CHARACTERISTICS OF OSTEOARTHRITIS AT KNEE JOINT PATIENTS ATTENDED AT CRP

A. K. M. Minarul Tawhid

Bachelor of Science in Physiotherapy (B.Sc PT)

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BHPI, CRP, Savar, Dhaka-1343

Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka-1343

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

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Submitted by **A. K. M. Minarul Tawhid**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

……..
Nasirul Islam
B.Sc. PT (Hons.), MPH
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka
Supervisor

…….
Md. Sohrab Hossain
B.Sc. PT (Hons.), Dip. Ortho. Med, MPH
Assistant Professor of Physiotherapy,BHPI &
Head, Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

…….
Mohammad Anwar Hossain
B.Sc. PT (Hons.), Dip. Ortho. Med, MPH
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……..
Md. Shofiqul Islam
B.Sc. PT (Hons.), MPH
Lecturer
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……
Md. Obaidul Haque
B.Sc. PT (Hons.), Dip. Ortho. Med, MPH
Assistant Professor & Course Coordinator
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

DECLERATION

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.

Signature: **Date:**

A.K.M. Minarul Tawhid
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2005-2006
BHPI, CRP, Savar, Dhaka-1343

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Abbreviations

ACL:	Anterior Cruciate Ligament.
ADL:	Activity of Daily Living.
BHPI:	Bangladesh Health Professions Institute.
BMI:	Body Mass Index.
CMC:	Carpometacarpal.
CRP:	Center for the Rehabilitation of the Paralyzed.
DIP:	Distal Interphalanges.
DM:	Diabetes Mellitus.
EOA:	Erosive Osteoarthritis.
HTN:	Hypertension.
MRI:	Magnetic Resonance Imaging.
NSAID:	Non Steroidal Anti Inflammatory Drug.
NOA:	Nodal Osteoarthritis.
OA:	Osteoarthritis.
PIP:	Proximal Interphalanges.
ROM:	Range Of Motion.
SPSS:	Statistical Package of Social Science.
TENS:	Tanscuteneous Electrical Nerve Stimulator.
VAS:	Visual Analog Scale.

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Abstract

Purpose: To explore the characteristics of Osteoarthritis at knee joint. *Objective:* To determine the age range of the patients, to compare the gender, to determine Body weight, to identify the occupations of the patient, to determine the number of affected knee, to find out the aggravating factors, to explore the severity of pain, to find out the past medical history among the patients and to explore the outcome of Physiotherapy treatment for the patients with Knee OA. *Methodology:* A quantitative cross-sectional study design was chosen to accomplish the objectives of the study. 50 subjects were selected through simple random sampling technique from the outpatient's musculoskeletal department of CRP. A structural questionnaire was used for collecting data from the participants. *Result:* The mean age of the participant was 54±8.4. The result of the study demonstrates that n=29 (58.00%) female are affected by OA where as n=21 (42.00%) are male. The frequent occupations affected by OA Knee are included housewife n=23(46.00%), office job n=12(24.00%), businessman n=7(14.00%) and teacher n=4(8.00%). Among the participants n=39 (78.00%) subjects had obesity and n=35 (70.00%) have positive family history of OA, among the subjects n=22(44.00%) were affected by bilateral OA knee with moderate types of pain at knee in n=33(66.00%) where as n=14(28.00%) patients have severe pain and n=3(6.00%) patient have mild pain. Just n=13(26.00%) were diabetic and n=29(58.00%) patients were hypertensive and n=27(54.00%) patients were under Physiotherapy treatment and all of them were improving. The finding also reflects that the participants who live in rural area have less educational status than who live in urban areas; Obese patient have experienced more pain in squatting position comparing to those who are normal in weight; bending activities such as squatting at Asian toilet provoke more pain than European toilet, Patient experienced locking at knee joint who had past history of trauma at knee joint. *Conclusion:* The vulnerable age range to develop OA knee is over 40 and obviously obesity is one of the key issues to develop OA. Health education and promotion and perform regular exercise can prevent obesity, thus it can also prevent OA. The outcome also indicates that bending and household activity aggravate OA knee. So, life style and ergonomic modification can help a lot to minimize the symptoms of knee OA.

CHAPTER-I: INTRODUCTION

1.1 Background

People are benefited with the advancement of medical science, which has occurred in the twentieth century because of improvements in imaging, medications, and surgical techniques and instruments, doctors can more effectively diagnose and treat illness. Despite these advances, Osteoarthritis (OA) is the most common form of arthritis, and the pain associated with OA is a major cause of activity limitation, functional disability and reduced health-related quality of life (Hochberg 2007). Osteoarthritis is a multifactorial disease involving firstly, systemic factors (e.g. age, sex, hormones, genetics and nutritional factors), secondly, intrinsic joint vulnerabilities (e.g. previous damage, bridging muscle weakness, malalignment and laxity) and finally, extrinsic factors acting on joints (e.g. specific injurious activities and obesity) (Reijman et al. 2007).

Osteoarthritis (OA) of the knee is a major cause of activity limitation among the aging population of the industrialized world. A major hallmark of OA is loss of cartilage. The exact cause of knee pain in patients with OA remains enigmatic because hyaline cartilage does not contain pain fibers and, as such, cannot be the direct cause of pain in OA. Pain fibers are present in other structures in the knee, such as the joint capsule, periosteum, insertional sites of ligaments and muscles, outer third of the menisci, and, possibly, the synovium but their role is uncertain. Radiographs remain the usual means for assessment of osteoarthritic changes in the knee and their association with clinical features, such as knee pain. The association between findings of OA on radiographs and clinical features, however, is poor Magnetic resonance (MR) imaging allows another perspective of the structural abnormalities associated with OA, and MR imaging findings have been associated with clinical features, which include knee pain. Reported findings include the association between knee pain and MR imaging findings, such as joint effusion and synovial thickening, bone marrow edema , osteophytes, minimal cartilaginous lesions, alterations in volume of patellar cartilage, and periarticular lesions, which include bursitis and iliotibial band syndrome (Kornaat et al. 2006).

Osteoarthritis (OA) is perhaps the most common disabling joint affection in developed countries, and consequently a large burden to their health systems. Furthermore, it is a growing global problem due to increasing life expectancy as well as obesity and smoking, all identified as risk factors for developing knee OA and knee pain. Efforts to identify early stages of knee OA are gaining importance because of its prevalence and morbidity and the possible emergence of preventive or modifying interventions (Wollheim 2003).

1.2 Justification of the study

Osteoarthritis is a condition affects mainly old aged people and maximum old aged people are the sufferer by OA. Osteoarthritis (OA) is the most common joint disorder in all over the world. It occurs most in women of age over 45. It occurs in 80% of people over 55 years of age, 23% experience limitation of activities, Radiographic evidence of osteoarthritis is present in the majority of people over age 65; 80% of those over 75, Approximately 11% of those over 65 have symptomatic osteoarthritis of the knee (Croft 2005).

It is the most common cause of pain at knee joint that causes joint dysfunction, muscle wasting, immobility etc. It is also the cause of activity limitation thus decrease the quality of life. For that researcher interested to conduct this research to find out new things. If the characteristics of OA is find out that means the vulnerable age group of OA, the group of people are affected by OA, Body type of the OA patient, aggravating factors of OA, clinical representation of knee OA and outcome of physiotherapeutic treatment in Knee OA, As a Physiotherapist it will help to diagnose Knee OA easily and will give details information to the patient about knee OA so that people can modify their life style regarding OA at knee and we can provide better treatment as well as essential advice to the patients. As a health professional it improves our knowledge. Research makes the profession strongest. So there is no alternative option to do research as a professional to develop the profession.

1.3 Research question

What are the characteristics of Knee Osteoarthritis?

1.4 Study Objectives

1.4.1 General objective

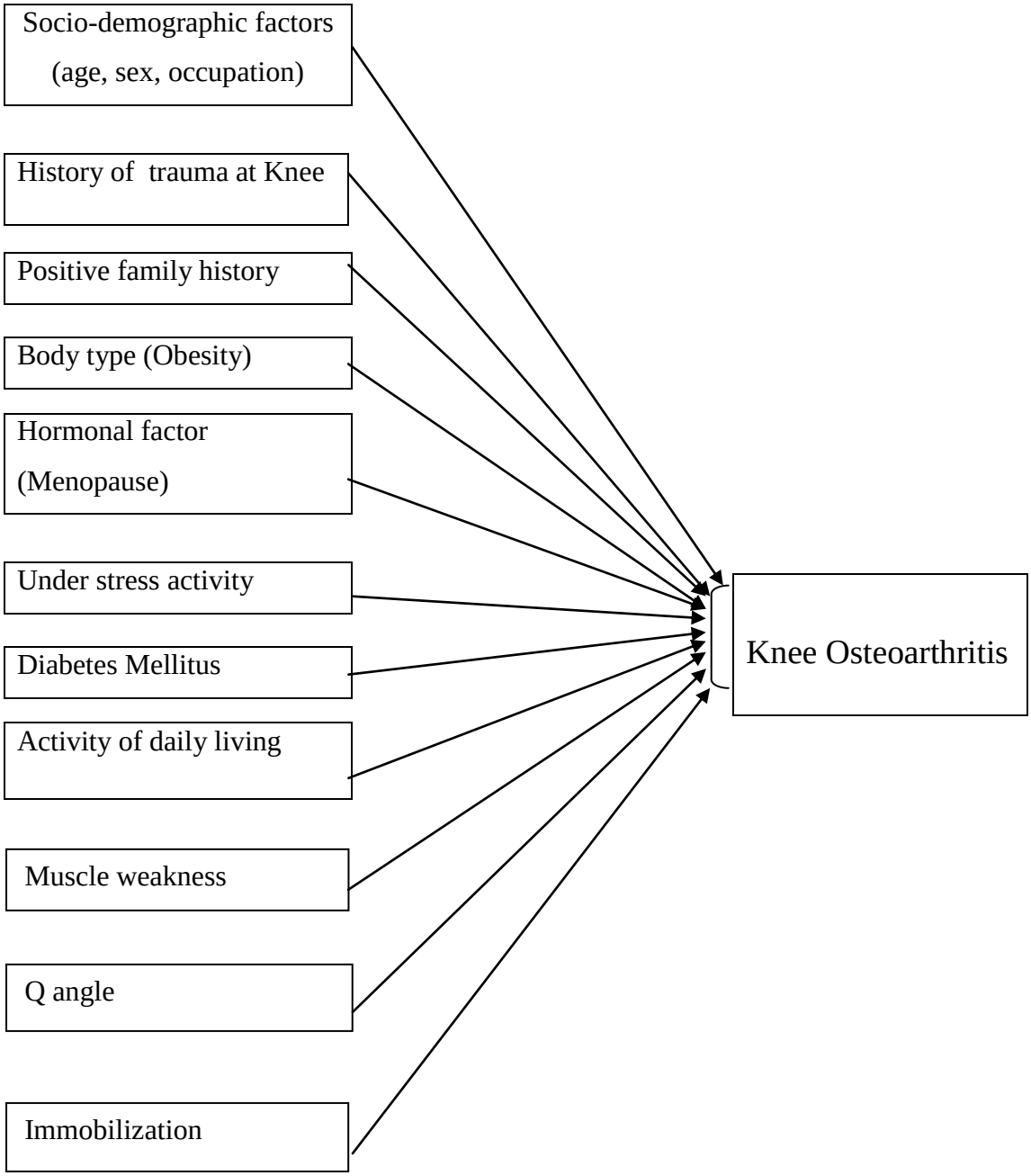
To determine the characteristics of Osteoarthritis at knee joint.

1.4.2 Specific objectives

- To determine the age range of the patient affected by Osteoarthritis at knee joint.
- To compare the gender affected by knee Osteoarthritis.
- To determine Body weight of knee osteoarthritis patients.
- To identify the occupations of the patient with knee Osteoarthritis.
- To determine the number of affected knee among the patient with knee OA.
- To find out the aggravating factors for the patients with Knee Osteoarthritis.
- To explore the severity of pain in patients with Osteoarthritis.
- To find out the past medical history (DM, HTN) among the patients affected by knee OA.
- To explore the outcome of Physiotherapy treatment for the patients with Knee OA.

1.5 Conceptual Framework

Independent variable **Dependent variable**



1.6 Operational definition

Osteoarthritis: Pain at knee which is the barrier to do daily work/job properly, decreased joint range of motion, difficulty to perform activity of daily life (ADL).

Diabetic: Participants are asked subjectively whether they have diabetic or not.

Obesity: Participants are asked subjectively about their body weight and height. Then it calculates in Body mass index (BMI) scale to find out the body type of the participants.

HTN: Participants are asked subjectively whether they have hypertension or not.

Family history: Participants are asked about his/her family history that they have any history of OA in their family.

Past trauma: Participants are asked about the number of trauma at knee or not.

Congenital deformity: Any deviation than normal from birth.

Menopause: Ending of menstruation that means starting of menopause.

CHAPTER-II: LITERATURE REVIEW

Osteoarthritis

"Osteoarthritis" is derived from the Greek word "osteo", meaning "of the bone", "arthro", meaning "joint", and "itis", meaning inflammation, although the "itis" of osteo arthritis is somewhat of a misnomer -- inflammation is not a conspicuous feature of the disease (Wilkins et al. 1983). Osteoarthritis (OA) is a degenerative joint disease, occurring primarily in older persons, characterized by erosion of the articular cartilage, hypertrophy of bone at the margins (i.e., osteophytes), subchondral sclerosis, and a range of biochemical and morphologic alterations of the synovial membrane and joint capsule. Pathologic changes in the late stages of OA include softening, ulceration, and focal disintegration of the articular cartilage; synovial inflammation also can occur"(Kornaat et al. 2006). Osteoarthritis (OA) is the most common joint disorder in all over the world. Its occurs most in women of age over 45.It occurs in 80% of people over 55 years of age, 23% experience limitation of activities, Radiographic evidence of osteoarthritis is present in the majority of people over age 65; 80% of those over 75, Approximately 11% of those over 65 have symptomatic osteoarthritis of the knee (Croft 2005).

The prevalence of OA varies according to the definition, the specific joint, and the characteristics. The age standardized prevalence of radiographic knee OA in adult's age ≥ 45 was 19.2% among the participants in the Framingham Study and 27.8% in the Johnston County Osteoarthritis Project. In the third National Health and Nutrition Examination Survey (NHANES III), approximately 37% of participants age >60 years or older had radiographic knee OA (Zhang & Jordan 2008). Symptomatic knee OA occurs in 10% men and 13% in women aged 60 years or older (Zhang and Jordan 2008). In Malaysia, 14.4% complained of pain in the joints and/or musculoskeletal pain. The knee was responsible for 64.8% of all complaints pertaining to the joints, and more than half those examined with knee pain had clinical evidence of osteoarthritis (OA). The complaint rate increased with age, up to 53.4% in the group age > 65 years. The major disability encountered was the inability to squat (3.1%). Fibromyalgia, soft tissue lesions, and localized OA of the knees were the main clinical diagnoses (Veerapen et al. 2007).

Classification of OA

Generally OA is 2 types- 1. Primary OA.

2. Secondary OA.

Another classification are-

Joint Distribution of OA

Among all Osteoarthritis DIP joints affects in 40% case, PIP 15% case, CMC 30% case, Knee joint affects in 30-40% case and Hip joint affects in 10% cases.

Radiological Classification of Osteoarthritis (OA)

Grade-0 (Normal) = No feature of OA, Minute osteophyte.

Grade-1 (Doubtful) = Doubtful significance.

Grade-2 (Mild) = Definite osteophyte. Normal joint space.

Grade-3 (Moderate) = Moderate joint space reduction.

Grade-4 (Severe) = Joint space greatly reduced, Subchondral sclerosis (Kellgren 1963).

Arthroscopic classification of severity of OA

- Grade-1 = Swelling and softening of cartilage. Oedema and cellular infiltrate.
- Grade-2 = Superficial fibrillation.
- Grade-3 = Deeper and large cartilage fibrillation.
- Grade-4 = Visualisation of underlying subchondral bone (Ayral 1993).

Risk Factors of OA

Age is an Osteoarthritis Risk Factor

Osteoarthritis is the most common joint disease in the United States and worldwide. OA is also the most common causes of pain and disability in older people. Some statistics like one third of people over 65 years old have knee osteoarthritis which can be seen on x-ray, Seventy percent of people over 70 years old have x-ray evidence of osteoarthritis, Before 50 years old, osteoarthritis is more prevalent among men than women and after 50 years old, women are more likely affected by osteoarthritis than men. Not all people who have osteoarthritis evident on x-ray develop symptomatic osteoarthritis (Eustice 2010).

Other Known Osteoarthritis Risk Factors

Osteoarthritis risk factors include:

- **Excess weight or obesity** - Obese women are four to five times more likely to have knee osteoarthritis than people of normal weight.
- **Injury** - Acute knee injuries are recognized as common causes of knee osteoarthritis.
- **Certain occupations** - Farmers, jackhammer operators, and mill workers have high rates of osteoarthritis.
- **Congenital or developmental deformities** - Abnormalities of the hip and knee can lead to premature osteoarthritis.
- **Hormones** - Women who take estrogen replacement therapy are not as likely to develop osteoarthritis as women who do not take estrogen.
- **Weak thigh muscles** - Weak quadriceps can lead to osteoarthritis of the knees.
- **Genetic factors** - Genetics may impact the incidence of osteoarthritis. For example, heritability of hand osteoarthritis is about 65 percent.
- **Race** - Some reports suggest that African-Americans have higher rate of osteoarthritis than Caucasians.
- **Other diseases which change cartilage structure** - Rheumatoid arthritis, gout, pseudogout, and hemochromatosis may increase the risk of developing osteoarthritis.
- **Low intake of vitamin C and D** - Has been associated with increased risk of knee osteoarthritis (Eustice 2010).

In shortly Age, Gender, Ethnicity, Genetics, Hormonal status, Bone density, Metabolic and Nutritional status are the systemic risk factors of OA. On the other hand Obesity, Major trauma, Joint deformity, Physical disability, Muscle weakness, Occupational/sports stress and Sports injury are the local risk factors for developing osteoarthritis (Blagojevic et al. 2001).

Causes of OA

Primary OA- This type of OA is a chronic degenerative disorder related to but not caused by aging, as there are people well into their nineties who have no clinical or functional signs of the disease. As a person ages, the water content of the cartilage

decreases as a result of a reduced proteoglycan content, thus causing the cartilage to be less resilient. Without the protective effects of the proteoglycans, the collagen fibers of the cartilage can become susceptible to degradation and thus exacerbate the degeneration. Inflammation of the surrounding joint capsule can also occur, though often mild (compared to that which occurs in rheumatoid arthritis). This can happen as breakdown products from the cartilage are released into the synovial space, and the cells lining the joint attempt to remove them. New bone outgrowths, called "spurs" or osteophytes, can form on the margins of the joints, possibly in an attempt to improve the congruence of the articular cartilage surfaces. These bone changes, together with the inflammation, can be both painful and debilitating (Solomon & Warkick 2001)

A number of studies have shown that there is a greater prevalence of the disease between siblings and especially identical twins, indicating a hereditary basis. Up to 60% of OA cases are thought to result from genetic factors.

Both primary generalized nodal OA and erosive OA (EOA. also called inflammatory OA) are sub-sets of primary OA. EOA is a much less common, and more aggressive inflammatory form of OA which often affects the DIPs and has characteristic changes on X-Ray (Peat et al. 2001).

Secondary OA

This type of OA is caused by other factors but the resulting pathology is the same as for primary OA:

- Congenital disorders of joints
- Diabetes.
- Inflammatory diseases (such as Perthes' disease), (Lyme disease), and all chronic forms of arthritis (e.g. costochondritis, gout, and rheumatoid arthritis). In gout, uric acid crystals cause the cartilage to degenerate at a faster pace.
- Injury to joints, as a result of an accident.
- Septic arthritis (a infection of a joint)
- Ligamentous deterioration or instability may be a factor.
- Marfan syndrome
- Obesity
- Alkaptonuria

- Hemochromatosis and Wilson's disease (Hassett et al. 2006)

Nodal generalized OA

Presentation is typically in women between 40 and 50 who develop pain, stiffness and swelling of one or a few finger interphalangeal joints (IPJs). Gradually, over many months, more finger IPJs (distal > proximal) are affected. These joints develop posterolateral swellings on each side of the extensor tendon which slowly enlarge and harden to become Heberden's (distal IPJ) and Bouchard's (proximal IPJ) nodes. Typically, each joint goes through a phase of episodic symptoms (1-5 years) while the node evolves and OA develops in the underlying IPJ. Once OA is fully established, symptoms may subside and hand function often remains good. Affected IPJs often show characteristic lateral deviation, reflecting the asymmetric focal cartilage loss of OA. Involvement of the first carpometacarpal joint is also common. At this site, marked osteophyte and subluxation may result in 'thumb-base squaring'. Unlike IPJ OA, thumb-base OA may associate with more persistent symptoms and more severe functional impairment. People with nodal OA are at increased risk of OA at other sites ('generalised OA'), especially the knee. Nodal generalised OA has a very strong genetic predisposition, the daughter of an affected mother having approximately a 1 in 3 chance of developing nodal OA. Nodal OA with multiple nodes and symptom onset in middle age should not be confused with just one or two asymptomatic nodes related to past trauma, a common finding, particularly in old age (Moore & Dalley 2006).

Pathophysiology of OA

Pathology will be considered in relation to each joint stuctures as follows:

- Articular cartilage
- Bone
- Synovial membrane
- Capsule.
- Ligaments
- Muscles

Articular Cartilage: Erosion occurs at the central and weight bearing areas of the bone lead to fibrillation which causes softening, splitting and fragmentation of the bones and disorganization of proteoglycans occurs, Water absorption of cartilage causing

further softening and flaking. Breaking off flakes cartilage causing locking and inflammation at the joint. Proliferation occurs at the periphery of cartilage.

Bones: Due to eburnation cystic cavity formation in the subchondral bone thus causes venous congestion in the subchondral bone. Osteophytes formation at the margin of articular surface and lteration of bony shape at weight bearing joint. E.g-the femoral head become flat and mushroom shaped, tibial condyle become flattened.

Synovial membrane: Synovial membrane become Hypertrophy and oedematous. Fibrous degeneration occurs in later stage and reduction of synovial fluid secretion causing loss of nutrition and lubrication of the articular cartilage.

Capsule: Like synovial membrane fibrous degeneration also occurs at the joint capsule and low grade chronic inflammatory change are seen at the joint capsule.

Muscles: Muscle wasting occurs due to disuse atrophy that causes limitation of the movement and ultimately causes functional limitation and at last fibrous atrophy at later stage (Aigner and Kim 2002).

Characteristics of OA

Basically, osteoarthritis is brought about by the wear and tear of a joint. Injuries and the aging process are the most common culprits to the development of this problem. The usual symptoms of this condition include pain and stiffness of the joint. Sometimes joint enlargement or swelling present. In osteoarthritis, the stiffness or difficulty to move your knees or affected joints gets worse as the day progresses. The people who usually get this condition are older people and even athletes because of the wearing down of joints due to excessive use. Generally, osteoarthritis triggers pain in the larger joints, such as the knees and the hips (Martin 2008).

Clinical Features of OA

Pain: Sever aching pain on weight bearing joint due to stress on the synovial membrane and bone surface. Throbbing pain occurs at night due to inflammation. Sometime pain referred distally and sharp stabbing pain comes if there is loose bodies within the joints (Kalunian 2009). The pain is caused by microfractures of the subchondral bone and medullary hypertension with bone angina of subchondral bone causes pain at the joint, osteophytes causes stretching of nerve endings in the

periosteum as well as ligamentum stretch also causes pain. Inflammation of joint capsule and synovium and its distention causes pain. Due to internal pathology of the joint periarticular muscle spasm occur and which also one of the cause of pain (Aigner and Kim 2002).

Typical clinical Signs of Osteoarthritis

- Patient over age of 40(often over 60).
- Pain mainly related to movement and weight bearing which is relieved by rest.
- Usually only one or few joint painful.
- Restricted movement due to capsular thickening, blocking by osteophytes.
- Palpable, sometime audible, Coarse crepitus (rough articular surface).
- Bony swelling around joint margins.
- Deformity without instability.
- Joint line or periarticular tenderness.
- Muscle weakness and wasting.
- No or only mild sinovitis (effusion, increased warmth) (Haslett C et al. 1999).

Knee OA

OA principally targets the patello-femoral and medial tibio-femoral compartments of the knee. It may be isolated or occur as part of NOA. Most knee OA, particularly in women, is bilateral and symmetrical. Trauma is a more important risk factor in men and may result in unilateral OA. OA knee pain is usually localised to the anterior or medial aspect of the knee and upper tibia. Patello-femoral pain is usually worse going up and down stairs or inclines. Posterior knee pain suggests a complicating popliteal 'cyst'. Prolonged walking, rising from a chair, getting in or out of a car, or bending to put on shoes and socks may be difficult. A jerky, asymmetric antalgic gait (less time weightbearing on the painful side) present in the people with knee OA. A varus less commonly valgus, and/or fixed flexion deformity are seen among the knee OA patient. Joint-line and/or periarticular tenderness (secondary anserine bursitis and medial ligament enthesopathy are common, giving tenderness of the upper medial tibia). Due to less use weakness and wasting is present at the quadriceps muscle is present. Sometimes coarse crepitus with restricted flexion/extension at the knee. Bony swelling present at the knee joint line (Moore & Dalley 2006).

Pain is around & through the joint. Pain may refer to the anterior aspect of the thigh or down to the ankle. Muscle spasm may present in hamstring so that flexion deformity present in most of the cases. Knee joint enlarged and Quadriceps muscle atrophy occurs due to less activity by the affected limb (Kenneth 2009).

Diagnosis of OA

Diagnosis of osteoarthritis focuses on two major goals. When diagnosing osteoarthritis, the doctor must first differentiate osteoarthritis from other types of arthritis. It is also important to determine whether a patient has primary osteoarthritis or a secondary form of osteoarthritis associated with another disease or condition.

Early, accurate diagnosis of osteoarthritis is necessary so that appropriate treatment options can be considered. To diagnose osteoarthritis, doctor will make assessments using:

Medical History

Medical history will include information about past medical conditions, allergies, treatments, and surgical procedures as well as current medical issues. Typically, at the first appointment with doctor, patient will be asked to fill out an extensive questionnaire about medical history. Patient will also be asked about the symptoms that patients are experiencing including when they commonly occur and what makes the symptoms worse or better (Eustice 2009).

Physical examination

During the physical examination, doctor will observe for any signs and symptoms which commonly are associated with osteoarthritis. The doctor will look for:

- Joint swelling
- Joint tenderness
- Decreased range of motion in joints
- Visible joint damage (i.e., bony growths)

Imaging studies

X-rays are typically used to confirm the diagnosis of osteoarthritis. X-rays can reveal osteophytes at the joint margins, joint space narrowing, and subchondral bone sclerosis. Subchondral bone is the layer of bone which is just below the cartilage.

While MRI (magnetic resonance imaging) is a more sensitive imaging method, it is used less often than x-rays due to cost and availability. MRI scans show cartilage, bone, and ligaments.

Laboratory tests

Routine laboratory tests are usually normal so their value is in ruling out other types of arthritis, especially inflammatory types of arthritis, or establishing a baseline for monitoring treatment. Synovial fluid analysis also helps rule out other conditions.

American College of Rheumatology Criteria

The American College of Rheumatology has established clinical criteria for diagnosing primary osteoarthritis of the hand, hips, and knees:

Osteoarthritis of the Knee

- Knee pain and;
- At least three of the following 6 criteria: 50 years of age or older, stiffness lasting less than 30 minutes, crepitus, bony tenderness, bony enlargement, no warmth to the touch.

Laboratory findings which are useful to assessing knee osteoarthritis include sedimentation rate less than 40 mm/hour, rheumatoid factor less than 1:40, and synovial fluid examination showing clear, viscous fluid with a white blood cell count less than 2,000/mm3. It is the doctor's job to be the diagnostician but it clearly is helpful if the patient understands why tests are being performed and what the results mean. If a patient understands the process from early symptoms to diagnosis to treatment plan, the patient will likely be more compliant and the outcome of treatment will likely be more successful (Eustice 2009).

Treatment of Knee OA

Treatment of knee arthritis should begin with the most basic steps and progress to the more involved, possibly including surgery. Not all treatments are appropriate for every patient, and he/she should have a discussion with doctor to determine which treatments are appropriate for him/her. Some treatment options are like weight Loss which is probably one of the most important, yet least commonly performed treatments. The less weight the joint has to carry, the less painful activities will be.

Activity Modification which limiting certain activities may be necessary, and learning new exercise methods may be helpful; Walking Aids that is use of a cane or a single crutch is the hand opposite the affected knee will help decrease the demand placed on the arthritic joint; Physical Therapy like strengthening of the muscles around the knee joint may help decrease the burden on the knee. Preventing atrophy of the muscles is an important part of maintaining functional use of the knee. Some anti-Inflammatory Medications these are anti-inflammatory pain medications (NSAIDs) are prescription and nonprescription drugs that help treat pain and inflammation; Cortisone Injections may help to decrease inflammation and reduce pain within a joint; Synvisc may be effective against pain in some patients with knee arthritis and may delay the need for knee replacement surgery; Joint Supplements (Glucosamine) mainly Glucosamine appears to be safe and might be effective for treatment of knee arthritis, but research into these supplements has been limited; Knee Arthroscopy exactly how effective knee arthroscopy is for treatment of arthritis is debatable. For some specific symptoms, it may be helpful then knee Osteotomy-while most patients are not good candidates for this alternative to knee replacement, it can be effective for young patients with limited arthritis; Total Knee Replacement Surgery and by this procedure, the cartilage is removed and a metal & plastic implant is placed in the knee and lastly artial Knee Replacement Surgery is also called a unicompartmental knee replacement; this is replacement of one part of the knee. It is a surgical option for the treatment of limited knee arthritis (Cluett 2011).

Physiotherapy Management of Knee OA

The aims of the physiotherapy management of Knee OA are-

- Relieve pain and muscle spasm.
- Strengthen muscles.
- Mobilize joints.
- Teach maintenance of joint range and muscle power.
- Improve coordination.
- Train to reduce postural stress.
- Advise rest/activity relationship.
- Help to maintain function (Magee 1997).

Management of OA at knee

Measures to relieve pain and muscle spasm: During the acute phase treatment should be continued with TENS, ultrasound, short-wave diathermy, hydrotherapy, cryotherapy etc and during the chronic phase deep heating should be introduced.

Exercise regimen for OA of knee: Strong isometric exercise for Quadriceps and hamstring is necessary for the patient with knee OA. In case of Active ROM exercises patient can easily perform and it improve the joint range of motion at the knee, with the improvement of joint range of motion it facilitates joint lubrication and thus joint get relaxation. On the other hand Isokinetic exercise is a self controlled exercise and it's also easy to perform frequently as well as active exercise which improves muscle strength. Straight leg raising gives stability to the knee during weight bearing. Hamstring stretching exercise helps to prevent flexion deformity of the knee. By using assistive device like- Orthosis, walkers, sticks etc. we can reduce compressive forces on the knees. Besides these patient can take some measure him/her selves like reduction of weight so that load on the knee joint comes down. Walking on level ground and avoid uneven surface and minimization of frequent standing & sitting (Ebnezar 2003).

Prevention of Knee OA

As the number of people who have osteoarthritic disease is increasing, the prevention of osteoarthritis is important and necessary. Osteoarthritis has three strong risk factors (excessive musculoskeletal loading, high body mass index and previous knee injury) in which prevention may work. According to Hochberg, avoiding squatting and kneeling and carrying heavy loads during work have been associated with a reduction of 15–30% in the prevalence of osteoarthritis in men. Another study showed a significant exposure–response relationship between symptomatic knee osteoarthritis and squatting and kneeling .Overweight is a risk factor for knee osteoarthritis. Weight reduction reduces not only the symptoms and progression of osteoarthritis, but also the risk of acquiring osteoarthritis. The Osteoarthritis Research Society International Group strongly recommends that patients with osteoarthritis lose weight and maintain weight at a lower level in overweight patients. Maintaining the body mass index at 25 kg/m^2 or below would reduce osteoarthritis in the population by 27–53%. As mentioned, knee injuries such as knee ligament tears, meniscal injuries and fractures

involving the articular surfaces is a strong risk factor for knee osteoarthritis. Prevention programmes for sports injury, especially ACL injury, have recently shown encouraging results. Norwegian studies showed that the prevention of ACL injuries was possible with the use of neuromuscular training programmes. According to Felson, prevention of joint injuries would give an additional 14–25% reduction in the prevalence of osteoarthritis (Takeda et al. 2007)

CHAPTER-III: METHODOLOGY

3.1 Study design

Cross sectional study design is used to identify the characteristics of Osteoarthritis of Knee joint. People with osteoarthritis were selected at a point in time without follow-up.

3.2 Study area

Data was collected from the outdoor and indoor Musculoskeletal Physiotherapy unit of Centre for the Rehabilitation of the Paralyzed (CRP).

3.3 Study population

The study population will be patient with OA of knee joint who attended in CRP for treatment.

3.4 Sample size

The equation of sample size calculation are given below-

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

Here,

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

P= 0.25 (Here P=Prevalence and P=25%)

q= 1-p

=1-0.25

=0.75

d= 0.05

According to this equation the sample should be more than 288 people but due to lack of opportunity the study was conducted with 50 patients attending at physiotherapy department selected randomly.

3.5 Inclusion criteria

- Both male and female were included.
- Medically diagnosed knee OA patient.

3.6 Exclusion criteria

- Traumatic injury around the soft tissues of knee.
- Other orthopedic condition like Ankylosing spondylitis, Septic arthritis etc.
- Patients who were medically unstable.
- Patients who are not diagnosed OA by physician.

3.7 Sampling technique

50 participants with knee OA were selected through simple random sampling technique from outdoor and indoor musculoskeletal Physiotherapy unit of CRP. Participants were selected from CRP because they were easily accessible for the researcher. Researcher took data from the patients (medically diagnosed as knee OA) randomly who came at CRP to take Physiotherapy treatment or continuing their treatment. According to Hicks- simple random sampling is the most commonly used and best way of selecting a sample. The fundamental principle of simple random sampling is that every member of the target population should have an equal chance of being selected for study (Hick 1999). It is therefore more representative. Bowling stated that, in simple random sampling the members of the population were numbered and a number of them were selected using random numbers by replacing them. Therefore each sample unit can only appear once in the sample (Bowling 1997). So the researcher chose simple random sampling for this study to get the appropriate sample and to maintain the standard of the study.

3.8 Data collection procedure

All patients who diagnosed as OA at knee joint by the Physician and came at CRP for first time or continuing their Physiotherapy treatment will be asked to participate in the study. There was a developed structured questionnaire after reviewing literature for asking to the participants. In the questionnaire participant's demographic information including age, sex, marital status, level of education, occupational history including types of job, health history including other injury and osteoarthritis related information was asked.

3.9 Data Analysis

Quantitative data was analyzed by using SPSS 16 software. Descriptive statistics was used for data analysis.

3.10 Informed consent

Written consent (appendix) was given to all participants prior to completion of the questionnaire. The researcher explained to the participants about his or her role in this study. The researcher received a written consent form every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants that the study would not be harmful to them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might get benefit from it. The participants had the rights to withdraw consent and discontinue participation at any time without prejudice to present or future treatment at the musculoskeletal (MS) unit of CRP. Information from this study was anonymously coded to ensure confidentiality and was not personally identified in any publication containing the result of this study.

3.11 Ethical Consideration

For conducting this research ethics committee have checked the proposal and allowed to carry out the research project. The formal permission was taken from the head of the physiotherapy department to collect the data. Data collection was started and complete within the allocated time frame. All the data was reviewed in strict secure and maintained confidentiality. The assessment files were strictly secured and it was not open in front others without researcher.

3.12 Limitation of the study

Though the expected sample size was >288 for this study but due to resource constrain researcher could manage just 50 sample which is very small to generalize the result for the wider population of knee OA. There are a few literatures about knee OA in the perspective of Bangladesh so it is difficult to compare the study with the other research. In this study the researcher was able to collect data only from CRP for a short period of time which will affect the result of the study to generalize for wider population. The questionnaire was developed only through searching sufficient literature but considering the context of the demography of the population a pilot study would substantial before developing questionnaire.

Age range of the participants

The mean age of the participants was 54±8.4 years. n=12 (24.00%) affected by OA knee in between 41-46 years, n=13 (26.00%) was between 47-52 years, n=16 (32.00%) was between 53-60 years, n=9 (18.00%) was more than 60 years of age. Result shows that 53-60 years are more vulnerable age group to develop knee OA (Figure 1).

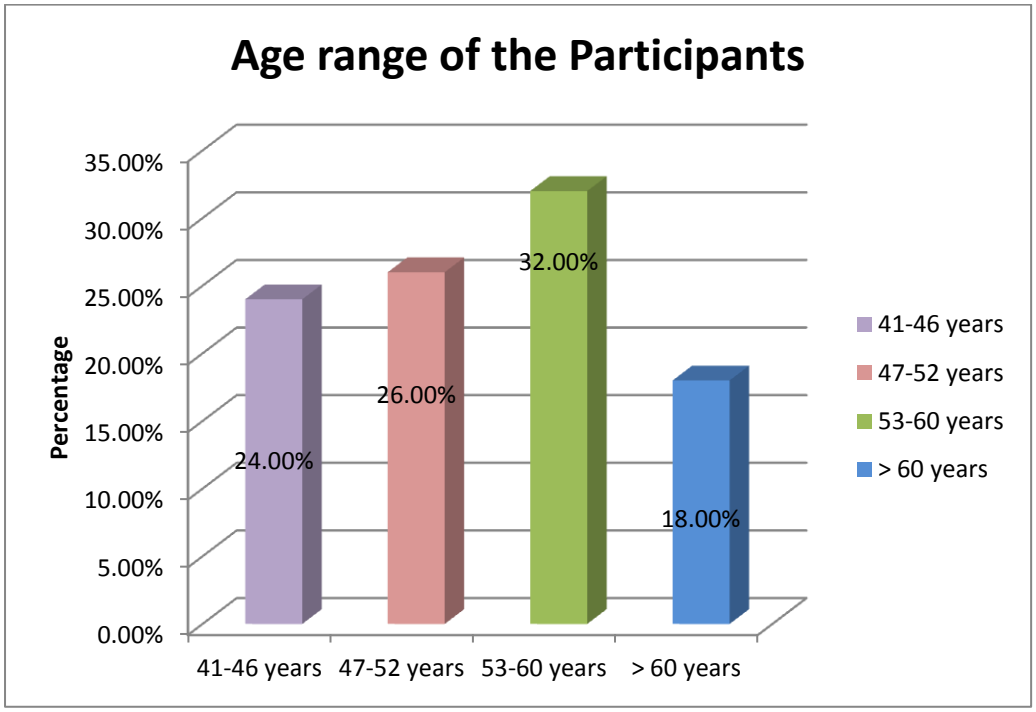


Figure-1: Age range of the participants.

Male-Female Ratio

Among all the participants n=29 (58.00%) was female and n=21 (42.00%) was male. Result shows that female are more affected by OA than male (Figure 2)

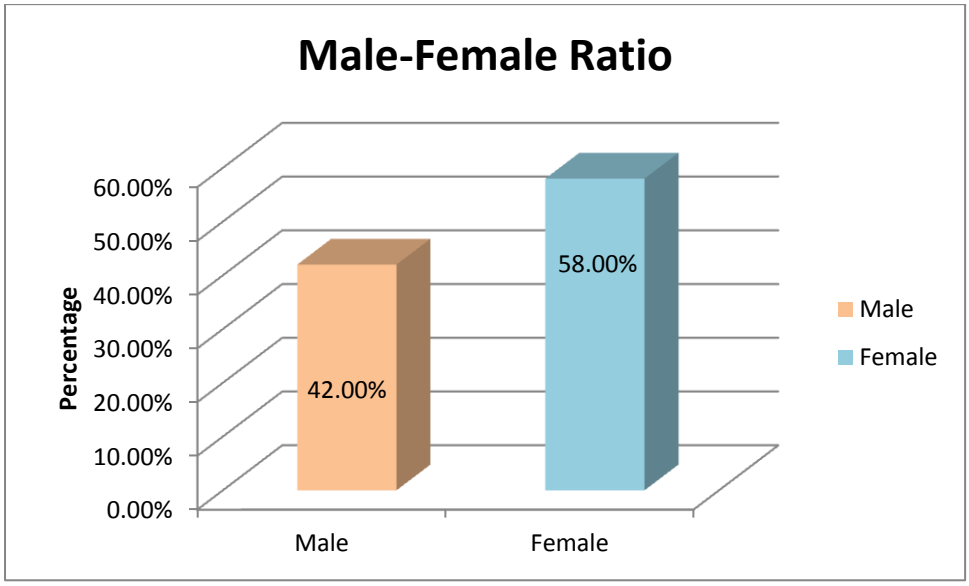


Figure-2: Male-Female ratio among the Participants.

BMI of the Participants

Among the subjects n=11 (22.00%) persons BMI (Body mass index) was in normal value, n=39 (78.00%) persons have obesity in their BMI measurement. Result shows that obesity is a major cause for developing knee OA (Figure 3).

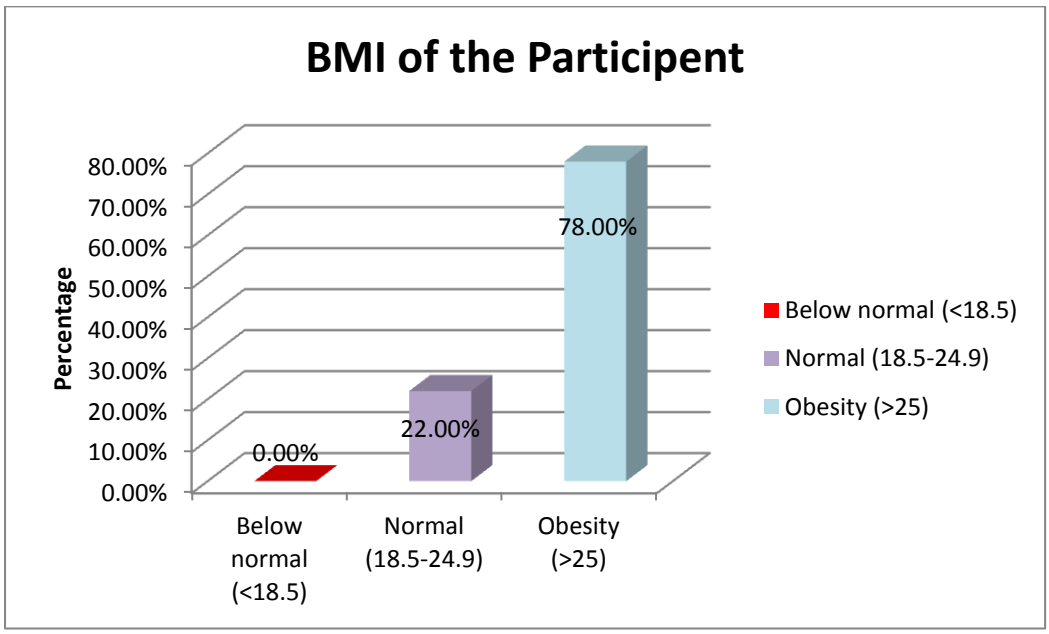


Figure-3: BMI of the participants.

Occupation of the patients

Among the participants affected by knee OA, n=1 (2.00%) person was farmer/agriculturer, n=2 (4.00%) was garments worker, n=1 (2.00%) was driver, n=7 (14.00%) was businessman, n=23 (46.00%) was housewife, n=4 (8.00%) was teacher and n=12 (24.00%) were in others occupation like office job. Result shows that housewife are more affected by knee OA (Figure 4).

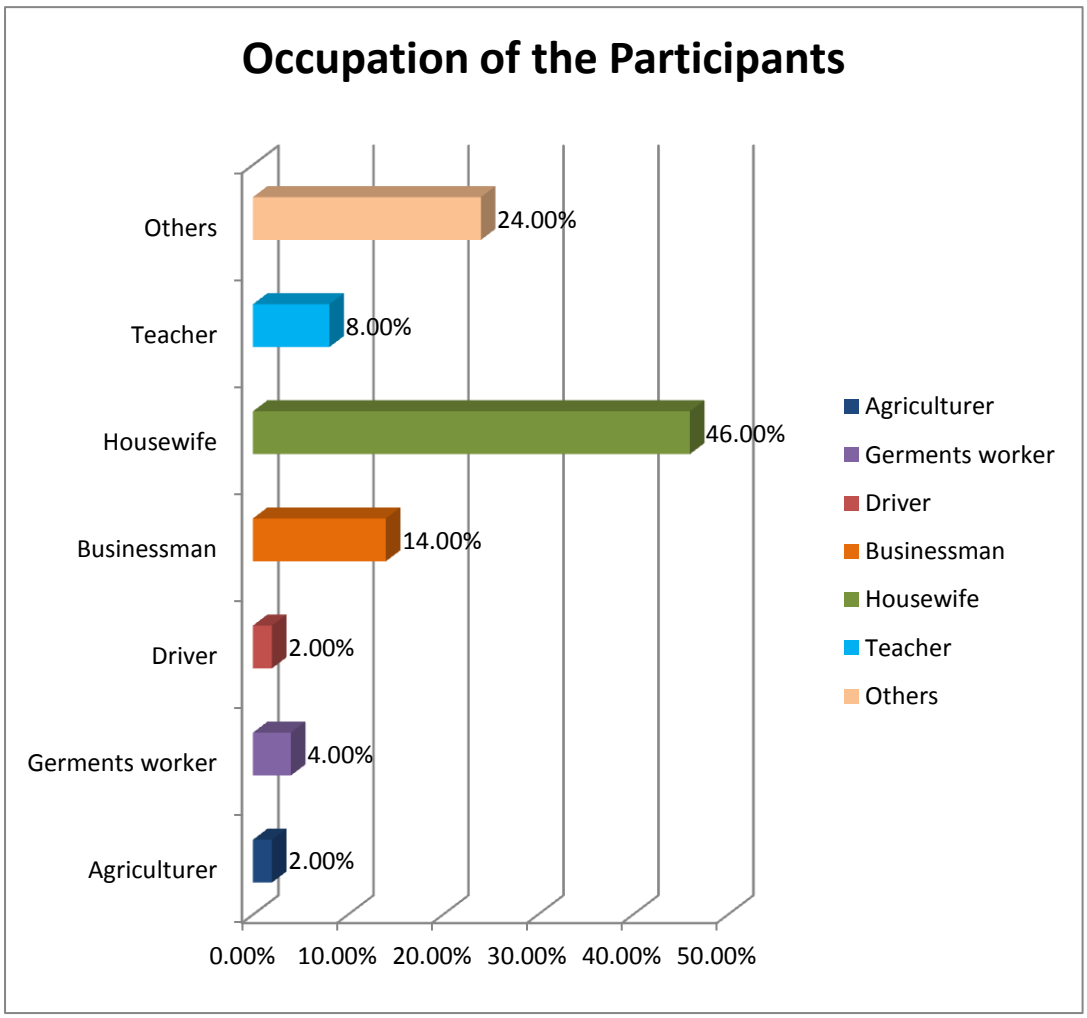


Figure-4: Occupation of the participants.

Past history of trauma

Among the participants n=19 (38.00%) have positive history of trauma at the knee joint and n=31 (62.00%) have negative history of trauma at knee joint. Result shows that knee OA may developed from previous trauma at knee joint (Figure 5).

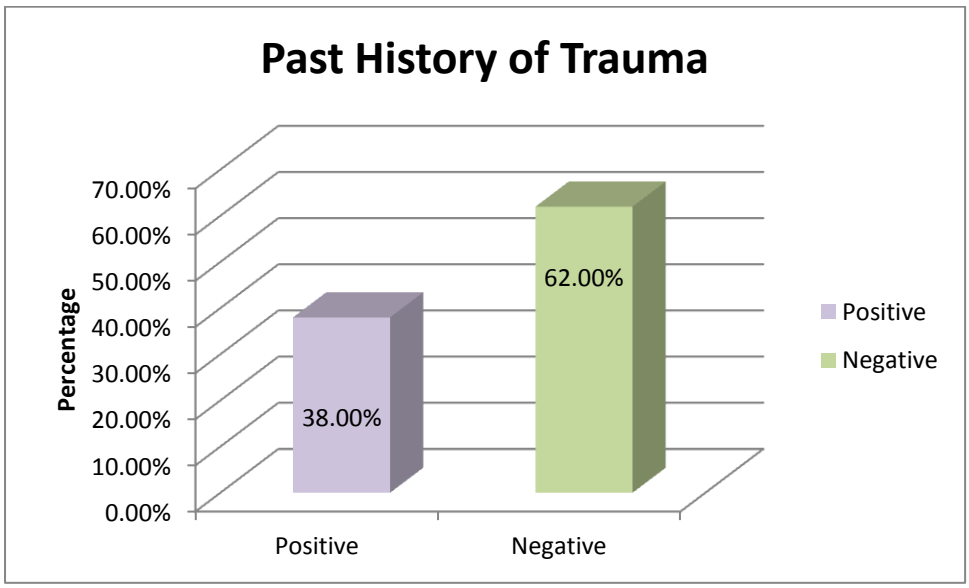


Figure-5: History of trauma of the participants.

Positive family history

Among the participants, n=35 (70.00%) have positive family history and n=15 (30.00%) have no history of OA in their family. Result shows that there is a strong association between positive family history and OA (Figure 6)

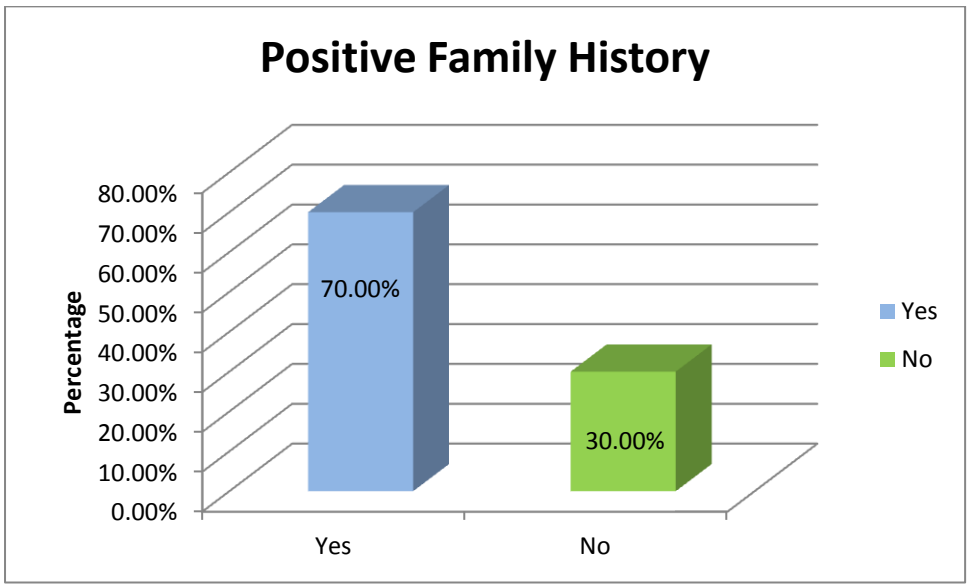


Figure-6: Positive family history of the participants.

Knee joint involvement

Among participants affected by knee OA, n=17 (34.00%) was affected by right knee OA, n=11 (22.00%) was affected by left knee OA and n=22 (44.00%) patients was affected by both knee OA. Result shows that bilateral knee OA is more common than single knee OA (Figure 7).

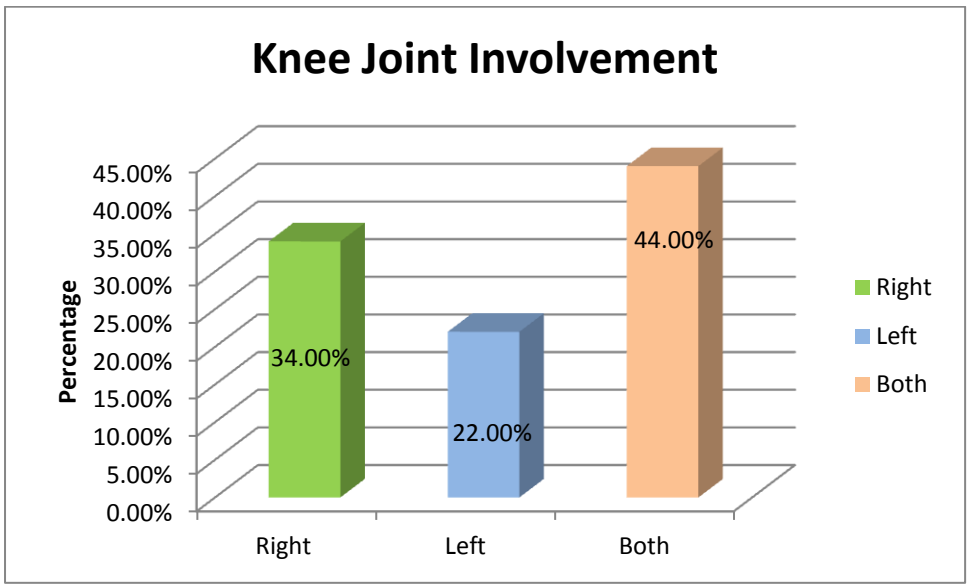


Figure-7: Knee joint involvement of the participants.

Severity of Pain

Among the participants n=3 (6.00%) patients pain was mild, n=33 (66.00%) patients pain was moderate and n=14 (28.00%) patients pain was severe in VAS scale. Patient experienced moderate type of pain at knee in case of knee OA (Figure 8).

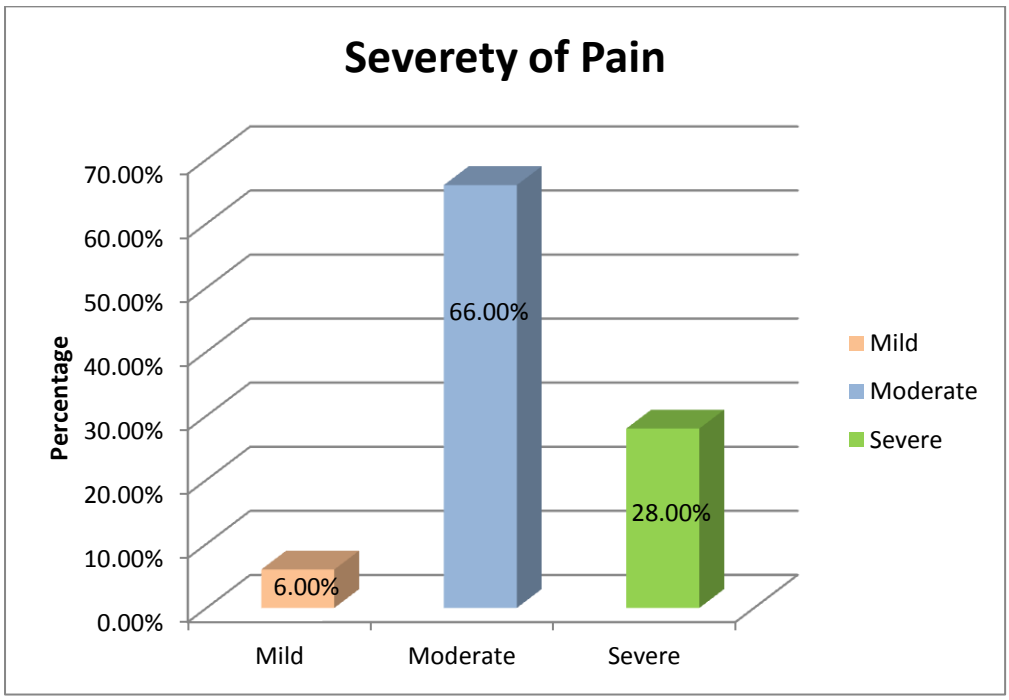


Figure-8: Pain severity of the participants.

Past medical History

Among the participants n=13 (26.00%) was affected by DM and n= 37 (74.00%) patient was free from DM (Figure 9.1) and n=29 (58.00%) patients was affected by HTN and n=21 (42.00%) patients was free from HTN (Figure 9.2)

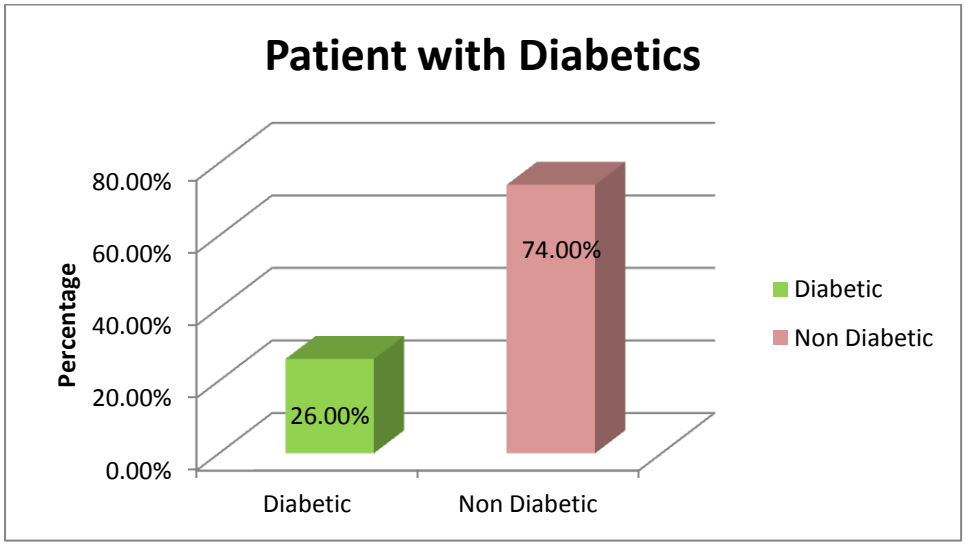


Figure-9.1: Past medical history of the participants.

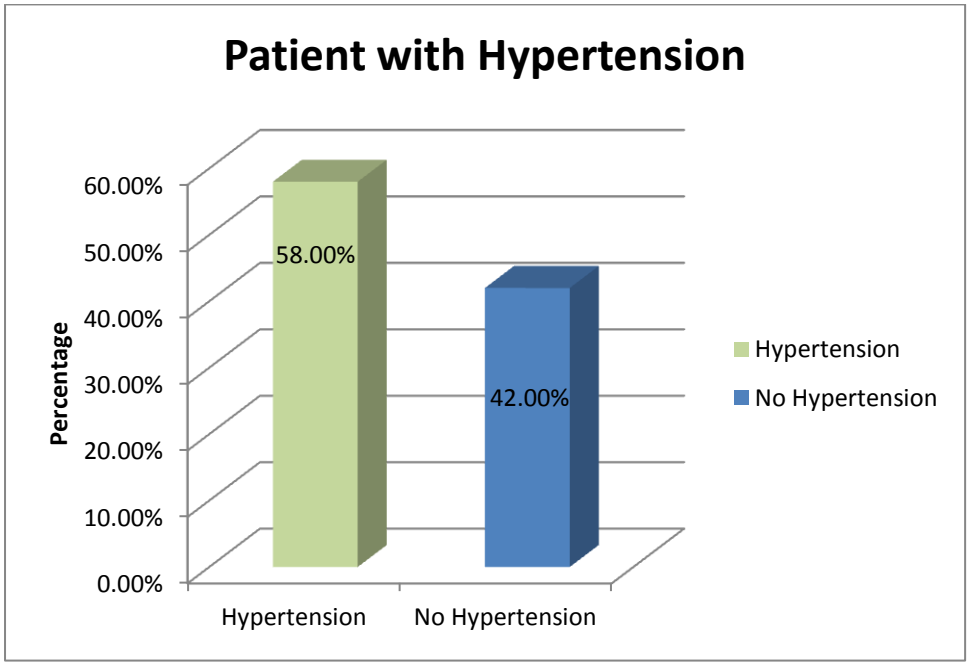


Figure-9.2: Past medical history of the participants.

Outcome of Physiotherapy

Among 50 participants affected by knee OA, n=27 (54.00%) patients have been improved through Physiotherapy. Another 46.00% (n=23) patients come to receive Physiotherapy. Result shows that Physiotherapy is a effective treatment for Knee OA (Figure 10)

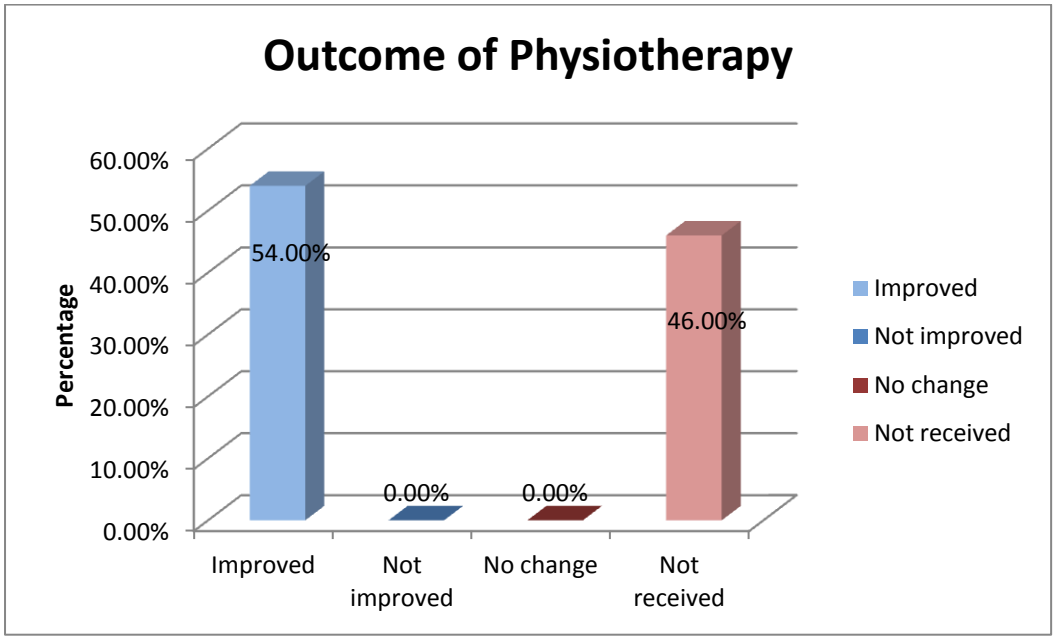


Figure-10: Outcome of Physiotherapeutic treatment.

Association among the variables:

Subsequently Chi squire test is performed to find out the association among the variables. Only significant result shows Educational status Vs Residential area, BMI Vs Pain at squatting, Past history of trauma Vs locking of knee and Types of toilet Vs Pain at squatting.

So, researcher can generate some hypothesis that patient of rural area have less educational status than patient of urban area; obese patient have experienced more pain at knee in squatting position; Bending activities of knee such as squatting at Asian toilet provoke more pain than European toilet; Patient with knee OA experienced locking at knee joint who have past history of trauma at knee joint.

CHAPTER-V: DISCUSSION

Fifty patients of OA knee were studied. Out of them, 29(58.00%) were female and 21(42.00%) were male. The male female ratio was 0.72:1. In a study in Chittagong, Bangladesh among 162 participants 96 (59.30 %) were males and 66 (40.70 %) were females. The male: female ratio was 1: 0.68 (Shakoor et al. 2009). In this study the mean age of the participant was 54.16 ± 8.33 and most of the participants (32.00%) were age group 53-60 years. In United States a study about epidemiology of OA by Zhang and Jordan shows that the age standardized prevalence of radiographic knee OA in adults age ≥ 45 was 19.2% among the participants in the Framingham Study and 27.8% in the Johnston County Osteoarthritis Project. In the third National Health and Nutrition Examination Survey, approximately 37.00% of participants age >60 years or older had radiographic knee OA (Zhang and Jordan 2008).

In this study, 78.00% of the patients were obese according to BMI (Body mass index) scale. On the other hand The Rotterdam study in Netherland about Body mass index associated with onset and progression of osteoarthritis of the knee but not of the hip by M Reijman, H A P Pols, A P Bergink, J M W Hazes, J N Belo, A M Lievense, S M A Bierma-Zeinstra shows, A high BMI (.27 kg/m2) at baseline was associated with incident knee osteoarthritis. A high BMI was also significantly associated with progression of knee osteoarthritis (Reijman et al. 2007). This is similar as this study. In this study n=23(46.00%) patients were house wife that means house wife are mostly affected by knee OA, this may be due to long time activity in knee bending position according to our culture. A study about Clinical profile of patients with osteoarthritis of the knee A study of 162 cases in Chittagong, Bangladesh by MA Shakoor, MA Taslim, MS Ahmed and SA Hasan the doctors of BSMMU and Chittagong medical college found a majority of the patients were housewives (35.8%) followed by retired servicemen (19.1%) and those on government service (17.3%). Others were labourers (6.2%), salesmen (0.6%), businessmen (6.8%), field workers (1.2%), cultivators (4.9%), drivers (1.2%), teachers (3.1%), barbers (0.6%), defence servicemen (1.2%), imams (1.2%) and garment workers (0.6%) (Shakoor et al. 2009).

In this study 26.00% participant were affected by Diabetes, 58.00% patients were affected by Hypertension and 70.00% patients had positive history of OA in their family. On the other hand a study about Risk factors for osteoarthritis: genetics have done by Tim D spector and Alex J MacGregor. According to their study the multifactorial nature of osteoarthritis (OA) is well recognized, genetic factors have been found to be strong determinants of the disease. Evidence of a genetic influence of OA comes from a number of sources, including epidemiological studies of family history and family clustering, twin studies, and exploration of rare genetic disorders. Classic twin studies have shown that the influence of genetic factors is between 39% and 65% in radiographic OA of the hand and knee in women, about 60% in OA of the hip, and about 70% in OA of the spine. Taken together, these estimates suggest a heritability of OA of 50% or more, indicating that half the variation in susceptibility to disease in the population is explained by genetic factors (Spector and MacGregor 2004).

In this study 38.00% patients have past history of trauma at knee joint and on the other hand A study about Joint injury in young adult and risk for subsequent knee and hip OA by Allan C. Gelber, Marc C. Hochberg, Lucy A. Mead, Nae-Yuh Wang, Fredrick M. Wigley, and Michael J. Klag. In their study, Over a median follow-up of 36 years, 141 participants reported joint injuries (knee alone [n = 111], hip alone [n = 16], or knee and hip [n = 14]) and 96 developed osteoarthritis (knee alone [n = 64], hip alone [n = 27], or knee and hip [n = 5]). The cumulative incidence of knee osteoarthritis by 65 years of age was 13.9% in participants who had a knee injury during adolescence and young adulthood and 6.0% in those who did not($P = 0.0045$) (relative risk, 2.95 [95% CI, 1.35 to 6.45]) (Gelber et al. 2000).

In this study 34.00% patients were affected by right knee OA, 22.00% patients were affected by left knee OA and 44.00% patients were affected by both knees OA. A study in Chittagong, Bangladesh shows that most of the study subjects were suffering from both sided knee OA (48.1%), 44 (27.2 %) patients were suffering from right sided knee OA and 40 (24.70 %) patients were suffering from left sided knee OA (Shakoor et al., 2009). The severity of pain among the participants was 6.00% patient's pain was mild, 66.00% patient's pain was moderate and 28.00% patient's pain was severe in VAS scale. A study about Incidence of musculoskeletal pain and

rheumatic disorders in a Bangladeshi rural community by Syed Atiqul Haque, John Darmawan and Md. Nazrul Islam shows that among 440 participants 32 (7.3%) were suffering from mild pain, 232 (52.6%) were suffering from moderate pain and 176 (40.1%) were suffering from severe pain (Haque et al. 2008). Among 50 participants 54% patients have been improved through Physiotherapeutic treatment and rest of the participants that means 46.00% patients were not received physiotherapeutic treatment but come to receive. In USA, A study about aquatic physical therapy for Hip and Knee OA: Results of a single –Blind Randomized controlled trail by Rana S Hinman, Sophie E Heywood and Anthony R Day shows that by receiving Physiotherapeutic treatment totals of 72% and 75% of participants reported improvements in pain and function, respectively, compared with only 17% (each) of control participants. Benefits were maintained 6 weeks after the completion of physical therapy, with 84% of participants continuing independently (Hinman et al. 2007).

In Bangladesh, A study about Effects of isometric strengthening exercise of quadriceps in Knee OA by Md. A. Shakoor, Md. Shahidur Rahman, Abul kalam Azad and Md. Sadrul Islam shows that total of 64 patients of osteoarthritis of the knee joints were studied to observe the effects of isometric quadriceps muscle strengthening exercise plus non-steroidal anti-inflammatory drugs (NSAIDs) on osteoarthritis of knee joints. Another 75 patients were treated with NSAIDs as control. They were assessed by visual analogue scale (VAS), OMAC scale and range of motion of the knee joints and followed-up weekly for six weeks. Improvement was found in both groups ($p= 0.001$) after treatment. In comparison, more improvement was found in the exercise group after four weeks ($p= 009$). Then improvement was gradually increased day by day and finally there was highly significant improvement ($p=0.001$). This study suggests that isometric quadriceps muscle strengthening exercise has its beneficial role to reduce symptoms in osteoarthritis knee (Shakoor et al. 2010)

Another study about role of muscle strengthening exercise on OA at the knee joint by Abul kalam Azad, Golam Nabi, MA Shakoor and MD Moyeenuzzaman shows that total of 106 patients of osteoarthritis of knee were selected for the study. Out of 106 patients 26.41% were male and 73.58% were female. The female and male ratio is 2.78: 1. Mean age was 49.68 ± 9.16 years and house wives were maximum in number

75 (70.8%). They were divided into two groups, 52 patients in group–A, were treated with NSAID plus Exercise and another 54 patients in group-B, were treated with NSAID only. In both group patients were treated for six weeks duration. The improvement was assessed with WOMAC scoring system. Students' test was to see the level of significance. In present study, the patients groups those who received NSAID plus Exercise, improved more significantly (p= 0.001) than those who received NSAID only. So it can be concluded that quadriceps muscle strengthening exercise is effective in the patients with OA knee (Azad et al. 2007).

Current study shows some positive association between Educational status with Residential area (Chi square=0.03); BMI with pain at squatting (Chi square=0.051); Past history of trauma with locking of knee (Chi square=0.051); Types of toilet with pain at squatting (Chi square=0.000). In Iran a study about Squatting, Sitting on the Floor, or Cycling: Are Life-Long Daily Activities Risk Factors for Clinical Knee Osteoarthritis. Stage III Results of a Community-Based Study by S. Dahaghin, S. A. Tehrani-Banihashemi, S. T. Faezi, A. R. Jamshidi and F. Davatchi shows two risk factors that are prolonged squatting (odds ratio [OR] 1.51, 95% confidence interval [95% CI] 1.12–2.04) and cycling (OR 2.06, 95% CI 1.23–3.45). Knee-bending had borderline significance (OR 1.98, 95% CI 0.98–3.99). Carrying loads (OR 1.24, 95% CI 0.87–1.76) or climbing stairs (OR 0.99, 95% CI 0.69–1.42) showed no extra risk for knee osteoarthritis. Prolonged standing, sitting on the floor, and walking up/downhill were not risks for knee osteoarthritis. Housewives were at greater risk (borderline-significant) of developing knee osteoarthritis (OR 1.68, 95% CI 0.93–3.03) than women whose main occupation was outside the home. Other types of jobs and sports did not show an extra risk of knee osteoarthritis (Dahaghin et al. 2009).

CHAPTER-VI: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

From the study it can be concluded that the most vulnerable age range is 53 to 60 for knee OA. Household and bending activities are aggravating factors to develop knee OA and housewife are more affected group among all occupation. Past history of trauma and positive family history are the causative factors to develop knee OA.

Health care provision in Bangladesh is still to be pragmatic in terms of ensure benefit for the people suffering from non-communicable disease including OA. The result of the study reveals that Physiotherapy is crucial treatment for the patient with OA knee but still Physiotherapist are not included in the mainstream of the Government health care system.

Considering the context of the country and disease burden as well as disability, Physiotherapist should immediately be included in the government health care system.

6.2 Recommendation

The results of the study demonstrate the characteristics of the OA knee through purely an observational research but further research would need to be carried out considering proof of hypothesis in term of obesity and type of pain in different activities, bending activity and types of toilet, past history of trauma and locking of the knee through further Cohort study. The identified domain about the characteristics of OA knee were just included as pain and ADLs but other important aspects including range of motion, muscle weakness, knee alignment (Q angle) etc. should further be included in such type of research.

REFERENCES

- Aigner, T & Kim, HA 2002, 'Apoptosis and cellular vitality: issues in osteoarthritic cartilage degeneration', *Arthritis & Rheumatism,* retrieved on 12th Aug 2011. < http//www.onlinelibrary.wiley.com/doi/10.1002/art.10554/full>
- Ayral X, Dougados M, Listrat 1993, 'Chondroscopy: a new method for scoring chondropathy', *Semi Arthritis rheumatism,* retrieved on 26th Sep 2011. <http//www.annals.orgg>
- Azad, AK, Nobi, G, Shakoor, MA, Moyeenuzzaman MD 2011, *Role of muscle strengthening exercise on Osteoarthritis of the knee joint,* retrieved on 9th Dec 2011. <http://www.banglajol.info/bd/index.php/JOM >
- Blagojevic, M, Jinks, C, Jeffery, A, & Jordan, K P 2001, 'Risk factors for onset of osteoarthritis of the knee in older adults: a systematic review and meta-analysis', *Osteoarthritis and cartilage* retrieved on 11th Oct 2012. <http//www.Oarsijournal.com/article/S1063-4584(09)00225-8/abstract>
- Cluett, J 2011, *Knee Arthritis: Information about knee arthritis and available treatments,* retrieved on 25th Oct 2011. <http://orthopedics.about.com/cs/generalinfo1/a/kneearthritis.htm>
- Croft, P 2005, *The epidemiology of osteoarthritis: Manchester and beyond* retrieved on 7th Oct 2012. <http://rheumatology.oxfordjournals.org/content/44/suppl 4/iv27.full.pdf+html>
- Cushnaghan, J, Dieppe, P 1991, *Study of 500 patients with limb joint osteoarthritis. I. Analysis by age, sex, and distribution of symptomatic joint sites,* retrieved on 23rd Dec 2011. < http//www.ard.bmj.com/content/50/1/8.>
- Dahaghin, S, Tehrani-Banihashemi, SA, Faezi, ST, Jamshidi, AR, Davatchi, F 2009, *Squatting, Sitting on the Floor, or Cycling: Are Life-Long Daily Activities Risk Factors for Clinical Knee Osteoarthritis? Stage III Results of a Community-Based Study* retrieved on 21st Jan 2012. <http//www.onlinelibrary.wiley.com/doi/10.1002/art>

- Davis, MA, Hinger, WHE, Neuhaus, JM, Hauck, WW 1987, 'Sex difference in Osteoarthritis of the knee: The role of obesity', *American journal of Epidemiology* .Vol 127, Issue 5, retrieved on 8th Jan 2012. <http//www.aje.oxfordjournal.org/content/127/5/1019>
- Ebnezar, J 2003, *Essentials of Orthopaedics for Physiotherapist*, 1st edition. Jaypee Brothers, New Delhi.
- Eustice, C 2009, *Diagnosis of Osteoarthritis: an Accurate Diagnosis of Osteoarthritis Ensures Proper Treatment*, retrieved on 21st Oct 2011. <http://osteoarthritis.about.com/od/osteoarthritisdiagnosis/a/OA_diagnosis.htm>
- Eustice, C 2010, *Osteoarthritis Risk Factors: What increases the risk of developing osteoarthritis?* Retrieved on 20th Oct 2011. <http://osteoarthritis.about.com/od/osteoarthritis101/a/OA_risk_factors.htm>
- Gelber , AC, Hochberg, MC, Mead, LA, Wang, N, Wigley, FM, and Klag, MJ 1998, *joint injury in young Adults and Risk for Subsequent Knee and Hip Osteoarthritis* retrieved on 4th Jan 2012. <http//www.annals.orgg/content/133/5/321.full.pdf+html>
- Haque, SA, Darmawan, J, Islam, N 2008, *Incidence of musculoskeletal pain and rheumatic disorders in a Bangladeshi rural community: A WHO-APLAR-COPCORD study*, retrieved on 13th Nov 2011. <http://www.onlinelibrary.wiley.com>
- Haslet, C, Chilvers, ER, Hunter JAA, Boon, NA 1999, *Davidson's Principle And practice of Medicine,* 18th edition. Churchil Livingstone, USA.
- Hassett, G, Hart, DJ, Doyle, DV, March, L & Spector, TD 2006, 'The relation between progressive osteoarthritis of the knee and long term progression of osteoarthritis of the hand, hip, and lumbar spine' *Annals of the rheumatic diseases*, retrieved on 10th Oct 2011. <http//www.ard.highwire.org/content/65/5/623>
- Hinman, RS, Heywood, SE, Day, AR 2007, *Aquatic physical therapy for Hip and Knee Osteoarthritis: Results of a single-blind randomized controlled trail,* retrieved on 13th Nov 2011. <http://www.physther.org/content/87/1/32>

- Hochberg, MC 2007, *Quality measures in osteoarthritis*, retrieved on 17th jan 2012. <http://Scholar.google.com/scholar?hl=en&as sdt=0,5 &q=sign/symptom of OA>
- Kellgren 1963, The epidemiology of chronic rheumatism, Atlas of standard radiographs, vol. 2, Oxford: Blackwell Scientific, UK.
- Kenneth, C, Kalunian, M 2009, *Patient information: Osteoarthritis symptoms and diagnosis. In Peter Tugwell, M. (Ed. Spain)*, retrived on 10th Sep 2011. < http://www.google.com/search?hl=en&q=19.%09Kenneth,+C,+Kalunian,+M+ 2009,+Patient+information>
- Kornaat, PR, Bloem, JL, Ceulemans, RYT, Riyazi, N, Rosendaal, FR, Nelissen, RG, Carter, WO, Hellio, LE, Graverand, MP and Kloppenburg, M 2006, *Osteoarthritis of the Knee: Association between Clinical Features and MR Imaging Findings1*. *Radiology*, retrieved on 10th Oct 2012. < http//www.radiology.rsna>
- Magee, DJ 1997, *Orthopedic Physical Assessment*, 3rd edition. W.B Saunders Company, Philadelphia.
- Martin, J 2008, *Important Characteristics of Osteoarthritis and Rheumatoid Arthritis*, retrieved on 13th Sep 2011. < http://EzineArticles.com/?expert=Janet Martin >
- Moore, KL, Dalley, AF 2006, *Clinically Oriented Anatomy*, 5th edition. Lippincott Williams & Wilkins, USA.
- Peat, G, Mccarney, R and Croft, P 2001, 'Knee pain and osteoarthritis in older adults: a review of community burden and current use of primary health care'. *Annals of the rheumatic diseases*, retrieved on 9th Oct 2011. <http//www.ard.bmj.com/content/60/2/91.abstract>
- Reijman, M, Pols, HAP, Bergink, AP, Hazes, JMW, Belo, JN, Lievense, AM and Bierma-Zeinstra, SMA 2007, 'Body mass index associated with onset and progression of osteoarthritis of the knee but not of the hip: the Rotterdam Study' *Annals of the rheumatic diseases*, retrieved on 9th Sep 2011. <http//www.ard.bmj.com/content/66/158/abstract>
- Shakoor, MA, Rahman, MS, Azad, AK, Islam, MS 2010, *Effects of isometric quadriceps muscle strengthening exercise on chronic Osteoarthritis of the*

knee, retrieved on 10th Jan 2012. < http://www.banglajol.info/index.php/BMRCB>

- Shakoor, MA, Taslim, MA, Ahmed, MS, Hasan, SA 2009, *Clinical profile of patients with Osteoarthritis of the knee: A study of 162 cases*, retrieved on 13th Jan 2012. <http://www.ijpmr.com>
- Solomon L, Warkick, D 2001, *Apley`s System of Orthopedics and Fractures*, 8th edition. Arnold, Great Britain.
- Spector, TD, MacGregor, AJ 2004, *Risk factors for Osteoarthritis: genetics*, retrieved on 14th Dec 2011. <http://www.scincedirect.com/science/article>
- Takeda, H, Nakagawa, T, Nakamura, K and Engebretsen, L 2007, 'Prevention and management of knee osteoarthritis and knee cartilage injury in sports', *British Journal of Sports Medicine*, retrieved on 3rd Nov 2012. <http//www.bjsportmed.com/content/45/4/304>
- Veerapen, K, Wigley, RD, Valkenburg, H 2007, 'Musculoskeletal pain in Malaysia: a COPCORD survey', *Journal of Rheumatology*, Retrived on 27th Dec 2012, <http//www.jrheum.org/content/34/1/207.short>
- Wilkins, E, Dieppe, P, Maddison, P and Evison, G 1983, 'Osteoarthritis and articular chondrocalcinosis in the elderly', *Annals of the rheumatic diseases*, retrieved on 4th Jan 2012. <http//www.ard.highwire.org/content/42/3/280>
- Wollheim, FA 2003, 'Early stages of osteoarthritis: the search for sensitive predictors', *Annals of the rheumatic diseases*, retrieved on 5th Nov 2011. <http//www.ard.highwire.org/content/62/11/1031>
- Zhang, Y and Jordan, JM 2008, *Epidemiology of osteoarthritis*. *Rheumatic Disease Clinics of North America* retrieved on 6th Dec 2011. <http//www.linkinghub.elsevier.com/retrieve/pii>

APPENDIX

Dated: 22/05/11

To

The Head

Department of Physiotherapy,

Center for the rehabilitation of the paralyzed (CRP),

Savar, Dhaka-1343

Subject: Permission to collect data to conduct a research study.

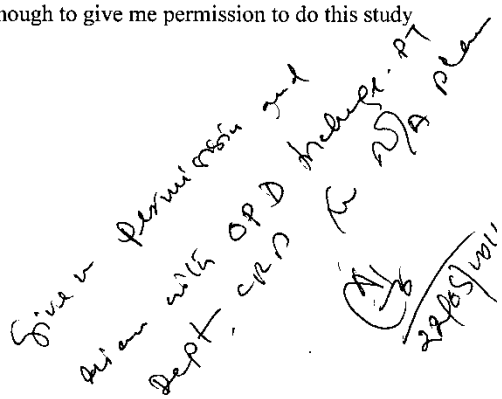
Sir,
I respectfully to state that I am a student of 4th year B.Sc in physiotherapy at Bangladesh health professions institute(B.H.P.I).In 4th year we have to conduct a research project and I have chosen a title that is "Characteristics of Osteoarthritis at knee joint". I have chosen the outdoor physiotherapy department of CRP for data collection. For your kind information the research methodology, consent form & Questionnaire have submitted with this application.

I therefore pray and hope that you would be kind enough to give me permission to do this study successfully in your department.

Yours faithfully

Tawhid
22.05.11

A.K.M. Minarul Tawhid
4th year B.Sc in physiotherapy of B.H.P.I.
savar,Dhaka



VERBAL CONSENT STATEMENT

(Please read out to the participant)

Assalamualaikum/Namasker, my name is *A.K.M.Minarul Tawhid*, I am conducting this study for a Bachelor project study titled "Characteristics of Osteoarthritis at knee joint." from Bangladesh Health Professions Institute (BHPI), University of Dhaka. I would like to know about some personal and other related questions about Osteoarthritis. This will take approximately 20 - 30 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. The researcher is not directly related with this area (Musculoskeletal), so your participation in the research will have no impact on your present or future treatment in this area (Musculoskeletal). All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't 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 A.K.M. Minarul Tawhid, researcher and/ or Nasirul Islam, Assistant professor, BHPI, CRP, Savar, Dhaka-1343.

Do you have any questions before I start?

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

YES ☐

NO ☐

Signature of the Patient/Attendence……

Signature of the Interviewer……

সম্মতি পত্র / অনুমতি পত্র

চিকিৎসা কেন্দ্রঃ- পক্ষাঘাতগ্রস্দের পুনর্বাসন কেন্দ্র (সি.আর.পি)।

এই অধ্যায়ন হাঁটুতে বাতের বৈশিষ্ট সম্পর্কিত গবেষনা। গবেষক এ.কে.এম. মিনারুল তৌহিদ, বি.এইচ.পি.আই এর ৪র্থ বর্ষ বি.এস.সি ইন ফিজিওথেরাপি কোর্সের একজন ছাত্র এবং এই গবেষনা তার অধ্যায়নের অংশ। (নিম্নোক্ত তথ্যাদি পাঠ করার পর অধ্যায়নে অংশগ্রহনকারিগন অংশগ্রহন করার জন্য আমন্ত্রিত।)

এই অধ্যায়নের লক্ষ্য হল কি কারনে হাঁটুতে বাত হতে পারে, হাঁটুতে বাত হলে কি কি সমস্যা দেখা দেয়, কোন ধরনের চিকিৎসা হাঁটুতে বাতের জন্য উপকারি তা খুঁজে বের করা যা পরবর্তি সময়ে হাঁটুতে বাতের চিকিৎসার জন্য সহায়ক হবে। এই গবেষনা / অধ্যায়নের জন্য আপনাকে কিছু প্রশ্ন করা হবে. আপনি এর উত্তর করবেন এবং এতে প্রায় ২০ মিনিট সময় লাগবে। এই গবেষনায় অংশগ্রহনের কারনে আপনার চিকিৎসার কোন রকমের অসুবিধা হবে না এবং আপনার ব্যক্তিগত সমস্থ তথ্য গোপন রাখা হবে/ গবেষক গোপনিয়তা রক্ষা করবেন।

প্রশ্ন-উত্তর পর্বের যেকোন মুহূর্তে আপনি সম্মতি প্রত্যাহার এবং কোন প্রশ্নের উত্তর প্রদানের অপারগতা প্রকাশের ব্যাপারে আপনার সম্পূর্ন অধিকার রয়েছে। এই গবেষনায় প্রাপ্ত তথ্য সম্পূর্নভাবে গোপনীয় থাকবে এবং অংশগ্রহনকারিকে ব্যক্তিগতভাবে গবেষনার ফল প্রকাশের সময় চিহ্নিত করা হবে না।

---------- তারিখঃ----------

রোগীর সাক্ষর

---------- তারিখঃ----------

গবেষকের সাক্ষর

---------- তারিখঃ----------

অভিভাবকের সাক্ষর

“Characteristics of Osteoarthritis at knee joint patient attended at CRP”

Identification number:	Date of Interview:
Start time:	End time:
Name of the Patient:	
Name of the Interviewer:	
Consent Taken : Yes No	
Name and signature of witness	

Section 1: Demographic Questions

QN	Questions and filters	Responses	Code
1.	May I know your age please?	|__|__| yrs	
2.	Sex:	□ Female □ Male	01 02
3.	Address and conduct number:		
4.	Patients height:		
5.	Patients weight:		
5.	Marital status:	□ Married □ Divorced □ Separated □ Widow	01 02 03 04
6.	What is your religion?	□ Islam □ Hindu □ Others	01 02 03
7.	Your residential area?	□ Urban □ Rural	01 02
8.	What is your education?	□ Never attended school □ Some primary education □ Completed primary education □ Some secondary education □ Completed secondary education □ Higher secondary □ Bachelor or above □ Other (Specify):----------	01 02 03 04 05 06 07 08
9.	What is your profession (occupation)?	□ Rickshaw puller □ Agriculture □ Factory/garments worker □ Driver □ Businessman □ Day laborer □ Unemployed □ Housewife □ Teacher □ Other (Specify): _____	01 02 03 04 05 06 07 08 09 10

10.	What is your previous occupation?	□ Rickshaw puller □ Agriculture □ Factory/garments worker □ Driver □ Businessman □ Day laborer □ Unemployed □ Housewife □ Teacher □ Other (Specify): _____	01 02 03 04 05 06 07 08 09 10

Section 2: Osteoarthritis related question:

QN	Questions and filters	Responses	Code
1.	What is your dominant side?	□ Right □ Left	01 02
2.	Patients BMI	□ Under weight □ Normal weight □ Over weight/Obesity	01 02 03
3.	Do you have any past history of trauma at the knee?	□ Yes □ No	01 02
4.	Do you have any past history of painful swelling of knee?	□ Yes □ No	01 02
5.	Do you have positive family history of knee or other joint disease?	□ Yes □ No	01 02
6.	Do you have Diabetes mellitus?	□ Yes □ No	01 02
7.	Do you have Hypertension?	□ Yes □ No	01 02
8.	Do you have any congenital deformity at knee?	□ Varus □ Valgus □ Normal □ Others	01 02 03 04
9.	Did you experience any work related pain during the job?	□ Yes □ No	01 02
10.	Types of your toilet?	□ Asian □ European	01 02
11.	Have you changed your toilet?	□ Yes □ No	01 02
12.	Year of starting your menopause?	□ <5 yrs □ 5-10 yrs □ >10 yrs	01 02 03
13.	Onset of your Osteoarthritis?	□ <5 yrs □ 5-10 yrs □ >10 yrs	01 02 03

14.	Number of involvement of knee joint?	□ Right □ Left □ Both	01 02 03
15.	Number of affected joint due to Osteoarthritis?	□ One □ Two □ More than two	01 02 03
16.	Severity of joint pain(knee joint)	□ Mild □ Moderate □ Severe	01 02 03
17.	Local tenderness	□ Medial □ Lateral □ Entire joint	01 02 03
18.	Crepitus sound at knee?	□ Present □ Absent	01 02
19.	Locking of the joint?	□ Yes □ No	01 02
20.	Pain at knee joint during weight bearing?	□ Yes □ No	01 02
21.	Have you feel pain in stair climbing?	□ Yes □ No	01 02
22.	Pain at knee during squatting?	□ Yes □ No	01 02
23.	Have you feel pain at rest?	□ Yes □ No	01 02
24.	Time of initiation of Pain killer drugs.	□ <2yrs □ 2-5yrs □ >5yrs	01 02 03
25.	Time of initiation of steroid drugs.	□ <2yrs □ 2-5yrs □ >5yrs □ Not introduced	01 02 03 04
26.	History of surgery at knee?	□ Yes □ No	01 02
27.	Outcome of Physiotherapy?	□ Improve □ Not improve/Harmful □ No change □ Not taken	01 02 03 04
28.	Do you use any assistive device for Knee?	□ Yes □ No	01 02

”হাঁটুতে বাতের বৈশিষ্ট সমূহ”

পরিচিতি নংঃ	সাক্ষাৎকারের তারিখ
শুরুর সময়ঃ	শেষের সময়ঃ
রোগীর নামঃ	
সাক্ষাৎকার গ্রহনকারীর নামঃ	
অনুমতি গ্রহনঃ হ্যাঁ	না
রোগীর অভিভাবকের অনুমতি ও সাক্ষর	হ্যাঁ না সাক্ষর

রোগীর ব্যক্তিগত বিষয়ক প্রশ্নসমূহঃ

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
১।	আপনার বয়স জানতে পারি?	----- বৎসর	
২।	লিঙ্গঃ	☐ মহিলা ☐ পুরুষ	০১ ০২
৩।	ঠিকানা ও মোবাইল নম্বরঃ		
৪।	রোগীর উচ্চতাঃ		
৫।	রোগীর ওজনঃ		
৬।	বৈবাহিক অবস্থাঃ	☐ বিবাহিত ☐ অবিবাহিত ☐ তালাকপ্রাপ্ত ☐ পৃথক ☐ বিধবা / বিপত্নীক	০১ ০২ ০৩ ০৪ ০৫
৭।	আপনি কোন ধর্মের অনুসারি?	☐ ইসলাম ☐ হিন্দু ☐ অন্যান্য	০১ ০২ ০৩
৮।	আপনার আবাসিক এলাকা কি?	☐ শহর ☐ গ্রাম	০১ ০২
৯।	আপনার শিক্ষাগত যোগ্যতা?	☐ নিরক্ষর ☐ কিছু প্রাথমিক শিক্ষা ☐ প্রাইমারি স্কুল পাস ☐ হাই স্কুল পাস ☐ এস.এস.সি পাস ☐ এইচ.এস.সি পাস ☐ স্নাতক বা এর অধিক ☐ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮
১০।	আপনার পেশা কি?	☐ রিক্শা চালক ☐ কৃষক ☐ গার্মেন্টেস শ্রমিক ☐ গাড়ি চালক ☐ ব্যবসায়ি ☐ দিনমজুর ☐ বেকার ☐ গৃহবধু ☐ শিক্ষকতা ☐ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
১১।	আপনার পূর্বের পেশা কি?	☐ রিক্শা চালক ☐ কৃষক ☐ গার্মেন্টেস শ্রমিক ☐ গাড়ি চালক ☐ ব্যবসায়ি ☐ দিনমজুর ☐ বেকার ☐ গৃহবধু ☐ শিক্ষকতা ☐ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০

বাতবিষয়ক প্রশ্নসমূহঃ

প্রশ্ন নং	প্রশ্নসমূহ	উত্তর	কোড
১।	আপনার দুর্বল পার্শ্ব (সাইড)	☐ ডান ☐ বাম	০১ ০২
২।	রোগীর বি এম আই	☐ স্বাভাবিকের চেয়ে কম ওজন ☐ স্বাভাবিক ওজন ☐ স্বাভাবিকের চেয়ে বেশি ওজন	০১ ০২ ০৩
৩।	পূর্বে কখনো আপনার হাঁটুতে আঘাত পেয়েছিলেন?	☐ হ্যাঁ ☐ না	০১ ০২
৪।	পূর্বে কখনো ব্যাথার কারনে আপনার হাঁটু ফুলে গিয়েছিলো?	☐ হ্যাঁ ☐ না	০১ ০২
৫।	আপনার পরিবারের অন্য কারো হাঁটু বা অন্য জোড়া (জয়েন্ট)-র রোগ আছে বা ছিল?	☐ হ্যাঁ ☐ না	০১ ০২
৬।	আপনার বহুমূত্র (ডায়াবেটিস) রোগ আছে?	☐ হ্যাঁ ☐ না	০১ ০২
৭।	আপনার উচ্চরক্তচাপ (হাইপ্রেসার) আছে?	☐ হ্যাঁ ☐ না	০১ ০২
৮।	আপনার হাঁটুতে জন্মগতভাবে কোন বিকলঙ্গতা আছে কি?	☐ হাঁটু বাইরের দিকে থাকা ☐ হাঁটু ভিতরের দিকে থাকা ☐ স্বাভাবিক ☐ অন্যান্য	০১ ০২ ০৩ ০৪
৯।	আপনার পেশাগত কাজের সময় কি ব্যাথা অনুভব করেন?	☐ হ্যাঁ ☐ না	০১ ০২
১০।	আপনার পায়খানার ধরন কি রকম?	☐ নিচু কমোড ☐ উঁচু কমোড	০১ ০২

১১।	রোগের পর কি আপনার পায়খানা বদল করেছেন?	☐ হ্যাঁ ☐ না	০১ ০২
১২।	আপনার মাসিক শেষ হয়েছে কতদিন হলো?	☐ ৫ বছরের কম ☐ ৫ থেকে ১০ বছর ☐ ১০ বছরের বেশি	০১ ০২ ০৩
১৩।	কখন থেকে আপনার বাতের ব্যাথা?	☐ ৫ বছরের কম ☐ ৫ থেকে ১০ বছর ☐ ১০ বছরের বেশি	০১ ০২ ০৩
১৪।	কয় হাঁটুতে আপনার বাত?	☐ ডান ☐ বাম ☐ উভয়	০১ ০২ ০৩
১৫।	কয়টি জোরায় (জয়েন্ট) আপনার বাত?	☐ একটি ☐ দুইটি ☐ দুইয়ের অধিক	০১ ০২ ০৩
১৬।	হাঁটুতে ব্যাথার ধরন	☐ মৃদু ☐ মাঝারি ☐ অধিক	০১ ০২ ০৩
১৭।	হাঁটুতে কোন স্থানে ধরলেই ব্যাথা অনুভব করেন?	☐ ভিতরের দিকে ☐ বাহিরের দিকে ☐ সমগ্র হাঁটুতে	০১ ০২ ০৩
১৮।	হাঁটাচলার সময় হাঁটুতে কোন শব্দ হয় কি?	☐ আছে / হ্যাঁ ☐ নাই / না	০১ ০২
১৯।	হাঁটু বন্ধ হয়ে আসে কি?	☐ হ্যাঁ ☐ না	০১ ০২
২০।	ভারী কিছু বহনের সময় হাঁটুতে কি ব্যাথা অনুভব করেন?	☐ হ্যাঁ ☐ না	০১ ০২
২১।	সিঁড়ি দিয়ে উঠা বা নামার সময় কি ব্যাথা অনুভব করেন?	☐ হ্যাঁ ☐ না	০১ ০২
২২।	আপনি কি হাঁটু ভাজ করে বসতে (টয়লেটে বসা) ব্যাথা অনুভব করেন?	☐ হ্যাঁ ☐ না	০১ ০২
২৩।	বিশ্রামের সময়েও কি হাঁটুটে ব্যাথা অনুভব করেন?	☐ হ্যাঁ ☐ না	০১ ০২
২৪।	ব্যাথা নিরাময়ক ঔষধ খাওয়া শুরু করেছেন কতদিন হলো?	☐ ২ বছরের কম ☐ ২ থেকে ৫ বছর ☐ ৫ বছরের বেশি	০১ ০২ ০৩
২৫।	স্টেরয়েড কতদিন হলো ঔষধ খাওয়া শুরু করেছেন	☐ ২ বছরের কম ☐ ২ থেকে ৫ বছর ☐ ৫ বছরের বেশি ☐ শুরু হয়নি	০১ ০২ ০৩ ০৪

২৬।	আপনার হাঁটুতে কি কখনো অস্ত্রপাচার করা হয়েছিল?	☐ হ্যাঁ ☐ না	০১ ০২
২৭।	ফিজিওথেরাপির ফলাফল?	☐ উন্নতি হয়েছে ☐ উন্নতি হয়নি / ক্ষতি হয়েছে ☐ কোন পরিবর্তন হয়নি ☐ ফিজিওথেরাপি নেওয়া হয়নি	০১ ০২ ০৩ ০৪
২৮।	হাঁটু রক্ষার জন্য আপনি কি কোন যন্ত্র / (ডিভাইস) ব্যবহার করেন?	☐ হ্যাঁ ☐ না	০১ ০২