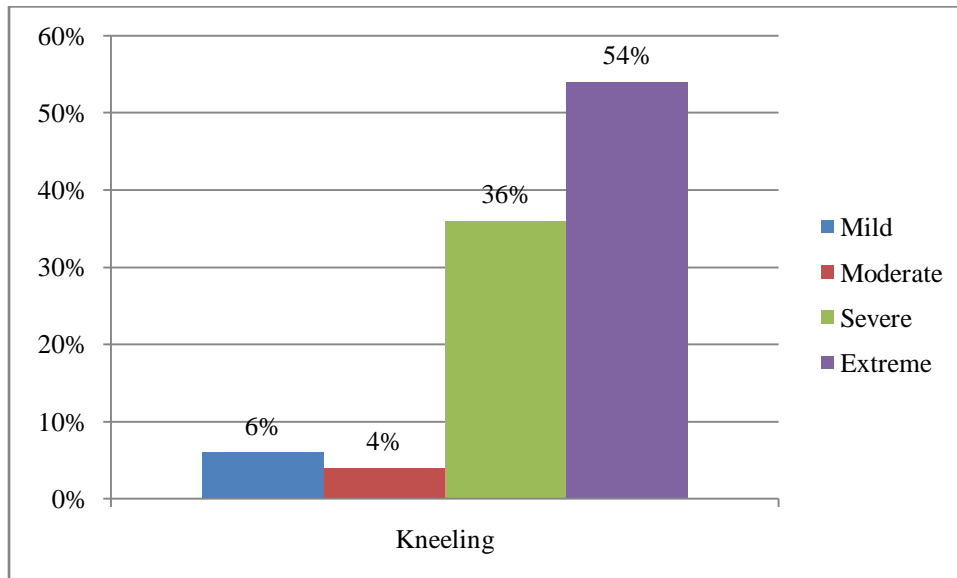

Figure 20: Experiencing difficulty during kneeling

CHAPTER-V	DISSCUSSION

This is a cross sectional study. The main objective of the study was to explore work related factors developing of OA. Convenience sampling was done to select samples. Total 50 data were collected from the OA patients.

Among the 50 participants 12 participants were between 35-45 years, 20 were between 46-55 years, 18 were between years 56-70 years. There mean age 2.12 years, minimum age was 35 years and maximum age was 70 years. In percentage around 24% participants were between 35-45 years, about 40% were between 45-55 years, about 36% were between 56-70 years . There we can see that at the range of 46-55 years, most of the patients are suffering from OA as it is the absolute age of suffering from OA. . Compared to only about 7.6% of those 18 44 years of age and about 29.8% of those 45–64 years of age, about 50% of individuals older than 65 years are diagnosed with this disease (Cheng et al., 2007-2009).

Among the 50 participants, about 33 (66%) female were more in number than male about 17 (34%) as shown in (Figure-2). 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 et al., 2007).

Among the 50 participants 1 participants was farmer, 7 were service holder, 32 were housewife, 1 was businessmen, 1 was teacher, 1 was jobless, 5 were retired and 2 were others. In percentage around 2% participants was farmer, around 14% were service holder, about 64% were housewife, about 2% was businessman, about 2% was teacher, about 2% was jobless, about 10% were retired, and around 4% were others (Figure-3). In this study, 32 housewife are mostly affected by OA as female are more sufferer than male.

Among the 50 participants, 12 (24%) participants had no formal schooling, 10 (20%) participants had some primary education, 18 (36%) participants secondary education, 7 (14%) participants had graduation and 3 (6%) participants were others (Figure-4). Here, most of the patients are not properly educated. So, levels of consciousness of these people are very low. They have not enough knowledge about OA. So, they suffer from OA most.

In this study greater number of participants 29 (58%) lived in rural area than urban area 21 (42%) as shown in (Figure-5). Rural people are more affected by OA than urban people. 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).

Outcome demonstrated that among the 50 participants the lowest weight was 40 kg and the highest weight was 80 kg. Mean weight of the affected group was 64.46 kg (SD ± 8.192). Those who have over weight they are mostly affected by OA. Grotle et al. found a significant dose-effect relationship for overweight (BMI >30) as a risk factor for knee osteoarthritis (Pollard et al., 2008).

Among the 50 participants, 25 (50%) participants never had swelling, 1 (2%) participants rarely had swelling, 21 (42%) participants had swelling sometimes and, 3 (6%) participants often had swelling (Figure-7). 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 (2010), among the 50 participants, 1 (2%) participants felt no pain, 23 (46%) participants felt pain daily and 26 (52%) participants felt pain always (Figure-8). Most of the OA patients feeling pain always. Only half of patients with radiographic knee OA reported knee pain (Dahaghin et al., 2005).

Among the 50 participants, 7 (14%) participants felt no pain during knee bending fully, 8 (16%) participants felt mild pain , 12 (24%) participants felt moderate pain, 18 3(6%) participants felt severe pain and 5 (10%) participants felt extreme pain (Figure-9). The investigator found that, 1.122 times more possible chance to occur knee osteoarthritis due to Sustained knee bending (Braunwald et al., 2001).

Among the 50 participants, 1 (2%) participants felt no pain during going up down stairs, 3 (6%) participants felt mild pain, 15 (30%) participants felt moderate pain, 17 (34%) participants felt severe pain and 14 (28%) participants felt extreme pain (Figure-10). Most of the patients feel severe pain during stairs climbing. Braunwald et al., (2009) 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.

Among the 50 participants, 6 (12%) participants felt no pain during sitting, 13 (26%) participants felt mild pain, 17 (34%) participants felt moderate pain, 13 (26%) participants felt severe pain and 1 (2%) participants felt extreme pain (Figure-12). Long time sitting is danger for OA patients.

Among the 50 participants, 10 (20%) participants felt no pain during standing upright, 12 (24%) participants felt mild pain, 16 (32%) participants felt moderate pain, 9 (18%) participants felt severe pain and 3 (6%) participants felt extreme pain (Figure-13).

Among the 50 participants, 7 (14%) participants felt no difficulty during standing, 22 (44%) participants felt mild pain, 7 (14%) participants felt moderate pain, 10 (20%) participants felt severe pain and 4 (8%) participants felt extreme pain (Figure-15). In this study, it was state that 1.304 times more possible chance to occur knee osteoarthritis due to prolong standing. Hurley (2002) stated that, prolong standing in occupation or recreational activities are a factor of knee osteoarthritis.

Among the 50 participants, 0 (0%) participants felt no difficulty during getting on/off toilet, 1 (2%) participants felt mild pain,4 (8%) participants felt moderate pain, 6 (12%) participants felt severe pain and 39 (78%) participants felt extreme pain (Figure-18). 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 the 50 participants, 2 (4%) participants felt no difficulty during doing heavy domestic activities, 1 (2%) participants felt mild pain, 11 (22%) participants felt moderate pain, 23 (46%) participants felt severe pain and 13 (26%) participants felt extreme pain (Figure-19). 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.

Among the 50 participants, 0 (0%) participants felt no difficulty during kneeling, 3 (6%) participants felt mild pain, 2 (4%) participants felt moderate pain, 18 (36%) participants felt severe pain and 27 (54%) participants felt extreme pain (Figure-20). Kneeling is also being a risk factor of developing knee osteoarthritis (Braunwald et al., 2009).

Limitation of the study

Despite the researcher best efforts with research, the present study was not completely free from all limitation and impediments. Limitations are:

Sample size was small to generalize the study result.

This study was done in a short period, so all factors in relation to osteoarthritis Musculoskeletal problem may not be highlighted.

Study was conducted in a District of Bangladesh. So this study result would

Not be generalized for whole Bangladesh.

To identify musculoskeletal problem laboratory diagnosis was not available to all participants. This can be limitation of this study.

Time and resources are limited have a great deal of impact on the study

CHAPTER-VI	CONCLUSION AND RECOMENDATION

6.1. Conclusion

In this study there were 50 participants. Intended of this study to determine the work related factors of developing osteoarthritis with considering the variables like sociodemographic and socio-economic variables, using painful knee swelling, obesity, occupation, heavy activity, stair climbing, sitting on the floor for home activity, prolong standing, sustained knee bending, squatting and kneeling. The investigator found the strong positive association of the knee osteoarthritis with using painful knee swelling, obesity, occupation, heavy activity more than four hour, stair climbing, sitting on the floor for home activity, prolong standing, sustained knee bending, squatting and kneeling. 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 squatting for toileting is one of the risk factor of the knee osteoarthritis in the study. So the investigator wishes to correct the obesity, faulty posture in occupation, regular weight bearing activity; modify sustained knee bending, stair climbing, prolong standing, and hormone replacement therapy. It is essential to develop research based findings about the work related 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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February 17, 2016
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI)
CRP-Savar, Dhaka-1343, Bangladesh

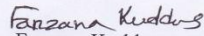Subject: **Application for review and ethical approval.**

Sir,

With due respect I would like to draw your kind attention that I am a student of Bachelor of Science in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under Faculty of Medicine of University of Dhaka (DU). I have to conduct a thesis entitled, "Work related factors that affect development of knee osteoarthritis", Muhammad Rezaul Karim, Lecturer, Department of Physiotherapy, Coordinator School of Prosthetics and Orthotics, Bangladesh Health Profession Institute (BHPI),CRP, Savar, Dhaka. The purpose of the study is to find out the work related factors that affect development of knee osteoarthritis.
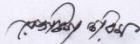
Questionnaire will be used that will take about 10 to 15 minutes. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential.

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

Sincerely yours,

Farzana Kuddus
Farzana Kuddus
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2011-2012, DU Reg. No: 1736
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Recommendation from the thesis supervisor:
Muhammad Rezaul Karim
Lecturer, Department of physiotherapy
Coordinator School of Prosthetics and Orthotics
BHPI, CRP

Attachment: Thesis Proposal including measurement tools and process and procedure for maintaining confidentiality, Questionnaire (English and Bengali version), Information sheet & consent.

BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)

(The Academic Institute of CRP)

Ref: CRP-BHPI/IRB/04/17/88   *Date:* 08/04/2017

To
Farzana Kuddus
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2011-2012 DU Reg. No: 1736
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal – Work related factors that affect development of knee osteoarthritis.

Dear Farzana Kuddus,

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on February 17, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Thesis Proposal
2	Questionnaire (English and Bengali version)
3	Information sheet & consent form.

Since the study involves answering a questionnaire that takes 10 to 15 minutes, have no likelihood of any harm to the participants, the members of the Ethics committee has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on February.

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

Best regards,

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

Permission Letter

30 August, 2016

The Head of the Physiotherapy Department.

Centre for the Rehabilitation of the Paralyzed (CRP)

Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject : Prayer for seeking permission of data collection to conduct my research project.

Dear Sir,

With due respect and humble submission to state that I am Farzana Kuddus, student of 4th Professional, B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). According to course curriculum, we have to conduct a research for the partial fulfillment of our degree. My research project entitled on **"Work related factors that affect development of knee osteoarthritis."** under the supervision of Rezaul Karim, Co_ordinator of School of Prosthetics & Orthotics, BHPI, CRP. So I need to take permission to collect data for my research project from the Musculoskeletal, unit of Physiotherapy department, CRP, Savar. I would like to assure that anything of my study will not be harmful for the participants.

I, therefore, pray & hope that you would be kind enough to grant my application & give me permission for data collection and oblige thereby.

Sincerely Yours

Farzana Kuddus
Farzana Kuddus

4th Professional B.Sc. in Physiotherapy

Roll-31, Session: 2011-2012

Bangladesh Health Professions Institute (BHPI)

M Rezaul Karim Rajib
Coordinator
School of Prosthetics & Orthotics
ID NO: 0936

সম্মতি পত্র

আসসালামুআলাইকুম \ নমস্কার,

আমি ফারজানা কুদ্দুস , ৪র্থ পেশাগত, বাংলাদেশ হেলথ প্রফেশন ইঙ্গটিটিউট (বিএইচপিআই),ঢাকা বিশ্ববিদ্যাল্যের পেরামেডিকেল অনুষদের একজন ছাত্রী। আমার ব্যাচেলর ডিগী প্রাপ্তির জন্য আমার একটি গবেষণা পরিচালনা করতে হবে এবং এটা আমার পড়াশোনার একটি অংশ। আমার গবেষণা প্রকল্পটি হচ্ছে **"কাজের সাথে জড়িত কারনগুলোযেগুলো হাঁটুতে হাড়ের বাত উন্নয়নকে প্রভাবিত করে সিআরপিতে অংশগ্রহনকারীরমধ্যে।"** আমার গবেষণা প্রকল্পটি পূরনে আমার কিছু তথ্য সংগ্রহ করা প্রয়োজন। সুতরাং এই গবেষনার জন্য অংশগ্রহনকারীর সম্মতি প্রয়োজন এবং তথ্য সংগ্রহের জন্য গবেষক অংশগ্রহনকারীর কাছ থেকে ২০-৩০ সময় নিতে হবে। আমি আপনাকে অবহিত করছি যে, এটি একটি একাডেমিক গবেষনা এবং অন্য কোনো উদ্দেশ্যে ব্যবহার করা হবে না। আমি আশ্বস্ত করতে চায় যে,সব তথ্য গোপন রাখা হবে। অংশগ্রহনকারী যে কোনো মুহূর্তে সম্মতি প্রত্যাহার করতে পারেন। এ ছাড়াও আপনি যেটা পছন্দ করেন না সেটি উত্তর না দেওয়ার অধিকার আছে।

শুরু করার আগে আপনার কি কোনো প্রশ্ন আছে?

সুতরাং আমরা ইন্টারভিউয়ের দিকে এগিয়ে যেতে পারি।

হ্যাঁ ☐

না ☐

অংশগ্রহনকারীর স্বাক্ষর ও তারিখ.........   গবেষকের স্বাক্ষর ও তারিখ ....

ঠিকানা ....   মোবাইল নং ....

কুস এর হাঁটুর জরিপ

আজকের তারিখঃ....../....../......

নামঃ...

সূচনাঃএই জরিপ আপনার হাঁটু সম্পর্কে আপনার মতামত জানতে চায়।এই তথ্য আমাদের চিহ্ন রাখতে সাহায্য করবে যে আপনি আপনার হাঁটু সম্পর্কে কি অনুভব করেন এবং কতটুকু ভালভাবে আপনি আপনার সাধারন ক্রিয়াকলাপ সম্পন্ন করতে সক্ষম।উপযুক্ত বাক্সে টিকদান দিয়ে প্রত্যেক প্রশ্নের উত্তর দিন ,প্রতি প্রশ্নের জন্য শুধুমাত্র একটি বাক্স।একটি প্রশ্নের উত্তর কিভাবে দিতে হয় তা যদি আপনি অনিশ্চিত থাকেন,দয়া করে আপনি পারেন এমন সেরা উত্তর দিন।

রোগীর সনাক্তকরণ

রোগীর কোড	
	....
বয়স	
	.... বছর

জনসংখ্যাভিত্তিক তথ্যাবলী

০১	.লিঙ্গ	ছেলে	০১
		মেয়ে	০২
০২	পেশা	কৃষক	০১
		চাকুরিজীবি	০২

			গৃহিণী	০৩
			ব্যবসায়ী	০৪
			শিক্ষকতা	০৫
			বেকার	০৬
			অবসর প্রাপ্ত	০৭
			অন্যান্য	০৮
০৩	শিক্ষাগত যোগ্যতা		প্রাতিষ্ঠানিক শিক্ষা নেই	০১
			প্রাইমারী	০২
			উচ্চ মাধ্যমিক	০৩
			স্নাতক/এর অধিক	০৪
			অন্যান্য	০৫
০৪	আবাসিক এলাকা		গ্রাম	০১
			শহর	০২
০৫	ওজন		....................কেজি	০১

লক্ষণসমূহ

গত সপ্তাহে আপনার হাঁটুর লক্ষণগুলোকে চিন্তা করে এই প্রশ্নগুলোর উত্তর দিতে হবে।

ক১) আপনার হাঁটুতে কি ফোলা আছে?

কখনই না	বিরলভাবে	কখনও কখনও	প্রায়	সর্বদা
১	২	৩	৪	৫

ক২) যখন আপনার হাঁটু নাড়ান তখন কি আপনি হয়রান,টকটক শব্দ শোনা অথবা অন্য ধরনের কোলাহল অনুভব করেন?

কখনই না	বিরলভাবে	কখনও কখনও	প্রায়	সর্বদা
১	২	৩	৪	৫

ক৩) যখন নড়াচড়া করেন আপনার হাঁটু কি ধরে আসে বা লেগে থাকে?

কখনই না	বিরলভাবে	কখনও কখনও	প্রায়	সর্বদা
১	২	৩	৪	৫

ক৪) আপনি কি আপনার হাঁটু পুরাপুরি সোজা করতে পারেন?

সর্বদা	প্রায়	কখনও কখনও	বিরলভাবে	কখনই না
১	২	৩	৪	৫

ক৫) আপনি কি আপনার হাঁটু পুরাপুরি বাঁকা করতে পারেন?

সর্বদা	প্রায়	কখনও কখনও	বিরলভাবে	কখনই না
১	২	৩	৪	৫

শক্ত হয়ে যাওয়া

নিম্নলিখিত প্রশ্নগুলো নিযুক্ত করবে যে গত সপ্তাহের সময় আপনার হাঁটুতে আপনি কি পরিমান সন্ধি শক্ত হয়ে যাওয়া অনুভব করেছেন।শক্ত হয়ে যাওয়া হলো আরামের সীমাবদ্ধতা অথবা মন্থরতার একটি সংবেদন যখন আপনি আপনার হাঁটু নড়াচড়া করান।

ক৬) সকালে প্রথম জাগরিত হওয়ার পর আপনার হাঁটু কি পরিমান শক্ত থাকে ?

কোনোটা না   হালকা   মাঝারি   তীব্র   অত্যন্ত

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

ক৭) দিনের পরে আসন গ্রহন,শয়ন অথবা বিশ্রামের পরে আপনার হাঁটু কি পরিমান শক্ত থাকে?

কোনোটা না   হালকা   মাঝারি   তীব্র   অত্যন্ত

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

ব্যাথা

খ১) আপনি কতবার হাঁটু ব্যাথা অনুভব করেন?

কখনই না   মাসিক   সাপ্তাহিক   দৈনিক   সর্বদা

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

নিম্নলিখিত কাজগুলো করার সময় গত সপ্তাহে আপনি কি পরিমান হাঁটু ব্যাথা অনুভব করেছেন?

খ২) আপনার হাঁটুতে মটকানো

কোনোটা না   হালকা   মাঝারি   তীব্র   অত্যন্ত

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

খ৩) হাঁটু পুরাপুরি সোজা করা

কোনোটা না   হালকা   মাঝারি   তীব্র   অত্যন্ত

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

খ৪) হাঁটু পুরাপুরি বাঁকা করা

কোনোটা না   হালকা   মাঝারি   তীব্র   অত্যন্ত

☐   ☐   ☐   ☐   ☐
১   ২   ৩   ৪   ৫

খ৫) সমতল ভূমির উপরে হাঁটা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

খ৬) সিঁড়ি দিয়ে উপরে ওঠা এবং নিচে নামা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

খ৭) রাতে যখন বিছানায় থাকেন

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

খ৮) বসে থাকা অথবা শুয়ে থাকা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

খ৯) সোজা হয়ে দাঁড়ানো

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

কাজ,দৈনিক জীবিকা

নিম্নলিখিত প্রশ্নগুলো আপনার শারিরিক পরিশ্রম সম্পর্কে অবগত করবে।এটার মাধ্যমে আমরা আপনার চলাফেরার সক্ষমতা এবং নিজের প্রতি যত্ন নেওয়ার মানে বোঝাচ্ছি।নিম্নলিখিত প্রত্যেকটি কাজের জন্য দয়া করে আপনার সমস্যার মাত্রা নির্দেশিত করুন যেটি আপনি গত সপ্তাহ থেকে আপনার হাঁটুর জন্য অনুভব করছেন।

গ১) সিঁড়ি দিয়ে নামার সময়

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ২) সিঁড়ি দিয়ে ওঠার সময়

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৩) বসা থেকে ওঠার সময়

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৪) দাঁড়ানো অবস্থায়

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৫) মেঝের দিকে ভাঁজ হওয়া /একটি জিনিস তোলা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৬) সমতল ভূমির উপরে হাঁটা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৭) গাড়ি থেকে ওঠা অথবা নামা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৮) কেনাকাটায় যাওয়া

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ৯) মোজা পরা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১০) বিছানা থেকে ওঠা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১১) মোজা খোলা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১২) বিছানায় শুয়ে থাকা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১৩) গোসলে যাওয়া এবং বের হওয়া

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১৪) বসে থাকা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১৫) পায়খানায় বসা এবং ওঠা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১৬) ভারী গৃহস্থালির কাজকর্ম করা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

গ১৭) হালকা গৃহস্থালির কাজকর্ম করা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

কাজ,খেলাধুলা এবং বিনোদনমূলক কাজকর্ম

নিম্নলিখিত প্রশ্নগুলো আপনার শারিরিক পরিশ্রম সম্পর্কে অবগত করবে যখন আপনি সর্বচ্চ পরিমান কাজ করেন।আপনি গত এক সপ্তাহে আপনার হাঁটুর জন্য কি পরিমান সমস্যা অনুভব করেছেন সেটির উপর চিন্তা করে প্রশ্নগুলোর উত্তর দিতে হবে।

ঘ১) উবু হওয়া

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

ঘ২) দৌড়ানো

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

ঘ৩) লাফানো

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

ঘ৪) আপনার আঘাত প্রাপ্ত হাঁটুতে মটকানো

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

ঘ৫) হাঁটু গেড়ে বসা

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

জীবনের মান

ঙ১) আপনার হাঁটুর সমস্যা সম্পর্কে আপনি কতটুকু সচেতন?

কখনই না	মাসিক	সাপ্তাহিক	দৈনিক	সর্বদা
১	২	৩	৪	৫

ঙ২) আপনি কি কখনও আপনার হাঁটুতে সম্ভাব্য ক্ষতিকর কাজগুলো এড়িয়ে চলার জন্য আপনার জীবন ধারা পরিবর্তন করেছেন?

না	হালকাভাবে	মাঝারিভাবে	গুরুতরভাবে	সম্পূর্ণভাবে
১	২	৩	৪	৫

ঙ৩) আপনার হাঁটুর জন্য বিশ্বাসের অভাবে কতটুকু সমস্যার সম্মুখীন হতে হয়?

না	হালকাভাবে	মাঝারিভাবে	গুরুতরভাবে	অত্যন্ত
১	২	৩	৪	৫

ঙ৪) সাধারনত, আপনি আপনার হাঁটু নিয়ে কি পরিমান অসুবিধায় আছেন?

কোনোটা না	হালকা	মাঝারি	তীব্র	অত্যন্ত
১	২	৩	৪	৫

প্রশ্নমালার সবগুলো প্রশ্নের সম্পূর্ণ উত্তর দেওয়ার জন্য আপনাকে অসংখ্য ধন্যবাদ।

<div style="border:1px solid black; padding:10px;">

Appendix - : 3

</div>

Consent Form

Assalamualaikum\ Namashker,

I am Farzana Kuddus, 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 **"Work related factors affecting the development of osteoarthritis at knee joint attended at CRP"** To fulfill my research project, I need to some information from you to collect data. So, you can be a respected participant of this research and the conversation time will be 20-30 minutes. I would like to inform you that this is a purely academic study and will not to be used for any other purposes. 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.

Do you have any questions before start this session?

So, I can proceed with the interview.

Yes ☐

No ☐

Signature of the participant and Date …………………………….

Signature of the researcher and Date ……………………………..

Address……………………………………………………………….

Mobile no. ………..............................

KOOS KNEE SURVEY

Today's date: _____/_____/_____

Name: _____

INSTRUCTIONS: This survey asks for your view about your knee. This information will help us keep track of how you feel about your knee and how well you are able to perform your usual activities. Answer every question by ticking the appropriate box, only one box for each question. If you are unsure about how to answer a question, please give the best answer you can.

Patient's Identification

Patient's code	
	……………
Age	
	…………… years

Demographic information

01	Sex	Male	01
		Female	02
02	occupation	Farmer	01
		Service holder	02
		House wife	03
		Businessmen	04
		Teacher	05
		Jobless	06
		Retired	07

		Others	08
03	Educational level	No formal schooling	01
		Primary	02
		Secondary	03
		Graduate/more	04
		Others	05
04	Residential area	Urban	01
		Rural	02
05	Weight	…………. Kg	01

Symptoms

These questions should be answered thinking of your knee symptoms during the last week.

S1. Do you have swelling in your knee?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐
1	2	3	4	5

S2. Do you feel grinding; hear clicking or any other type of noise when your knee moves?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐
1	2	3	4	5

S3. Does your knee catch or hang up when moving?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐
1	2	3	4	5

S4. Can you straighten your knee fully?

Always	Often	Sometimes	Rarely	Never
☐	☐	☐	☐	☐
1	2	3	4	5

S5. Can you bend your knee fully?

Always	Often	Sometimes	Rarely	Never
☐	☐	☐	☐	☐
1	2	3	4	5

Stiffness

The following questions concern the amount of joint stiffness you have experienced during the last week in your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your knee joint.

S6. How severe is your knee joint stiffness after first wakening in the morning?

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

S7. How severe is your knee stiffness after sitting, lying or resting later in the day?

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

Pain

P1. How often do you experience knee pain?

Never	Monthly	Weekly	Daily	Always
☐	☐	☐	☐	☐
1	2	3	4	5

What amount of knee pain have you experienced the last week during the following activities?

P2. Twisting/pivoting on your knee

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P3. Straightening knee fully

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P4. Bending knee fully

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P5. Walking on flat surface

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P6. Going up or down stairs

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P7. At night while in bed

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P8. Sitting or lying

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

P9. Standing upright

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

Function, daily living

The following questions concern your physical function. By this we mean your ability to move around and to look after yourself. For each of the following activities please indicate the degree of difficulty you have experienced in the last week due to your knee.

A1. Descending stairs

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A2. Ascending stairs

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A3. Rising from sitting

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A4. Standing

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A5. Bending to floor/pick up an object

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A6. Walking on flat surface

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A7. Getting in/out of car

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A8. Going shopping

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A9. Putting on socks/stockings

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A10. Rising from bed

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A11. Taking off socks/stockings

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A12. Lying in bed (turning over, maintaining knee position)

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A13. Getting in/out of bath

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A14. Sitting

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A15. Getting on/off toilet

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A16. Heavy domestic duties (moving heavy boxes, scrubbing floors, etc)

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

A17. Light domestic duties (cooking, dusting, etc)

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

Function, sports and recreational activities

The following questions concern your physical function when being active on a higher level. The questions should be answered thinking of what degree of difficulty you have experienced during the last week due to your knee.

SP1. Squatting

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

SP2. Running

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

SP3. Jumping

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

SP4. Twisting/pivoting on your injured knee

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

SP5. Kneeling

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

Quality of Life

Q1. How often are you aware of your knee problem?

Never	Monthly	Weekly	Daily	Constantly
☐	☐	☐	☐	☐
1	2	3	4	5

Q2. Have you modified your life style to avoid potentially damaging activities to your knee?

Not at all	Mildly	Moderately	Severely	Totally
☐	☐	☐	☐	☐
1	2	3	4	5

Q3. How much are you troubled with lack of confidence in your knee?

Not at all	Mildly	Moderately	Severely	Extremely
☐	☐	☐	☐	☐
1	2	3	4	5

Q4. In general, how much difficulty do you have with your knee?

None	Mild	Moderate	Severe	Extreme
☐	☐	☐	☐	☐
1	2	3	4	5

Thank you very much for completing all the questions in this questionnaire.