

**IMPACT OF KNEE OSTEOARTHRITIS ON QUALITY OF LIFE AND  
PHYSICAL ACTIVITY LEVELS AMONG ELDERLY OUTPATIENTS**

**BY**

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF  
PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES,  
COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN IN  
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD  
OF BACHELOR OF PHYSIOTHERAPY DEGREE**

**OCTOBER, 2025**

## **CERTIFICATION**

This dissertation by Ineatah Chinedu Fidel is accepted in its present form as satisfying the dissertation requirement of the degree of Bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.



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## **DEDICATION**

I dedicate this work to God Almighty, whose grace and guidance have brought me this far.

To my beloved grandmother, Mrs Betty Esuzor, whose health journey inspired my passion for Physiotherapy. Her strength and experience gave meaning to my path and shaped the purpose behind this achievement.

## ABSTRACT

**Background:** Knee osteoarthritis (OA) is a prevalent degenerative joint disease, particularly affecting the elderly, and significantly impacts both quality of life (QoL) and physical activity (PA) levels. The disease, marked by pain, joint stiffness, and mobility limitations, can exacerbate physical and psychological distress in older adults. Despite its widespread impact, there is limited research on how knee OA affects these dimensions among elderly populations in Nigeria.

**Aims:** This study aimed to evaluate the impact of knee osteoarthritis on QoL and physical activity levels among elderly outpatients at the University of Benin Teaching Hospital.

**Methods:** A cross-sectional descriptive study was conducted on 50 elderly patients (aged 60 and above) diagnosed with knee osteoarthritis. QoL was measured using the WHOQOL-BREF, physical activity levels were assessed using the Physical Activity Scale for the Elderly (PASE), and pain intensity was evaluated with the Numerical Pain Rating Scale (NPRS). Data were analyzed using descriptive and inferential statistics, including chi-square tests and Mann-Whitney U tests.

**Results:** The majority of respondents (64%) reported low QoL, with high levels of physical activity observed in 88% of participants. Pain intensity varied, with 40% of participants experiencing severe pain. No significant differences were found between male and female respondents in terms of QoL, physical activity, or pain intensity ( $p=0.565$ ;  $p=0.230$ ;  $p=0.012$  respectively). Furthermore, no significant association were found between age and each of QoL, physical activity levels and pain intensity ( $p=0.409$ ;  $p=0.620$ ;  $p=0.059$  respectively)

**Conclusion:** This study revealed that elderly patients with knee osteoarthritis experience low quality of life and generally high physical activity levels, with mild-to-severe variations in pain intensity. Furthermore, no statistically significant associations were found between age and each of QoL, physical activity and pain intensity

**Keywords:** Knee osteoarthritis, elderly, quality of life, physical activity, pain.

## **ACKNOWLEDGEMENT**

I would like to express my gratitude and thanksgiving to the Lord Almighty for His never-ending protection towards me throughout my stay on campus. I am deeply grateful for the strength to complete this project work.

My sincerest gratitude goes to my dedicated supervisor, Dr. S. O Bolarinde for his constant help, guidance and assistance towards my project work. His commitment towards the successful completion of my project is immeasurable. Thank you, sir and God bless you immensely.

I also want to thank the amiable Head of Department, Dr. (Mrs) C. O Obaseki and all the lecturers of the Department of Physiotherapy, University of Benin, Prof. K.I. Oke, Mr. E. Okhuaesuyi, Dr Hammed Adebisi, Dr Nelson Ekechukwu, Prof. Joe Ummunah, Dr. (Mrs) Aiyegbusi, Dr Bolarinde, Prof. Obinna Ezeukwu, Dr. (Mrs) Kubeyinje, Dr. Oghumu and PT. Osayi Obarisiagbon for making me thoroughly grounded in clinical practice and knowledge while undergoing my training. My appreciation also goes to the non-academic staffs for their kindness and support throughout my stay in the department.

With a deep sense of gratitude, I thank the Head of Department of Physiotherapy, University of Benin Teaching Hospital, Dr. Taiwo Oyewumi and all the chiefs, interns and every other clinicians who contributed to my clinical knowledge throughout the period of my training.

To my beloved parents, Mr and Mrs Ineatah, my ever supportive siblings, John and Mario, I say a big thank you. Thank you all for your constant presence and support. I am so grateful.

I will also like to thank my friends —Willy, Christian, Temi, Felix, Taiye, Justice, Eben and Preacher — for the times I needed them the most, they came through. You all are wonderful and irreplaceable.

Lastly, I also want to thank myself, Chinedu, for not giving up even when things were so rough, for constantly showing up in good and bad days.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of Study

Osteoarthritis (OA) is a degenerative joint disease characterized by the breakdown of articular cartilage, subchondral bone remodeling, synovial inflammation, and the formation of osteophytes (Li et al., 2024). The World Health Organization (WHO) defines osteoarthritis as “a degenerative joint disease that affects the articular cartilage and surrounding tissues, causing pain, stiffness, and impaired movement, particularly in weight-bearing joints such as the knees, hips, and spine” (He et al., 2020). Among these, knee osteoarthritis is the most common and functionally disabling form, especially among the elderly population (Bucknor et al., 2015).

Knee OA is not merely a localized mechanical joint problem, it is a complex, multifactorial condition influenced by aging, obesity, previous joint injuries, genetics, physical inactivity, and chronic stress on the joint (Silverwood et al., 2015). Pathophysiologically, the disease involves progressive deterioration of cartilage, leading to joint space narrowing, bone-on-bone contact, pain, swelling, stiffness, and, ultimately, impaired joint function (Yunus et al., 2020). The knee, being a major weight-bearing joint, is particularly vulnerable to the mechanical stressors that accelerate OA progression in older adults.

Osteoarthritis is a major public health challenge, especially in the context of aging populations. According to the Global Burden of Disease Study (2019), over 528 million people globally were affected by osteoarthritis, with knee OA accounting for nearly 85% of total OA cases (Li et al., 2024). The prevalence of knee OA increases markedly with age, with individuals aged 60 and above bearing the greatest burden (Jadhao & Dambhare, 2021).

In Africa, the prevalence of OA has been steadily increasing, although it remains underreported due to limited access to diagnostic tools and specialist care (Yahaya et al., 2021). A systematic review by (Usenbo et al., 2015) estimates that up to 29.5% of adults aged 60 and above in Sub-Saharan Africa have clinical or radiological evidence of knee OA. Factors such as increased life expectancy, rising obesity rates, occupational risks (e.g., farming, manual labor), and poor access to early treatment contribute to the growing incidence of knee OA in African population (Bija et al., 2015).

In Nigeria, studies suggest that knee OA is one of the most common causes of chronic musculoskeletal pain in the elderly. Research conducted in urban and semi-urban outpatient settings estimates the prevalence of knee OA among elderly Nigerians to range between 13% and 30%, with higher rates observed among females and individuals with a history of high physical workload or obesity (Ayanniyi et al., 2016). Despite its prevalence, many elderly Nigerians often delay seeking physiotherapeutic or orthopedic care, leading to worsening of symptoms and reduced quality of life (Owoyemi et al., 2024).

Quality of life (QoL) is a multidimensional concept that encompasses an individual's physical health, psychological state, level of independence, social relationships, and interaction with their environment (Post, 2014). The World Health Organization Quality of Life (WHOQOL) Group defines QoL as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns (Santoro et al., 2024).

Knee OA negatively affects nearly all domains of QoL. The chronic pain, joint stiffness, and functional limitations associated with OA can lead to difficulty performing basic activities of daily living (ADLs) such as walking, climbing stairs, standing up from a seated position, or even

dressing and bathing. These limitations often result in a loss of independence and autonomy, particularly in older adults who may already be vulnerable due to other age-related health conditions (Obara et al., 2023).

Furthermore, the psychological and emotional consequences of OA such as depression, anxiety, frustration, and social withdrawal are frequently under-recognized. Persistent pain and decreased mobility can foster a sense of hopelessness and negatively impact self-esteem (Burke et al., 2015). Social participation is often restricted, especially in societies where the elderly rely on communal activities for emotional support and identity. Thus, knee OA contributes significantly to diminished health-related quality of life (HRQoL) among elderly individuals.

Physical activity is essential for maintaining musculoskeletal health, cardiovascular function, mental well-being, and overall longevity, especially in older adults (Musich et al., 2017). However, knee OA often leads to reduced physical activity levels due to pain, fatigue, fear of injury, and physical deconditioning (Aldosari et al., 2022). This creates a vicious cycle: as activity levels drop, muscle strength decreases, joint stability is compromised, and the symptoms of OA are exacerbated.

The World Health Organization (WHO) recommends that adults aged 65 and older should engage in at least 150 minutes of moderate-intensity aerobic physical activity per week, along with muscle-strengthening activities on two or more days per week (WHO, 2020). However, elderly patients with knee OA frequently fall short of these targets due to mobility limitations and joint pain.

Reduced physical activity not only worsens OA outcomes but also contributes to comorbidities such as obesity, type 2 diabetes, hypertension, and osteoporosis. It also heightens the risk of falls

and fractures, particularly in elderly individuals with compromised balance and strength (Bendrik et al., 2024). From a physiotherapy perspective, promoting safe and tailored physical activity is a critical component of conservative OA management.

Knee osteoarthritis represents a significant and growing public health concern, particularly among the elderly, due to its far-reaching effects on physical function, emotional well-being, and overall quality of life. Its high prevalence globally, and increasingly within Africa and Nigeria, underscores the need for a deeper understanding of its impact beyond clinical symptoms. The condition's interference with daily activities and reduction in physical activity levels highlight the importance of addressing not just the structural damage, but also the functional and psychosocial dimensions of the disease. As such, investigating the interplay between knee OA, quality of life, and physical activity is essential for improving therapeutic strategies and enhancing the well-being of older adults.

## **1.2 Statement of the Problem**

Despite the high prevalence and significant consequences of knee OA, there remains a paucity of locally relevant data that explicitly links knee OA with quality of life and physical activity levels among elderly outpatients in Nigeria. Most studies have focused on clinical symptoms or radiographic findings, with limited emphasis on functional and psychosocial outcomes.

Understanding the extent to which knee OA affects these broader aspects of health is essential for designing holistic, patient-centered physiotherapy interventions. This study, therefore, aims to explore the impact of knee osteoarthritis on the quality of life and physical activity levels among elderly outpatients, with the goal of generating evidence that can inform clinical decision-making and policy formulation in geriatric rehabilitation services.

### **1.3 Research Questions**

This study was aimed at answering the following questions:

- i. What is the quality of life among elderly outpatients with knee osteoarthritis?
- ii. What are the physical activity levels among elderly outpatients with knee osteoarthritis?
- iii. Will there be a significant difference in physical activity levels between male and female elderly outpatients with knee osteoarthritis?
- iv. Will there be a significant difference in quality of life between male and female elderly outpatients with knee osteoarthritis?
- v. Will there be a significant difference in perceived intensity of Knee pain between male and female elderly outpatients with knee osteoarthritis?
- vi. What is the association between physical activity and quality of life among elderly adults with knee osteoarthritis?
- vii. What is the association between perceived intensity of Knee pain and each of physical activity and quality of life among elderly adults with knee osteoarthritis?

### **1.4 Aim of Study**

The aim of this study was to evaluate the impact of knee osteoarthritis on the quality of life and physical activity levels among elderly outpatients.

#### **1.4.1 Specific Objectives**

- i. To determine the quality of life among elderly outpatients with knee osteoarthritis.
- ii. To determine the physical activity levels among elderly outpatients with knee osteoarthritis.

- iii. To compare physical activity levels between male and female elderly outpatients with knee osteoarthritis.
- iv. To compare quality of life between male and female elderly outpatients with knee osteoarthritis.
- v. To compare the perceived intensity of Knee pain between male and female elderly outpatients with knee osteoarthritis.
- vi. To determine the association between physical activity levels and quality of life among elderly adults with knee osteoarthritis.
- vii. To determine the association between perceived intensity of Knee pain and each of physical activity and quality of life among elderly adults with knee osteoarthritis

## **1.5 Hypotheses**

- i. There would be no significant difference in physical activity levels between male and female elderly outpatients with knee osteoarthritis.
- ii. There would be no significant difference in quality of life between male and female elderly outpatients with knee osteoarthritis.
- iii. There would be no significant difference in perceived intensity of Knee pain between male and female elderly outpatients with knee osteoarthritis
- iv. There would be no significant association between physical activity levels and quality of life among elderly outpatients with knee osteoarthritis.
- v. There would be no significant association between pain intensity and the quality of life among elderly outpatients with knee osteoarthritis.
- vi. There would be no significant association between pain intensity and physical activity level among elderly outpatients with knee osteoarthritis.

- vii. There would be no significant association between age and the quality of life among elderly outpatients with knee osteoarthritis.
- viii. There would be no significant association between age and physical activity levels among elderly outpatients with knee osteoarthritis.
- ix. There would be no significant association between age and pain intensity levels among elderly outpatients with knee osteoarthritis.

## **1.6 Significance of the Study**

Knee osteoarthritis is a leading cause of disability among the elderly and poses a major burden on both individual well-being and public health systems, particularly in low- and middle-income countries like Nigeria. This study is significant because it seeks to provide context-specific insights into how knee OA affects the quality of life and physical activity levels of elderly outpatients.

By identifying the extent to which knee OA impairs physical function and overall well-being, the study will help clinicians, especially physiotherapists, design more targeted, patient-centered rehabilitation strategies that go beyond pain management to include functional recovery, emotional support, and promotion of active aging. The findings will also contribute to the growing body of local evidence needed to inform policy decisions, resource allocation, and the development of geriatric-friendly outpatient services.

Furthermore, understanding the factors that influence quality of life and physical activity levels among elderly patients with knee OA will enhance the precision of interventions. Ultimately, this study aims to promote better outcomes and quality of life for elderly individuals, empower

healthcare providers with evidence-based practice, and encourage greater awareness of the broader implications of osteoarthritis in aging populations.

## 1.7 Scope and Delimitations of Study

This study was delimited to:

- i. **Participants:** Male and female elderly outpatients who received care at the Physiotherapy Department, University of Benin Teaching Hospital (UBTH).
- ii. **Instruments:**
  - a) The 26-question quality of life questionnaire (WHOQOL-BREF)
  - b) The Physical Activity Scale for the Elderly (PASE)
  - c) Numerical Pain Rating Scale

## 1.8 Definition of Terms

- i. **Knee Osteoarthritis (OA):** Knee osteoarthritis refers to the degenerative condition of the knee joint characterized by the progressive breakdown of articular cartilage, subchondral bone changes, and inflammation in the synovial membrane.
- ii. **Quality of Life (QoL):** Quality of life refers to an individual's overall well-being, encompassing both the physical and mental aspects of health. It includes factors such as emotional state, physical functioning, social interactions, and the ability to perform daily activities.
- iii. **Physical activity:** Physical activity can be defined as any movement of the body that requires energy expenditure.
- iv. **Pain intensity:** Pain intensity is a measure of the degree or severity of pain that a person experiences.

## **1.9 List of Abbreviations**

OA – Osteoarthritis

QoL – Quality of Life

WHO – World Health Organization

WHOQoL - World Health Organization Quality of Life

HRQoL – Health Related Quality of Life

# CHAPTER TWO

## LITERATURE REVIEW

### 2.1 Introduction

Osteoarthritis (OA) is the most common form of arthritis affecting millions of people worldwide (Sen and Hurley, 2024). It is characterized by the degeneration of joint cartilage and underlying bone, leading to pain, stiffness and impaired movement (Hsu and Siwec, 2023). The prevalence of OA is rising due to the prevalence of risk factors, including obesity, physical inactivity which can lead to functional limitations and loss of independence (Hawker, 2019). Knee Osteoarthritis (OA) is a prevalent musculoskeletal condition characterized by progressive joint degeneration, leading to pain, stiffness, and functional impairment (Hsu and Siwec, 2023). Anthropometric variables such as weight, height, Body Mass Index (BMI) are measurements that provide insight into a person's overall health status and have been linked to the progression of knee OA (Li *et al.*, 2024).

The relationship between anthropometric variables and the severity of knee OA is essential for developing specific prevention and management strategies and serves as an indicator for an important risk factor of knee OA which is obesity. Excess body weight exerts additional mechanical stress on the knee joint during weight bearing or strenuous activities like prolonged standing, running, stair climbing and can contribute to cartilage wear and tear leading to joint degeneration (Chen *et al.*, 2020). Inflammation indicated by adipokines and cytokines can contribute to joint inflammation in knee OA (Rahmati *et al.*, 2017). Understanding this relationship helps to alleviate symptoms and slows down disease progression.

### 2.1.2 Epidemiology

The prevalence of knee OA varies across studies. The prevalence in US based on Johnson County and Framingham studies was 7% and 17% (Jordan *et al.*, 2007). In China it was 14.6% among adult greater than 45 years (Li *et al.*, 2020). National Health Interview Survey shows that an estimate of 14 million people in US has symptomatic knee OA (Deshpande *et al.*, 2016). Studies from Korean National Health and Nutritional Examination Survey shows that that the reported weighted prevalence of radiographic Knee OA among adults greater than 50 years was 35.1% (Hong *et al.*, 2020). Studies shows that adults aged 60-74 years in US, age and BMI adjusted knee OA approximately doubled by 65% (Nguyen *et al.*, 2011). Chingford Study on Knee OA among women age 45-64 years was 17.6% and the incidence of increased radiographic OA was 3.7% (Driban *et al.*, 2020). The life time risk of symptomatic knee OA has been estimated to be between 14% and 45% (Losina *et al.*, 2013). Knee OA is a well - known cause of disability in a large study of Mexican Americans the number of activities of daily living impairment was 1.12 -1.35 times greater among people who have knee OA (Haan *et al.*, 2016). In a nation-wide interview survey conducted in Korea showed that elderly male (836 per 100,000) and females (3039 per 100,000) lived with knee OA (Park *et al.*,2017). The prevalence of knee OA in Dutch population increases with age and women have the higher rates than men, especially adults after the age of 50 years and above as 15.6% in men and 30.5% in women (Bijisma *et al.*, 2007). The prevalence of symptomatic knee OA is 12.1% in National Health and Nutrition Examination Survey (NHANES) and 16.3% in adults aged 55-64 in Johnston County studies (Jordan *et al.*, 2007). Studies on the clinically diagnosed knee OA in Community Oriented Program for Control of Rheumatic Disorder (COPCORD) in Asia sowed the prevalence

of knee OA as 1.4% urban Filipinos and 19.3% in rural communities in Iran, in India the crude prevalence of knee OA was 5.5% in urban and 3.3% in rural community (Haq *et al.*, 2011).

### **2.1.3 Relevant Anatomy**

The knee is the largest joint in the body and it is primarily a hinge joint that is formed by the meeting of the thigh bone (femur) and larger bone (tibia) of the lower leg (Britannica, 2024). The knee joint allows leg flexion and extension and other movement though to a limited extent, Tibiofemoral and patellofemoral articulations make the knee a compound synovial joint (Chang *et al.*, 2023). The rounded ends or condyles of the femur and that of tibia meet at the knee, the articulating surfaces of the femur and tibia condyles are very smooth and separated by a slight gap and are held together by a complex system of ligament (Britannica, 2024). The patella is a sesamoid bone and the largest in the body occupying the anterior aspect of the knee, it is distal to the attachment of quadriceps tendon and protects the anterior articular surface of distal femur (Gupton *et al.*, 2023). The knee joints are weak on their own and are stabilized by 3 main structures which are Quadriceps femoris which is a four-component muscle that attaches to the patella via the quadriceps tendon. The fibrous capsule which attaches to the femur proximally, tibial distally and the intercondylar fossa posteriorly and lastly stabilized by the ligaments (Hyland *et al.*, 2023).

#### **2.1.3.1 Ligaments**

The main ligaments which stabilize the knee joint are:

- I. Patellar ligament : It extends inferiorly from the patella and attaches distally to tibial tuberosity.

II. Collateral ligaments: They are two strap like ligament that stabilize the hinge motion of the knee preventing excessive medial or lateral movement.

- Tibial (medial) collateral ligament: Wide and flat ligament found on the medial side of the knee joint which extends from the medial femoral epicondyle to the medial condyle of the tibia, typically attached to the medial meniscus, it prevents valgus stress on the knee (knocked knees).
- Fibular (lateral) collateral ligament; Thin and round ligament that runs inferiorly from the lateral femoral epicondyle to the fibula head lateral surface, it prevents varus stress on the knee (bowed knees).

III. Cruciate ligament: These two ligaments connect the femur and tibia.

- i. Anterior cruciate ligament; it extends from the anterior tibia inter condylar region posterior to the medial meniscus and inserts on the posteromedial surface of lateral femoral condyle. It prevents knee hyperextension, posterior femoral displacement, and anterior tibial displacement in the flexed knee, it is a weaker cruciate ligament with poor circulation.
- ii. Posterior cruciate ligament; it attaches to the posterior tibial inter condylar region and inserts on the anterolateral aspect of the medial femoral condyle. It tightens during knee flexion and prevents hyper flexion and posterior tibial displacement, stronger cruciate ligaments, supports the body weight when the knee is flexed.

IV Oblique popliteal ligament; continuation of semimembranosus tendon, reinforces fibrous capsule posteriorly.

V Arcuate popliteal ligament; originates from the fibular heads posterior margin, extends supero - medially over the tendon of popliteus (Moore *et al.*, 2013).

### **2.1.3.2 Bursae**

A Bursae is a synovial fluid filled sac, found between moving structures of the joint with the aim of reducing friction between its different components during movement. They also help to stabilize the knee.

- I. Suprapatellar bursa; an extension of the synovial cavity of the knee joint located deep between the quadriceps femoris and the femur.
- II. Prepatellar bursa; a subcutaneous bursa found between apex of the patella and the skin.
- III. Infrapatellar bursa; it splits into deep and superficial. the deep bursa lies between tibia and patella ligament while the superficial lies between patella ligament and the skin.
- IV. Semimembranosus bursa; located posteriorly in the knee joint between semimembranosus muscle and medial head of gastrocnemius (Moore *et al.*,2013).

### **2.1.3.3 Menisci**

The medial and lateral menisci are fibrocartilage that acts as shock absorbers by increasing the surface areas and deepen the articular surface of tibia, increasing stability of the joint. They are C shaped and are attached to both ends to the intercondylar region of the tibia. The medial meniscus is fixed to the tibial collateral and joint capsule and covers 51-74% of the articular surface of the medial tibial plateau (Fukazawa *et al.*, 2009). while lateral meniscus is smaller and does not attach to any ligaments and joint capsule and covers 75 – 93% of the articular surface of the tibial plateau (Mameri *et al.* , 2022).

### **2.1.3.4 Neurovascular Supply**

Genicular anastomosis is the arterial network in the knee region. The femoral artery, popliteal artery which bifurcates into superior femoral artery, supero-medial, infero-medial, supero-lateral and infero-lateral genicular branches which supplies the cruciate ligaments, synovial membrane and menisci. Anterior and posterior recurrent branches of the circumflex fibular and tibial recurrent arteries. The venous drainage are the Great saphenous vein, small saphenous vein, perforating veins which pierces the deep fascia and connect superficial and deep lower limb vein, the posterior tibial veins pass through the posterior aspect of the knee area. Most lymph from the knee drains into the popliteal lymph nodes in the popliteal fossa. The popliteal nodes and the knee lymphatics empty into the deep inguinal and sub inguinal nodes. The structures of the knee are innervated by the femoral nerve, tibial nerve and common fibular nerve (Moore *et al.*, 2013).

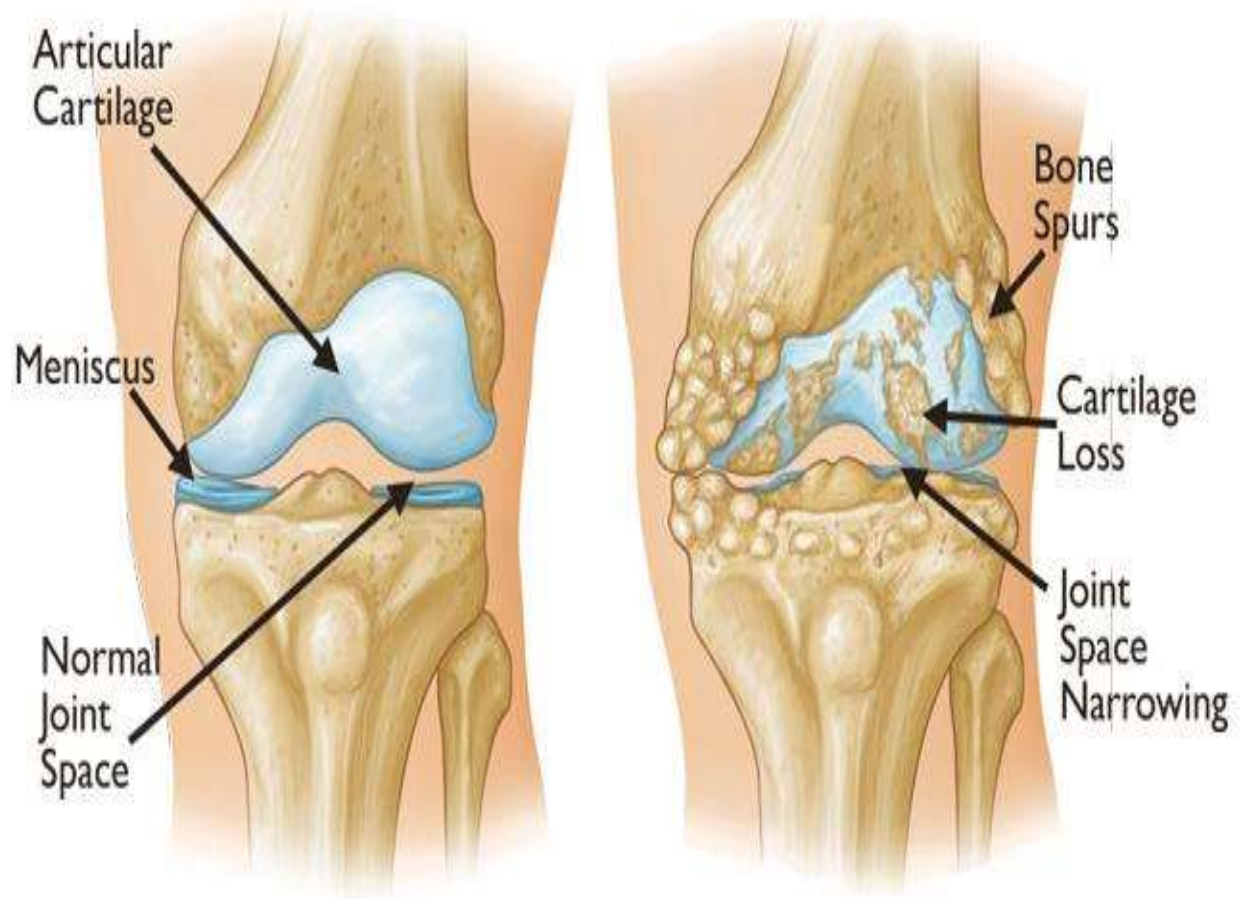
### **2.1.3.5 Muscles**

Muscles around the knee joint are responsible for the movement which are extension, flexion, lateral rotation, and medial rotation, the muscles assist the knee ligaments in preventing excessive displacement in any direction. The muscles include knee extensors and flexors. Knee extensors mainly Rectus femoris, Vastus lateralis, Vastus medialis, Vastus inntermedius, which are innervated by femoral nerve. The knee flexors which are the semimembranosus, biceps femoris, gracilis, gastrocnemius and popliteus (Moore *et al.*, 2013).

### **2.1.4 Pathophysiology of Knee OA**

The articular surface experiences a series of degeneration in knee OA which starts with the occurrence of swelling which leads to fibrillation (O'Neill *et al.*, 2018). This process results in

development of erosion up to full thickness which expose subchondral bone. Chondrocytes undergo activation which triggers the production of enzyme responsible for the degradation of Extra cellular matrix (ECM) (Li *et al.*, 2017). These enzymes include matrix metalloproteinases - 13 (MMPs) which is essential for the degradation of type II collagen, it is also the enzyme that is involved in the regulatory mechanism of various cytokines, chemokines, and inflammatory mediators to degrade ECM (Saito *et al.*, 2017). Progressive cartilage degeneration and osteoclast activity in subchondral bone results in bone channel formation with blood vessels and inflammatory cells, reducing the ability of cartilage to resist new blood vessel formation and increased vascular endothelial growth factor (VEGF) synthesis (Mapp *et al.* , 2012). The surfacing of clonal clusters which are caused by the increased rate of chondrocyte proliferation. Chondrocytes produce inflammatory mediators like cytokines in response to tumor necrosis factor – alpha, interleukine-6, and also start calcium deposition in ECM, which resembles endochondral ossification process in epiphyseal plate (Vanderkraan *et al.*, 2012). Articular cartilage changes result in subchondral bone thickening, subchondral plate thickening, osteophyte formation and cyst development in the knee joint (Hodgkinson *et al.*, 2022).



**Figure 1: Features of Knee Osteoarthritis**

**Image source:** [www.orthoinfo.aaos.org/](http://www.orthoinfo.aaos.org/)

### **2.1.4.1 Aetiology**

Knee OA is classified as either primary (idiopathic) or secondary, there is a long list of etiologies of secondary Knee OA few are; Malformation of the knee joint, malposition of the knee joint, rickets, hyperparathyroidism, post traumatic immobilization and loss of mobility of the knee joint, articular cartilage degeneration due to age, obesity, family history, etc ( Micheal *et al.*, 2010).

### **2.1.4.2 Risk Factors**

There are different modifiable risk factors associated with knee OA, some are obesity and overweight, comorbidity, occupational factors, biomechanical factors and dietary exposures. Majority of patients with knee OA are over overweight or obese (Marks R, 2007). BMI greater than 30 further increases the risk of knee OA. High BMI increases the development and progression of knee OA using 2 mechanism which are mechanical stress on the weight bearing knee joint and modified metabolic and humoral profile which results in increased adipocytokine levels and pro inflammatory response (Kulkarni *et al.*, 2016).

In comorbidity e.g. Diabetes, metabolism play an important role in remodeling of the synovial joint tissues, including articular cartilage (Mobasheri *et al.*, 2017). In hyperglycemia formation of oxidants is promoted which results in increased catabolism of cartilage (Rosa *et al.*, 2009). Cartilage was shown to be softer in diabetes and at the risk of damage (Dawson *et al.*, 2018). The more severe the diabetes was, the greater the degeneration of the knee (Neumann *et al.*, 2018). Greater prevalence of patients with Knee OA suffer from concomitant depression (Stubbs *et al.*, 2016). Greater functional impairment, disability rate, are associated with worsening the knee pain in patients with knee OA (Rathbun *et al.*, 2018).

Occupational factor is one of the strongest modifiable risk factor for the progression of knee OA. There are two possible mechanism which can result in knee OA, repetitive physical movement or prolonged posture at work which result in stress on the knee joint which leads to higher incidence of knee OA and ACL injury. Professional activities like squatting, kneeling, running, climbing increases the risk of knee OA (Verbeek *et al.*, 2017).

Biomechanical factors play a crucial role in degeneration of the knee joint. The atrophy of quadriceps femoris due to inactivity can lead to symptomatic knee OA progression (Kemnitz *et al.*, 2017). Varus and Valgus mal alignment of the knee joint increases the medial and lateral stress on the tibiofemoral joint which increases pain and loss of cartilage which in a way hastens knee OA progression. Joint laxity results from ligaments being unable to oppose external forces (Sharma *et al.*, 2008).

Deficiency of vitamin D and Calcium decreases knee function and increases the progression of knee OA and increases the loss of tibial cartilage. Low level of vitamin C and E exacerbates knee OA (Liu *et al.*, 2018).

### **2.1.5 Clinical Presentations**

Persistent knee pain, limited morning stiffness, reduced functionality are the three major clinical features of knee OA (Zhang *et al.*, 2010), Additions are crepitus, restriction of joint movement, bony enlargement, joint instability, swelling.

Pain is the most common symptom in knee OA leading to disability, functional limitation, it is subjective and exacerbated by vigorous activities, pain can be dull, sharp, and intermittent (Peter *et al.*, 2006). It is not fully understood because hyaline fibre does not contain any pain fibre, pain arise from nociceptive fibre and mechanoreceptors in synovium, periosteum, capsule,

tendon, Pain in knee OA also arise from synovitis and bone marrow lesions by stimulating nociceptive fibers. Pain in knee OA is worse in the morning, with an improvement in the next 2 hours and then worsens in the afternoon and early afternoon, night pain in knee OA interferes with sleep which leads to fatigue, lack of functionality and increased pain sensitivity (Allen *et al.*, 2009).

Stiffness is the discomfort during movement caused by inflexibility of the knee joint, it occurs early in the morning and later in the day after periods of inactivity. It is usually short lived, less than 30minutes in the morning (Abhishek and Doherty, 2012).

Crepitus is a crunching sound caused by friction between damaged articular cartilage or bone, it is heard more during active movement and during passive movement during physical examination. It is exacerbated by stress on the knee joint surface. Reduced range of motion mainly results from marginal osteophytosis and capsular thickening (Abhishek and Doherty 2012). Knee OA tend to reduce range of motion which is also an indicator of both incidence and progression of cartilage deficit (Shelbourne *et al.*, 2012).

### **2.1.6 Diagnostic Measures**

The diagnostic measures for knee OA is a broad approach combing patient history, physical examination and imaging studies. X ray is the simplest, least expensive, and widely used imaging modality, it detects joint space width, osteophytes, subchondral, meniscal integrity.it is measured using the Kellgren-Lawrence(KL) system which measures the osteophyte formation and joint space narrowing (Kijowski *et al.*, 2023)

MRI is used in clinical assessment used during disease follow up, its ability to visualize pathologies that are not detected on radiographs i.e damage of articular cartilage, menisci lesion,

fluid collections and bone marrow lesion (Hunter *et al.*, 2011). It detects cartilage lesion on the knee joint, used to check for internal degeneration of ligament, menisci, and bone, it assesses the knee joint using multi contrast morphological imaging which assesses early onset and progression of knee degeneration (Chaudhari, 2020).

Computed Tomography (CT) is a method used for detecting cortical bone and soft tissue calcifications, it is used to evaluate the damage of articular cartilage with high anatomical resolution in multi planar fashion (Roemer *et al.*, 2014).

## **2.1.7 Management of knee OA**

The management of knee osteoarthritis (KOA) focuses on alleviating symptoms, improving joint function, enhancing quality of life, and delaying disease progression. Treatment strategies can be broadly categorized into conservative and surgical approaches, depending on the severity of symptoms and the patient's overall health and functional demands.

### **1. Conservative Management**

Conservative (non-surgical) management is typically the first-line approach for KOA and includes pharmacological, non-pharmacological, and rehabilitative interventions. The goal is to relieve pain, improve mobility, and delay or avoid surgical intervention.

#### **a. Physiotherapy Management**

Physiotherapy plays a central role in the conservative treatment of KOA and is supported by strong clinical evidence as a core component of non-operative care.

**Exercise Therapy:** Structured exercise programs are effective in reducing pain and improving function in KOA patients. Both aerobic and resistance training are recommended. Strengthening

exercises, particularly for the quadriceps and hip muscles, help stabilize the knee joint and reduce load on the articular surfaces (Fransen et al., 2015). Neuromuscular exercises further enhance proprioception and joint control.

**Range of Motion (ROM) and Flexibility Training:** Regular stretching exercises prevent joint stiffness, improve ROM, and maintain mobility. Targeting the hamstrings, calves, and hip flexors can be particularly beneficial (Goh et al., 2019).

**Manual Therapy:** Techniques such as joint mobilizations, soft tissue massage, and patellar glides may provide short-term relief by enhancing joint mechanics and reducing stiffness (Abbott et al., 2016).

**Balance and Proprioceptive Training:** Balance impairments are common in individuals with KOA and increase fall risk. Physiotherapists often incorporate wobble boards, single-leg stands, and gait training to improve postural control (Waller et al., 2019).

**Assistive Devices and Taping:** The use of knee braces, orthotics, or kinesiotaping can help offload stress on the affected compartment of the knee, thereby improving alignment and reducing pain during ambulation (Hinman et al., 2016).

**Patient Education and Self-Management:** Educating patients on joint protection strategies, activity modification, weight control, and the importance of continued exercise adherence is essential for long-term outcomes.

## **b. Pharmacological Management**

Pain relief may be achieved using medications such as acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and topical analgesics. Intra-articular injections of corticosteroids

or hyaluronic acid are sometimes used for temporary symptom relief in moderate-to-severe cases (Bannuru et al., 2019).

### **c. Weight Management and Lifestyle Modification**

Given the strong association between obesity and KOA, weight reduction is a critical aspect of management. Even modest weight loss can significantly reduce joint stress and improve symptoms (Messier et al., 2018).

### **d. Nutritional Supplements**

Some patients use glucosamine, chondroitin sulfate, or omega-3 fatty acids. While evidence is mixed, these may offer symptom relief in some individuals and are often considered as adjunctive therapies (Reginster et al., 2022).

## **2. Surgical Management**

Surgery is typically reserved for individuals with severe KOA who do not respond to conservative treatments and experience significant pain or functional impairment.

**Arthroscopic Surgery:** Although once widely used, arthroscopy is now limited in KOA management due to minimal long-term benefit. It may be considered in cases involving mechanical symptoms like locking or meniscal tears (Khan et al., 2020).

**Osteotomy:** This procedure involves realigning the knee joint by cutting and reshaping bones. It is suitable for younger patients with unicompartmental OA and malalignment, aiming to redistribute joint load (Duivenvoorden et al., 2016).

**Unicompartmental or Total Knee Arthroplasty (TKA):** When joint destruction is extensive and non-operative treatments fail, knee replacement surgery is considered. Total knee

arthroplasty offers pain relief, improves joint function, and restores mobility, especially in older adults with end-stage KOA (Carr et al., 2020).

## **2.2 Quality of Life**

### **2.2.1 Definition**

The World Health Organization (WHO, 1995) defines quality of life as a multifaceted concept encompassing an individual's overall well-being, satisfaction, and sense of fulfillment across various life domains. These domains include physical health, mental and emotional well-being, social relationships, personal growth, and the ability to engage in activities that hold meaning and purpose. Quality of life assesses overall contentment across the physical, mental, and social aspects of one's surroundings.

### **2.2.2 Domains of Quality of Life**

The WHOQOL-BREF, a well-being assessment tool, encompasses four key domains. The physical domain looks at how well you move, manage daily tasks, and your overall energy levels. It also explores pain and sleep quality. The psychological domain delves into your self-perception, emotional state, and cognitive abilities. This includes your self-esteem, outlook, ability to learn, and memory. In addition to the four core domains, the WHOQOL-BREF may also assess aspects of spiritual, religious, or existential beliefs, along with mental health.. The social relationships domain examines your personal connections, support networks, and intimate life. The WHOQOL-BREF focuses on four core domains but may also delve into aspects of spiritual or religious beliefs and mental health (Nejat et al., 2006). Other well-being assessment tools explore different domains. For example, the EuroQol-5D emphasizes five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (Balestroni &

Bertolotti, 2012). Similarly, the McGill Quality of Life Questionnaire – Expanded focuses on physical, psychological, existential, and social domains (Axelsson et al., 2020). These examples highlight how the choice of domains in such instruments depends on the specific aspects of life being measured.

### **2.2.3 Assessment Tools for Quality of Life**

#### **2.2.3.1 The 26-question quality of life questionnaire (WHOQOL-BREF)**

The WHOQOL-100 questionnaire was created by the World Health Organization in 1994 to assess Quality of Life. However, it was shown to be somewhat lengthy. In 1996, the organization created a shorter version of the questionnaire that had 26 items in 4 domains: environment, social relationships, psychological health, and physical health (WHO 2012). A study by Malibary et al. (2019) investigating quality of life among Saudi medical students found the WHOQOL-BREF instrument to be a valid tool due to its four well-defined dimensions. Additionally, the instrument demonstrated reliability with a Cronbach's alpha coefficient exceeding 0.7. Further supporting its reliability, Llic et al. (2019) reported high scale stability and significant test-retest reliability across all WHOQOL-BREF domains, with a p-value lower than 0.01.

#### **2.2.3.2 McGill Quality of Life Questionnaire — Expanded**

Developed specifically for palliative care research, the McGill Quality of Life Questionnaire (MQOL) remains a widely used tool to evaluate the quality of life for patients with life-threatening illnesses. Cohen et al. in 2019 expanded the original version of this questionnaire with 8 domains unlike the original version with 4 to assess individuals nearing the end of their life better. Studies (Axelsson et al., 2020) report positive feedback from both patients and their families regarding the McGill Quality of Life Questionnaire (MQOL). Patients appreciate that it

covers important aspects of their well-being, find it easy to understand, and view it as an opportunity to express their feelings. The questionnaire assesses quality of life across four domains: physical, psychological, existential, and social.

### **2.2.3.3 EuroQol-5D Questionnaire (EQ-5D)**

The EQ-5D, a European tool widely used to assess overall well-being, incorporates five key areas into its questionnaire. These areas, known as dimensions, focus on a person's ability to move around, care for themselves, engage in daily activities, manage pain and discomfort, and cope with anxiety and depression. The MQOL utilizes a scaling system within each domain to gauge the level of difficulty experienced by patients (Balestroni & Bertolotti, 2012). Additionally, the questionnaire incorporates a Visual Analog Scale (VAS) allowing respondents to visually represent their overall health perception.

### **2.2.4 Factors Influencing Quality of Life**

Quality of life (QoL) is a multidimensional concept that encompasses physical, psychological, social, and environmental domains of an individual's well-being. It is influenced by a complex interplay of personal, health-related, environmental, and socio-economic factors. These determinants can either enhance or diminish a person's perceived quality of life, particularly in populations living with chronic health conditions or age-related functional decline (Bowling, 2005; WHO, 1997).

#### **i. Physical Health Status**

One of the most critical determinants of QoL is an individual's physical health. Chronic illnesses, functional limitations, fatigue, and persistent pain—such as those associated with musculoskeletal disorders like osteoarthritis—have been strongly linked to reduced

QoL (Rejeski & Mihalko, 2010). Mobility impairments, reduced physical activity, and a decline in the ability to perform activities of daily living (ADLs) all contribute significantly to lower QoL scores in elderly populations (Netuveli & Blane, 2018). Moreover, the presence of multiple comorbid conditions (multimorbidity) further complicates physical functioning and increases healthcare needs, thereby impacting perceived well-being (Fortin et al., 2016).

**ii. Psychological Well-being**

Mental health is another powerful predictor of QoL. Conditions such as depression, anxiety, and cognitive impairments have been consistently associated with poorer QoL across various populations (Murray & Lopez, 2007). Psychological resilience, positive coping mechanisms, and a sense of purpose are important protective factors. Older adults who maintain a sense of autonomy and self-efficacy tend to report higher QoL, even in the face of health challenges (Wrosch, Schulz, & Heckhausen, 2014).

**iii. Pain and Symptom Burden**

Pain intensity and its interference with daily life are particularly important in determining QoL, especially among individuals with chronic diseases like osteoarthritis. Pain can limit mobility, disrupt sleep, impair social interaction, and lead to emotional distress, all of which contribute to diminished QoL (Salaffi et al., 2015). Unmanaged or poorly controlled symptoms often result in a downward spiral of inactivity, social isolation, and psychological distress.

**iv. Functional Ability and Independence**

The ability to perform daily tasks independently plays a central role in an individual's quality of life. Loss of function, especially in older adults, often leads to dependency on

caregivers, loss of dignity, and reduced self-esteem (Lawton, 2020). Functional ability is influenced not only by physical health but also by environmental supports and rehabilitation services. Individuals with higher functional autonomy generally experience better health outcomes and life satisfaction.

**v. Social Relationships and Support Networks**

Social connections, including family ties, friendships, and community involvement, are critical to quality of life. Strong social support has been shown to buffer stress, enhance emotional well-being, and improve coping with illness (Berkman & Glass, 2020). Conversely, social isolation and loneliness are linked to higher rates of morbidity, depression, and mortality in the elderly (Holt-Lunstad et al., 2015). Being engaged in meaningful relationships and having access to support systems contributes to a sense of belonging and life satisfaction.

**vi. Economic and Educational Status**

Socio-economic status, including income level, employment, and education, significantly impacts QoL. Financial stability allows better access to healthcare, nutritious food, safe housing, and recreational activities. Conversely, poverty or low-income status can result in unmet health needs, stress, and reduced participation in social life (Diener et al., 2019). Educational attainment is also associated with health literacy, healthier behaviors, and proactive health-seeking behavior, all of which influence QoL positively.

**vii. Environmental Conditions**

The physical and built environment also affects QoL. Clean air, access to green spaces, safe neighborhoods, and adequate housing conditions are essential for maintaining both physical and mental health (Evans, 2013). For older adults or individuals with mobility

impairments, the presence of accessible infrastructure (e.g., ramps, elevators, public transport) greatly influences their ability to participate in daily activities and maintain independence.

**viii. Cultural and Spiritual Beliefs**

Cultural values and religious or spiritual beliefs also play an important role in shaping perceptions of well-being. These factors influence how individuals interpret health, illness, suffering, and coping. For many, spiritual practices provide a sense of hope, meaning, and social belonging, especially during illness or end-of-life situations (Koenig, 2012).

**ix. Health Behaviors and Lifestyle**

Engagement in health-promoting behaviors such as regular physical activity, balanced nutrition, adequate sleep, and avoidance of harmful substances (e.g., tobacco, alcohol) has a positive effect on QoL (Bize, Johnson, & Plotnikoff, 2017). Conversely, sedentary lifestyles and poor dietary habits are associated with chronic illnesses and a lower perception of health and vitality.

### **2.2.5 Knee OA and Quality of Life**

Knee osteoarthritis (KOA) is one of the most prevalent musculoskeletal disorders affecting older adults, and it has a profound and multifactorial impact on quality of life (QoL). KOA is a chronic degenerative joint disease characterized by the progressive breakdown of cartilage, subchondral bone remodeling, synovial inflammation, and osteophyte formation, which collectively result in joint pain, stiffness, swelling, and decreased range of motion (Hunter & Bierma-Zeinstra, 2019). These clinical manifestations significantly compromise physical functioning, leading to

limitations in performing daily activities such as walking, climbing stairs, and standing for long periods (Dillon et al., 2019).

The decline in physical function directly affects patients' QoL by increasing dependency, reducing mobility, and lowering participation in social and recreational activities (Alkan et al., 2017). Health-related quality of life (HRQoL) encompasses physical, psychological, and social dimensions of health. In KOA, all these dimensions are negatively impacted. Physically, individuals suffer from chronic pain and reduced joint function. Psychologically, the persistent discomfort and reduced functional independence can lead to depression, anxiety, and a sense of helplessness (Akinlotan et al., 2021). Socially, KOA often leads to isolation due to reduced mobility and social withdrawal, further compounding its negative effects on QoL (Zhang et al., 2020).

Pain severity has been consistently identified as a key predictor of reduced QoL in individuals with KOA. A study by Allen et al. (2016) found that patients with higher pain scores reported significantly poorer outcomes in both physical and mental health domains. Similarly, functional disability – particularly difficulty with ambulation and basic self-care – has been shown to negatively correlate with QoL scores (Kiadaliri et al., 2016). Moreover, psychological factors such as mood disturbances and poor coping mechanisms exacerbate perceived disability and pain; thereby further diminishing QoL (Soni et al., 2020).

The progression of KOA also influences the extent of its impact on QoL. As the disease advances, joint deformities and increased mechanical stress can cause greater pain and instability, making it difficult for patients to remain active or engaged in community life (Cross et al., 2019). Reduced physical activity, in turn, contributes to muscle weakness, weight gain,

and cardiovascular risk, creating a vicious cycle that worsens both physical health and QoL outcomes (Duyur Cakit et al., 2017).

Additionally, sociodemographic factors such as age, gender, socioeconomic status, and educational level have been found to moderate the relationship between KOA and QoL. For instance, older individuals and women often report worse QoL outcomes, possibly due to more severe symptoms or comorbidities (Sackett et al., 2022). Furthermore, lower socioeconomic status is associated with poorer access to healthcare, rehabilitation services, and social support, which further deteriorates the patient's QoL (Murphy et al., 2021).

Although pharmacologic treatments such as NSAIDs can help alleviate pain, non-pharmacologic approaches like physical therapy, patient education, and weight management have been shown to yield long-term benefits in improving functional status and QoL (Hochberg et al., 2016). Moreover, interventions targeting mental health, such as cognitive-behavioral therapy and social support programs, have been found to reduce depressive symptoms and enhance coping, thereby improving overall well-being (Wallis et al., 2021).

### **2.2.6 Quality of Life among Elderly Patients with Knee OA**

Knee osteoarthritis (KOA) is a major contributor to disability and poor quality of life (QoL) among the elderly, with its burden rising in tandem with increasing life expectancy worldwide. The elderly population is particularly vulnerable to the degenerative effects of KOA due to age-related physiological changes, cumulative joint stress, and the presence of comorbidities (Hunter & Bierma-Zeinstra, 2019). The QoL in this group is often compromised due to pain, functional limitations, psychological distress, and reduced participation in social activities—all of which are common consequences of KOA.

Quality of life is a multidimensional construct that encompasses physical, mental, emotional, and social well-being. In elderly individuals with KOA, each of these domains is adversely affected. Physically, KOA causes chronic joint pain, stiffness, and reduced mobility, limiting the performance of essential daily tasks such as walking, climbing stairs, and rising from chairs (Alkan et al., 2017). These limitations often lead to increased dependence on others, loss of autonomy, and decreased self-esteem. Mental and emotional health are also impacted, as persistent pain and activity restrictions frequently result in anxiety, depression, and feelings of helplessness (Soni et al., 2020). These psychological effects further deteriorate the overall quality of life in elderly patients.

Social participation—a critical component of QoL in the elderly—is significantly hindered by KOA. As mobility declines, older adults may withdraw from community events, family gatherings, and recreational activities, leading to social isolation and reduced life satisfaction (Zhang et al., 2020). Moreover, the stigma associated with visible disability and the use of assistive devices can create additional psychological barriers to social integration (Akinlotan et al., 2021). The fear of falling, which is common in elderly individuals with impaired joint stability, also discourages physical activity and social interaction, exacerbating physical deconditioning and loneliness (Duyur Cakit et al., 2017).

Importantly, the impact of KOA on QoL is not uniform among elderly individuals; it varies with factors such as disease severity, pain intensity, duration of symptoms, and the presence of comorbidities like obesity, cardiovascular disease, and diabetes. Studies have shown that greater radiographic severity of KOA is significantly associated with lower QoL scores, particularly in the physical health domain (Allen et al., 2016). Pain intensity is another critical determinant;

higher pain levels are strongly correlated with worse QoL, affecting not only physical functioning but also sleep quality, mood, and daily productivity (Kiadaliri et al., 2016).

Age itself may compound the effects of KOA on QoL. Older adults are more likely to experience sarcopenia, frailty, and multiple chronic diseases, all of which interact synergistically with KOA to reduce mobility and increase the burden of care (Murphy et al., 2021). Cognitive decline, prevalent in some elderly individuals, may also impair their ability to manage the disease effectively, adhere to treatment regimens, or communicate their needs, further compromising QoL outcomes.

Gender differences have been observed as well, with elderly women often reporting more severe pain and disability than men, as well as lower QoL scores (Sackett et al., 2022). This disparity may be due to a combination of biological, psychosocial, and cultural factors, including differences in pain perception, hormonal changes, and caregiving roles.

In response to these challenges, multidisciplinary management strategies are essential. Non-pharmacological interventions such as physical therapy, patient education, weight management, and psychosocial support have shown efficacy in improving functional ability and QoL in elderly KOA patients (Wallis et al., 2021). Importantly, interventions should be tailored to the specific needs and limitations of elderly individuals, taking into account their cognitive status, social support systems, and coexisting health conditions.

## **2.3 Physical Activity**

### **2.3.1 Definition**

Physical activity (PA) refers to any voluntary bodily movement produced by skeletal muscles that results in energy expenditure above resting levels. It encompasses a wide range of

movements, including daily tasks, recreational pursuits, occupational activities, and structured exercises (World Health Organization [WHO], 2020). It is a fundamental determinant of health and well-being, contributing significantly to the prevention and management of various chronic diseases, enhancement of physical fitness, and promotion of mental health (Piercy et al., 2018).

Scientific evidence underscores the extensive benefits of regular physical activity. These include improved cardiovascular health, better glucose metabolism, reduced body fat, enhanced musculoskeletal strength, and improved respiratory function (Warburton & Bredin, 2017). Furthermore, consistent engagement in physical activity has been shown to reduce the risk of non-communicable diseases such as type 2 diabetes, hypertension, coronary artery disease, stroke, and several types of cancer (Kyu et al., 2016). In addition to physical benefits, physical activity also plays a crucial role in supporting mental health, including the reduction of anxiety and depressive symptoms and the promotion of cognitive performance and emotional well-being (Schuch et al., 2018).

Globally, public health recommendations advocate for at least 150–300 minutes of moderate-intensity or 75–150 minutes of vigorous-intensity aerobic physical activity per week for adults, alongside muscle-strengthening activities on two or more days per week (WHO, 2020). Despite these guidelines, physical inactivity remains a significant public health concern. Data from the Global Physical Activity Observatory reveal that over one in four adults globally fail to meet these minimum recommendations, contributing to an estimated 5 million deaths annually (Guthold et al., 2018).

Several factors influence physical activity participation, including environmental settings, personal motivation, social support, health status, occupational demands, and access to recreational facilities (Bauman et al., 2016). Urbanization, increased reliance on motorized

transport, sedentary occupations, and screen-based leisure have further contributed to the global decline in physical activity levels (Hallal et al., 2016).

In response, health promotion strategies have increasingly focused on integrating physical activity into daily routines, fostering active transportation, and developing supportive environments. These include community-based programs, workplace interventions, and national policy frameworks aimed at reducing sedentary behavior and promoting active lifestyles (Biddle et al., 2019).

### **2.3.2 Types of Physical Activity**

Physical activity can be generally divided into four primary categories: aerobic, flexibility, strengthening, and balance exercises.

**Aerobic Activities:** Often referred to as cardiovascular or endurance exercises, aerobic activities involve sustained, rhythmic movements that engage large muscle groups continuously over time. Examples include walking, hiking, jogging, running, and sports like table tennis. These activities elevate the heart rate and breathing frequency, thereby improving the efficiency of the cardiovascular and respiratory systems to meet the body's increased oxygen and energy requirements during exercise.

**Flexibility Activities:** These exercises are designed to enhance the mobility and elasticity of joints and muscles, helping to prevent injuries, alleviate muscle tension, and improve overall movement capacity. Common flexibility exercises include stretching routines, yoga, and tai chi. Typically, these are performed for 5 to 10 minutes before intense physical activity to increase blood circulation and oxygen delivery to muscles, making stretching more effective. They are also useful post-exercise to promote muscle relaxation and recovery.

**Strengthening Activities:** This type encompasses exercises aimed at boosting muscle mass and bone density. Bone-strengthening activities generate mechanical forces that stimulate bone growth and density, often through weight-bearing or impact actions such as running, jumping rope, basketball, tennis, and hopscotch. Muscle-strengthening exercises—sometimes known as resistance or weight training—involve deliberate muscle contractions performed with or without equipment, as outlined by the American College of Sports Medicine (2009). These exercises improve muscle strength, power, and endurance. Examples include resistance band workouts, physically demanding gardening tasks like digging, stair climbing, hill walking, cycling, dancing, and bodyweight exercises such as push-ups, sit-ups, and squats. These activities are particularly beneficial for older adults and those recovering from illnesses like stroke because they help maintain and build muscular and skeletal health.

**Balance Activities:** Designed to enhance stability and reduce the likelihood of falls, balance exercises focus on strengthening core muscles in the back, abdomen, and lower limbs. Examples include walking heel-to-toe, performing repeated sit-to-stand movements, and exercises involving unstable surfaces like wobble boards.

### **2.3.3 Components of Physical Activity**

Physical activity (PA) can occur in two main forms: it may be planned and intentional, such as in organized exercise sessions or sports, or it can be incidental and unstructured, involving routine daily movements like walking or gardening. The key elements of physical activity are generally categorized into three principal dimensions: intensity, duration, and frequency, as defined by the Physical Activity Guidelines Advisory Committee Scientific Report (2018).

**Intensity:** This dimension indicates the amount of effort or energy expenditure required during an activity. It is commonly assessed using metrics such as heart rate, metabolic equivalents (METs), or the rating of perceived exertion (RPE). High-intensity activities are those that demand 6 METs or more, or involve exertion at 70% or higher of an individual's maximum heart rate. Moderate-intensity exercises typically range between 3 and 6 METs, or 50% to 70% of the maximum heart rate, whereas low-intensity activities require less than 3 METs or less than 50% of the maximum heart rate (Physical Activity Guidelines Advisory Committee, 2018). The Borg RPE scale, which ranges from 6 to 20, categorizes intensity with low effort corresponding to scores between 9 and 11, moderate effort falling between 12 and 14, and vigorous effort ranging from 15 to 20 (Williams, 2017). These intensity classifications are important for evaluating physical exertion levels and guiding exercise prescriptions. According to Mendes et al. (2018), and reinforced by the Physical Activity Guidelines Advisory Committee (2018), PA is typically divided into vigorous, moderate, and low intensity categories. Vigorous activities, such as running, lap swimming, or competitive sports like basketball, soccer, or hockey, require a substantial increase in heart rate and respiratory rate. Moderate activities include brisk walking, hiking, moderate cycling, and gardening, which elevate cardiovascular function but less intensely. Low-intensity activities involve minimal physical strain, such as light household tasks (e.g., washing dishes, folding clothes) or leisure activities like reading or watching television. Classifying physical activities by intensity assists healthcare providers and individuals in assessing exercise levels and tailoring activity programs to meet health objectives (Physical Activity Guidelines Advisory Committee, 2018).

**Duration:** This component refers to the total length of time spent engaged in physical activity during a single session. Current recommendations for adults advise accumulating at least 150

minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity weekly (Physical Activity Guidelines Advisory Committee, 2018). The specific type of activity, including aerobic, resistance, flexibility, or balance training, also plays a role in defining appropriate duration.

**Frequency:** Frequency indicates the number of days per week that physical activity is performed. It is generally recommended that adults distribute the suggested 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity over a minimum of three days per week to optimize health benefits (Physical Activity Guidelines Advisory Committee, 2018).

### **2.3.4 Measurement Tools for Physical Activity**

Accurate measurement of physical activity (PA) is crucial in research involving elderly individuals with osteoarthritis (OA), as it enables quantification of activity levels and assessment of intervention outcomes. The Physical Activity Scale for the Elderly (PASE) is one of the most widely accepted self-report questionnaires designed specifically for older adults. PASE captures a comprehensive view of physical activity over a typical seven-day period, covering three main domains: leisure time activities (such as walking and sports), household activities (like housework and gardening), and occupational activities for those still working (Washburn et al., 2015). The instrument includes 12 items scored to provide a total physical activity score, which reflects the frequency, duration, and intensity of activities. The validity and reliability of PASE have been demonstrated in elderly populations, including those with chronic conditions such as OA, making it sensitive to changes following therapeutic interventions (Washburn et al., 2015; Evenson et al., 2018).

While PASE is advantageous for its brevity and ease of administration in clinical settings, other tools such as accelerometers and pedometers offer objective PA measurements by tracking movement patterns and intensity. However, these devices may be limited by cost, participant compliance, and inability to capture contextual information about the type of activities (Troost et al., 2018). Questionnaires like the International Physical Activity Questionnaire (IPAQ) and the Global Physical Activity Questionnaire (GPAQ) are also used but often lack specificity for elderly populations or do not consider the unique activity patterns of OA patients. Therefore, PASE remains one of the most practical tools for measuring PA in elderly OA cohorts.

### **2.3.5 Consequences of Physical Inactivity**

Physical inactivity in elderly patients with OA has profound negative effects on both disease progression and general health. Musculoskeletal deterioration is accelerated by inactivity, resulting in muscle atrophy, reduced joint lubrication, cartilage degradation, and increased joint stiffness, which exacerbate pain and functional limitations (Fransen et al., 2019). Inactivity also contributes to diminished aerobic capacity, poor balance, and reduced endurance, increasing the risk of falls and fractures in elderly populations (Taylor et al., 2018).

Beyond musculoskeletal health, physical inactivity is strongly linked to an increased incidence of non-communicable diseases such as cardiovascular disease, type 2 diabetes, hypertension, and obesity, all of which are prevalent in elderly OA populations (Kosteli et al., 2017). Furthermore, inactivity negatively impacts mental health, contributing to depression, anxiety, cognitive decline, and reduced social engagement (McPhate et al., 2019). In OA patients specifically, physical inactivity leads to a decline in physical function, worsened pain, and diminished overall quality of life (QoL), creating a self-perpetuating cycle of disability and inactivity (Fransen et al.,

2019). Therefore, promoting physical activity is essential not only to mitigate OA symptoms but also to prevent broader health complications and preserve independence.

### **2.3.6 Barriers to Physical Activity in Elderly with Osteoarthritis**

Multiple barriers restrict physical activity participation among elderly individuals with OA, spanning physical, psychological, social, and environmental domains. Pain is the predominant barrier, often described as a limiting factor that reduces willingness to engage in movement due to fear of worsening joint symptoms (Gusi et al., 2016; Silva et al., 2019). This fear-avoidance behavior can exacerbate physical inactivity and lead to a vicious cycle of muscle weakness and joint stiffness, further impairing mobility.

Physical limitations including joint swelling, decreased range of motion, muscle weakness, and fatigue compound the challenges of maintaining activity (Sjöström et al., 2020). Moreover, comorbidities such as cardiovascular disease, diabetes, and obesity commonly coexist with OA and increase the complexity of managing physical activity (Almeida et al., 2020). Psychological barriers such as depression, anxiety, and low self-efficacy reduce motivation and confidence in the ability to exercise, with social isolation and lack of social support further compounding these issues (Smith et al., 2017). Environmental factors, including unsafe neighborhoods, lack of accessible recreational facilities, adverse weather conditions, and financial constraints, also deter elderly patients with OA from participating in regular physical activity (Urrutia-Pereira et al., 2020). These multifactorial barriers necessitate tailored intervention strategies that address both individual and environmental challenges to promote sustained physical activity in this population.

### **2.3.7 Role of Physical Activity in Osteoarthritis Management**

Physical Activity is universally recognized as a cornerstone in the conservative management of OA. Clinical guidelines from organizations such as the American College of Rheumatology (ACR) and the Osteoarthritis Research Society International (OARSI) recommend Physical Activity as a first-line therapy for pain reduction and functional improvement (Bennell et al., 2018). The mechanisms by which Physical Activity benefits OA include strengthening periarticular muscles to improve joint stability, enhancing synovial fluid circulation to nourish cartilage, and reducing systemic and local inflammation (O'Reilly et al., 2019).

Different Physical Activity modalities offer complementary benefits. Strength training improves muscle mass and joint support, aerobic Physical Activity enhances cardiovascular health and promotes weight management, and flexibility exercises improve joint range of motion (Bennell et al., 2018). Aquatic Physical Activity is particularly beneficial for OA patients as it reduces joint load due to buoyancy while allowing for functional movement and cardiovascular conditioning (Bartels et al., 2016). Importantly, Physical Activity also mitigates common OA comorbidities such as obesity and cardiovascular disease, thereby improving overall health status.

Regular adherence to Physical Activity programs is essential for sustained symptom relief and improved function. Physiotherapists play a crucial role in designing individualized Physical Activity regimens that address patient-specific needs, barriers, and goals to maximize effectiveness and adherence (O'Reilly et al., 2019).

## **2.4 Relationship between Physical Activity and Quality of Life**

The relationship between physical activity and quality of life (QoL) is well-established and particularly relevant for elderly individuals with OA. Regular physical activity enhances multiple domains of QoL, including physical function, mental health, and social participation. Increased activity levels are associated with improvements in muscle strength, joint mobility, and cardiovascular fitness, which directly translate into enhanced ability to perform activities of daily living (Almeida et al., 2020). Psychosocial benefits of physical activity include reduced symptoms of depression and anxiety, enhanced mood, improved self-esteem, and greater social interaction, all of which contribute positively to overall QoL (McPhate et al., 2019).

Conversely, lower physical activity levels are strongly correlated with poorer QoL outcomes, including increased pain, reduced physical function, and social withdrawal (White et al., 2020). This bidirectional relationship suggests that improving physical activity levels can directly enhance QoL, while poor QoL can serve as a barrier to engaging in physical activity. Therefore, interventions aimed at increasing physical activity in elderly OA patients have the potential to create significant improvements in their holistic well-being.

Numerous studies and systematic reviews have documented the positive effects of physical activity on QoL among elderly populations with OA. Exercise interventions incorporating aerobic, strength, balance, and flexibility training consistently demonstrate reductions in pain severity and improvements in physical function, mental health, and overall QoL scores (Bricca et al., 2019; Uthman et al., 2019). For example, a meta-analysis by Bricca et al. (2019) concluded that structured exercise programs significantly enhance physical and mental domains of QoL in patients with knee and hip OA.

Randomized controlled trials have shown that even low-to-moderate intensity exercise can yield substantial QoL benefits, including decreased joint stiffness, improved sleep quality, and enhanced emotional well-being (Messier et al., 2018). The improvements are maintained when exercise programs are continued long term, emphasizing the importance of sustained physical activity. Moreover, evidence indicates that multidisciplinary programs combining physical activity with education and psychological support yield even greater improvements in QoL (Thompson et al., 2020).

## 2.5 Empirical Review of Literature

**Table 2.1 Empirical Review of Literature**

<b>AUTHOR/ YEAR</b>	<b>TITLE</b>	<b>SAMPLE SIZE</b>	<b>AIM OF STUDY</b>	<b>STUDY TYPE</b>	<b>FINDINGS</b>
(Mesci et al., 2015), Turkey	Relation of physical activity level with quality of life, sleep and depression in patients with knee osteoarthritis	Fifty-five patients over 65 years of age (age range: 65–84 years) with knee osteoarthritis were enrolled in the study.	The aim of this study was to investigate the effects of physical activity level on the quality of life, depression, sleep quality and functional capacity in elderly patients with knee osteoarthritis (OA).	A Cross-Sectional study.	Maintaining a high physical activity level reduces the possibility of depression and improves the quality of life and functional capacity in geriatric patients with knee osteoarthritis.
(Yukalang et al., 2021), Japan	Association Between Physical Activity and Osteoarthritis of Knee with Quality of Life in Community-Dwelling Older Adults	1067 community-dwelling older persons were recruited to this descriptive study.	The aim of this study was to investigate association between levels of PA and OA knee with levels of QOL in community-dwelling older adults.	A Cross-Sectional Descriptive Study.	Results showed that levels of PA in older adults were significantly associated with levels of KOA and levels of OA knee in older adults were significantly associated with levels of overall QOL

(Javanashir et al., 2023), Iran	The quality of life and physical function of the elderly with osteoarthritis of the knee	The study comprised of 332 patients with KOA	The aim of this study was to obtain data about physical function and its correlation to quality of life (QOL) and some clinical variables in knee osteoarthritis (KOA) in Iranian elderly as it is limited.	A Cross-Sectional study.	QOL domains were significantly associated with disability in all three domains of pain, stiffness and function ( $p < 0.001$ ). A significant negative correlation was also found between the QOL domains and the VAS pain ( $p < 0.001$ ). QOL was lower and the disability and pain intensity was higher in women than in men. A weak correlation was shown between some QOL domains and BMI. Age, comorbidity, polypharmacy and sedentary leisure time were associated with lower QOL scores.
(Khired et al., 2023), Saudi Arabia	Knee pain and its influence on quality of life and physical function in Jazan adult population	480 participants above 40 years who had knee pain and diagnosed with knee OA were recruited.	The aim of this study was to evaluate prevalence of knee pain and its influence on quality of life and physical function in the adult population of Jazan region of Saudi Arabia.	A Cross-Sectional Study.	Low IKDC scores were reported among the adult population with OA. The majority suffered from pain in different degrees and intensities. Physical function was also impaired and the quality of life is affected. Better pain management is recommended for OA patients.

# **CHAPTER THREE**

## **MATERIALS AND METHODS**

### **3.1 Participants Selection**

Male and female elderly outpatients who received care at the Physiotherapy Department, University of Benin Teaching Hospital (UBTH).

#### **3.1.1 Inclusion Criteria**

Participants eligible for this study included:

- Male and female elderly outpatients who received care at the Physiotherapy Department, UBTH across the Geriatrics and Orthopedics unit.
- Adults aged 60 years and above.
- Participants diagnosed with knee osteoarthritis by a Healthcare professional.
- Participants able to provide informed consent.
- Participants with no cognitive impairments preventing participation in the study.
- Participants who could effectively communicate in English Language or Pidgin English fluently.

#### **3.1.2 Exclusion Criteria**

The study excluded the following individuals:

- i. Individuals with the presence of other musculoskeletal conditions that may interfere with the knee joint.
- ii. Individuals with acute knee injuries or surgeries in the last 6 months.

## 3.2 Materials

### 3.2.1 Instruments

- i. **The 26-question quality of life questionnaire (WHOQOL-BREF):** In 1994, the World Health Organization (WHO) created a lengthy 100-question survey called the WHOQOL-100 to assess quality of life. Recognizing its length as a drawback, the WHO developed a shortened version in 1996 with just 26 questions. The WHOQOL-BREF (“Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment. The WHOQOL Group,” 1998), a shorter instrument focusing on physical health, psychological well-being, social relationships, and the environment, was found to be a valid and reliable tool for assessing quality of life among medical students in Saudi Arabia. Studies by Malibary et al. (2019) linked the instrument's four domains to its validity, and a Cronbach's alpha exceeding 0.7 confirmed its reliability. Additionally, Llic et al. (2019) demonstrated significant test-retest reliability ( $p < 0.01$ ) across all domains, indicating good stability of the scale.
- ii. **The Physical Activity Scale for the Elderly (PASE)** is a brief, self-report questionnaire specifically designed to assess the level of physical activity in individuals aged 65 years and older, although it has also been validated for use in adults aged 60 and above. The instrument evaluates physical activity over a 7-day period, covering leisure-time activity, household tasks, and work-related activity. It comprises 12 items, each assessing the frequency and duration of various types of physical activities, including walking, recreational sports, light and heavy housework, home repairs, gardening, and volunteer or paid work.

Each item is scored based on intensity and duration, with responses weighted according to activity type. The overall PASE score is computed by multiplying the time spent in each activity by empirically derived weights, and then summing across all activities. Scores typically range from 0 to over 400, with higher scores indicating greater levels of physical activity. The scale takes approximately 5–15 minutes to complete and may be administered in-person, via telephone interview, or as a self-administered questionnaire.

Reliability assessments of PASE show acceptable test-retest reliability, with intraclass correlation coefficients (ICC) ranging from 0.75 to 0.84 across studies. Internal consistency is modest but acceptable, given the multidimensional nature of the scale. In terms of validity, PASE demonstrates good content validity, as it captures physical activity common among older adults, including non-exercise-related tasks. Construct validity is supported through correlations with objective measures such as accelerometers and with other physical performance tests like gait speed and grip strength. The PASE also shows discriminative validity, effectively differentiating between active and sedentary individuals within elderly populations. Due to its age-appropriateness and coverage of daily physical activities, PASE is especially suitable for assessing physical activity levels in older adults with mobility limitations or chronic conditions such as osteoarthritis.

- iii. **Numerical Pain Rating Scale:** The Numerical Pain Rating Scale (NPRS) is a widely used self-report tool for assessing pain intensity in clinical and research settings. The validity and reliability of the NPRS have been extensively studied, and the scale has been shown to be a valid and reliable measure of pain intensity in various

populations. The Numeric Pain Rating Scale (NPRS) was found to have strong correlations with other pain measures and was able to detect changes in pain intensity over time in patients with chronic pain (Williamson and Hoggart, 2005). Similarly, a study found that the NPRS exhibited good test-retest reliability in patients with chronic low back pain (Farrar *et al.*, 2001). The NPRS has been used to determine the level of pain in osteoarthritis patients (De Oliveira *et al.*, 2019; Aiyegbusi *et al.*, 2019; Arif *et al.*, 2023). The NPRS is a reliable and valid measure of pain intensity that can be used with confidence in clinical and research settings.

### **3.3 Methods**

#### **3.3.1 Research Design**

This research was a cross-sectional descriptive study.

#### **3.3.2 Sampling Technique**

Purposive sampling was used to select the participants for this study.

#### **3.3.3 Sample Size Calculation**

The minimum sample size for this study was calculated using the formula  $n = Z^2 p (1 - p) / d^2$ .

Where n = minimum sample size

Z = z-value set at 95% confidence interval, this correlates with a normal standard deviate set at 1.96

p = expected prevalence, an estimate of 9.3%

d = degree of precision required, set at 0.05

The calculated minimum sample size for this study is:

$$n = [(1.96)^2 * (0.093) * (0.907)] / (0.05)^2$$

$$n = 129.62$$

130 participants were required for this study.

### **3.3.4 Procedure for Data Collection**

Informed consent was obtained from the participants. A well-structured data collection proforma was used to collect socio-demographic and clinical information, including age, sex, marital status, educational level, and occupation.

Participants were asked to complete a set of standardized and validated questionnaires:

- Quality of life was assessed using the WHOQOL-BREF, which evaluates four domains of health: physical, psychological, social, and environmental well-being.
- Physical activity levels were measured using the Physical Activity Scale for the Elderly (PASE), which captures information about physical activity in leisure, household, and work-related domains over the past seven days.

Additionally, pain intensity was evaluated using the Numerical Pain Rating Scale (NPRS).

The questionnaires were administered either self-completed or interviewer-administered, depending on each participant's literacy level, visual ability, and general physical state. Each session took approximately 10-15 minutes per participant.

### **3.3.5 Ethical Consideration**

Ethical approval for this study was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital, Benin City.

### **3.3.6 Data Analysis**

Data was analyzed using the IBM Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were employed to summarize demographic characteristics and other relevant variables. Inferential statistics was conducted using Chi-Square test to explore the relationships between study variables. To determine the significant differences between gender, Mann Whitney U test was used as appropriate. The level of statistical significance was set at an alpha value of  $p < 0.05$ .

## **CHAPTER FOUR**

### **RESULTS**

#### **4.1 Preamble**

This chapter presents the results of the study on Impact of Knee Osteoarthritis on Quality of Life and Physical Activity Levels among Elderly Outpatients. Data was obtained from fifty (50) elderly outpatients diagnosed with knee osteoarthritis attending the Physiotherapy Department, University of Benin Teaching Hospital (UBTH).

#### **4.1.1 Socio-Demographic Characteristics of the Respondents**

Table 4.1 shows the socio-demographic characteristics of the respondents. Out of the 50 respondents, 31 (62.0%) were females, while 19 (38.0%) were males, indicating that females constituted a greater proportion of the study population. The mean age of the respondents was  $66.70 \pm 8.44$  years, with most participants (42.0%) within the 71–80 years age group, followed by those aged 51–60 years (34.0%). The majority of the respondents, 47 (94.0%), were married, while 3 (6.0%) were widowed. In terms of occupation, 19 (38.0%) were civil servants, 11 (22.0%) were retired, and 14 (28.0%) engaged in other forms of occupation, including artisans and homemakers. Religion-wise, all respondents (100%) were Christians, while the largest ethnic representation was Esan (44.0%), followed by Edo (30.0%), others (16.0%), and Bini (10.0%).

**Table 4.1: Socio-demographic Characteristics of Respondents (N=50)**

<b>Variables</b>	<b>Category</b>	<b>n</b>	<b>%</b>
<b>Gender</b>	Male	19	38.0
	Female	31	62.0
<b>Age</b>	51-60 years	17	34.0
	61-70 years	11	22.0
	71-80 years	21	42.0
	81-90 years	1	2.0
<b>Marital status</b>	Single	0	0.0
	Married	47	94.0
	Widowed	3	3.0
<b>Occupation</b>	Civil servant	19	38.0
	Retired	11	22.0
	Business/Trading	6	12.0
	Others	14	28.0
<b>Religion</b>	Christianity	50	100.0
	Islam	0	0.0
<b>Ethnicity</b>	Esan	22	44.0
	Bini	5	10.0
	Edo	15	30.0
	Others	8	16.0
<b>Mean Age:</b>			
			<b>66.70± 8.44</b>

## 4.1.2 Descriptive Statistics Showing Quality of Life, Physical Activity, and Pain Scores

Table 4.2 presents the descriptive statistics of the respondents' QoL, PASE, and NPRS scores. The mean scores across the QoL domains were as follows: Physical domain ( $38.47 \pm 11.11$ ), Psychological domain ( $51.73 \pm 16.12$ ), Social domain ( $49.51 \pm 18.89$ ), and Environmental domain ( $51.55 \pm 10.72$ ). The overall mean total QoL score was  $47.73 \pm 8.26$ , indicating a moderate level of quality of life among the elderly respondents. For physical activity, the mean total PASE score was  $457.78 \pm 233.97$ , suggesting a generally moderate to high level of engagement in physical activity among participants. The mean pain intensity score measured by NPRS was  $2.84 \pm 0.47$ , indicating that most respondents experienced mild pain on average.

**Table 4.2 QoL, PASE and NPRS Score of Respondents (N=50)**

Variables		Minimum	Maximum	Mean	Standard Deviation
<b>QoL</b>	Physical Domain	11.00	61.00	38.4694	11.1095
	Psychological Domain	13.00	88.00	51.7347	16.1243
	Social Domain	17.00	100.00	49.5102	18.8868
	Environmental Domain	28.00	75.00	51.5510	10.7239
	Overall Total	2.00	68.00	47.7347	8.2607
<b>PASE</b>	Leisure Activity	20.00	227.00	100.2800	46.2177
	Household Activity	23.00	165.00	77.3200	32.8878
	Work-related Activity	0.00	738.00	354.9600	231.3154
	Total PASE Score	68.00	882.00	457.7800	233.9700
<b>NPRS</b>		0.0	10.00	2.8400	0.4677

### 4.1.3 Categorical Distribution of QoL, PASE, and NPRS

The categorical distribution of QoL, PASE, and NPRS is presented in Table 4.3. The majority of respondents (32; 64.0%) had low quality of life, while 18 (36.0%) had moderate quality of life; none of the respondents reported a high quality of life. In terms of physical activity level, 44 respondents (88.0%) demonstrated high levels of physical activity, while only 6 (12.0%) reported low or moderate activity levels. Regarding pain intensity, 20 (40.0%) of the respondents experienced severe pain, 12 (24.0%) had moderate pain, 14 (28.0%) had mild pain, and 4 (8.0%) reported no pain.

**Table 4.3 QoL, PASE and NPRS Categorical Value of Respondents (N=50)**

<b>Variables</b>		<b>n</b>	<b>%</b>
<b>QoL</b>	Low	32	64.0
	Moderate	18	36.0
	High	0	0
<b>PASE</b>	Low	2	4.0
	Moderate	4	8.0
	High	44	88.0
<b>NPRS</b>	No Pain	4	8.0
	Mild (1-3)	14	28.0
	Moderate (4-6)	12	24.0
	Severe (7-10)	20	40.0

#### 4.1.4 Comparison of Quality of Life, Physical Activity, and Pain Scores Between Male and Female Respondents

The Mann–Whitney U test (Table 4.4) was conducted to determine whether significant differences existed between male and female respondents in overall QoL, PASE, and NPRS scores. The results showed no statistically significant difference between male and female respondents in total QoL ( $Z = -0.576$ ,  $p = 0.565$ ), total PASE score ( $Z = -1.199$ ,  $p = 0.230$ ), and NPRS ( $Z = -0.111$ ,  $p = 0.912$ ). These findings imply that gender did not significantly influence the quality of life, physical activity level, or pain experience among elderly individuals with knee osteoarthritis in this study.

**Table 4.4 Man Whitney U Test of Significant Difference in Overall QoL, Total PASE Score and NPRS Score between Male and Female Respondents (N=50)**

Variable	Gender	N	Mean Rank	Sum of Ranks	Z score	P-value
<b>TOTAL QOL</b>	Male	19	23.53	447.00	-0.576	0.565
	Female	30	25.93	778.00		
<b>TOTAL PASE SCORE</b>	Male	19	22.34	424.50	-1.199	0.230
	Female	31	27.44	850.50		
<b>NPRS</b>	Male	19	25.79	490.00	-0.111	0.912
	Female	31	25.32	785.00		

$P > 0.05$  indicate No Significant Difference

#### 4.1.5 Relationship Between Quality of Life, Physical Activity, and Pain Scores

Table 4.5 presents the Chi-square test of association between QoL and each of PASE and NPRS scores. The results showed no significant association between QoL and PASE ( $X^2 = 1.468$ ,  $p = 0.480$ ) or between QoL and NPRS ( $X^2 = 1.751$ ,  $p = 0.626$ ).

**Table 4.5 Chi square Test of Significant Association Between QOL and Each of PASE and NPRS Score of Respondents (N=50)**

	Variables	Category	QOL CATEGORY		X <sup>2</sup>	P-Value
			Low	Moderate		
<b>PASE</b>	Low	% within PASE	2(100.0)	0(0.0)	1.468	0.480
	Moderate	% within PASE	3(75.0)	1(25.0)		
	High	% within PASE	27(61.4)	17(38.6)		
<b>NPRS</b>	No Pain	% within NPRS	3(75.0)	1(25.0)	1.751	0.626
	Mild Pain	% within NPRS	7(50.0)	7(50.0)		
	Moderate	% within NPRS	8(66.7)	4(33.3)		
	Severe	% within NPRS	14(70.0)	6(30.0)		

P>0.05 indicate No Significant Association

#### 4.1.6 Association Between NPRS Score and PASE Scores of Respondents (N=50)

Table 4.6 revealed that the association between NPRS and PASE was not significant ( $X^2 = 2.833$ ,  $p = 0.830$ ). This indicates that variations in pain intensity or physical activity levels did not significantly influence overall quality of life among the elderly respondents.

**Table 4.6: Chi square test of Significant Association Between NPRS Score and PASE Scores of Respondents (N=50)**

Variable	Category	NPRS Category				$X^2$	P-Value
		No pain	Mild pain	Moderate	Severe		
PASE	Low	% within PASE	0(0.0)	1(50.0)	0(0.0)	1(50.0)	2.833 0.830
	Moderate	% within PASE	0(0.0)	1(25.0)	2(50.0)	1(25.0)	
	High	% within PASE	4(9.1)	12(27.3)	10(22.7)	18(40.9)	

$P > 0.05$  indicate No Significant Association

#### 4.1.7 Relationship Between Age Group and Study Variables

As shown in Table 4.7, the Chi-square test revealed no significant association between age group and quality of life ( $X^2 = 2.890$ ,  $p = 0.409$ ), between age group and NPRS scores ( $X^2 = 16.401$ ,  $p = 0.059$ ), or between age group and PASE scores ( $X^2 = 4.418$ ,  $p = 0.620$ ). Although not statistically significant, the data indicated that respondents aged 71–80 years tended to report slightly lower QoL and higher pain scores than other age categories.

**Table 4.7: Chi square test of Significant Association Between Age Group and Each of QOL, NPRS Score and PASE Scores of Respondents (N=50)**

Variable	Category		Age group				X <sup>2</sup>	P-value
			51-60	61-70	71-80	81-90		
QOL	Low	% Within QOL	12(37.5%)	8(25.0%)	12(37.5)	0(0.0%)	2.890	0.409
	High	% Within QOL	5(27.8)	3(16.7)	9(50.0)	1(5.6)		
NPRS	No Pain	% within NPRS	2(50.0)	0(0.0)	2(50.0)	0(0.0)	16.401	0.059
	Mild Pain	% within NPRS	4(28.6)	1(7.1)	9(64.3)	0(0.0)		
	Moderate	% within NPRS	2(16.7)	7(58.3)	3(25.0)	0(0.0)		
	Severe	% within NPRS	9(45.0)	3(15.0)	7(35.0)	1(5.0)		
PASE	Low	% within PASE	0(0.0)	1(50.0)	1(50.0)	0(0.0)	4.4180.	0.620
	Moderate	% within PASE	0(0.0)	1(25.0)	3(75.0)	0(0.0)		
	High	% within PASE	17(38.6)	9(20.5)	17(38.6)	1(2.3)		

P>0.05 indicate No Significant Association

## **4.2 Hypothesis testing**

### **Hypothesis 1:**

There would be no significant difference in physical activity levels between male and female elderly outpatients with knee osteoarthritis.

Test: Mann–Whitney U test

Alpha level: 0.05

Observed p value: 0.230

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

### **Hypothesis 2:**

There would be no significant difference in quality of life between male and female elderly outpatients with knee osteoarthritis.

Test: Mann–Whitney U test

Alpha level: 0.05

Observed p value: 0.565

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

### **Hypothesis 3:**

There would be no significant difference in perceived intensity of Knee pain between male and female elderly outpatients with knee osteoarthritis

Test: Mann–Whitney U test

Alpha level: 0.05

Observed p value: 0.912

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 4:**

There would be no significant association between physical activity levels and quality of life among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.480

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 5:**

There would be no significant association between pain intensity and the quality of life among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.626

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 6:**

There would be no significant association between pain intensity and physical activity level among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.830

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 7:**

There would be no significant association between age and the quality of life among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.409

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 8:**

There would be no significant association between age and the physical activity levels among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.620

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

**Hypothesis 9:**

There would be no significant association between age and the pain intensity levels among elderly outpatients with knee osteoarthritis.

Test: Chi-square test

Alpha level: 0.05

Observed p value: 0.059

Judgement: Since the observed p value was greater than 0.05 alpha level, the null hypothesis was therefore NOT REJECTED.

## CHAPTER FIVE

### DISCUSSION, CONCLUSION, RECOMMENDATIONS

#### 5.1 Discussion

This study examined the impact of knee osteoarthritis (OA) on quality of life (QoL) and physical activity levels (PAL) among elderly outpatients attending the Physiotherapy Department of the University of Benin Teaching Hospital (UBTH). The findings are discussed in relation to existing literature and interpreted based on the research questions and hypotheses.

The socio-demographic characteristics revealed that females (62.0%) were more represented than males (38.0%), indicating a higher prevalence of knee OA among women. This aligns with global and regional studies reporting that women are disproportionately affected by knee OA, particularly after menopause due to estrogen decline, altered biomechanics, and higher body mass index (Wang et al., 2020; Yahaya et al., 2021). The mean age of respondents ( $66.7 \pm 8.44$  years) indicates that knee OA predominantly affects the elderly. This is consistent with findings by Heidari (2011) and more recent evidence by Li et al. (2024) showing a steady increase in OA incidence with advancing age due to cumulative joint wear and reduced cartilage regeneration.

Regarding marital status, 94% of the participants were married, suggesting strong family structures typical of Nigerian elderly populations. Studies such as Omondi et al. (2020) have noted that marital support may improve health outcomes in chronic musculoskeletal conditions by encouraging adherence to care. However, the predominance of married participants could also reflect the social reality that elderly widowed individuals are less likely to seek hospital-based physiotherapy services.

The mean overall QoL score ( $47.73 \pm 8.26$ ) reflects a moderate level of quality of life among participants. This aligns with previous Nigerian studies (Owoyemi et al., 2024; Ayanniyi et al., 2016) which reported moderate to poor QoL among elderly OA patients. The physical health domain had the lowest mean ( $38.47 \pm 11.11$ ), showing that pain, fatigue, and reduced functional independence are key challenges. Similar patterns were reported by Sharma et al. (2022) and Bendrik et al. (2024), who found that physical limitations are the most compromised domain among elderly OA patients. In contrast, the environmental and psychological domains had higher mean scores ( $51.55 \pm 10.72$  and  $51.73 \pm 16.12$ , respectively), possibly reflecting adaptive coping strategies, family support, and hospital accessibility common in urban Nigerian contexts (Usenbo et al., 2015).

The mean total Physical Activity Scale for the Elderly (PASE) score ( $457.78 \pm 233.97$ ) indicates a generally moderate-to-high physical activity level. This finding contrasts with studies by Aldosari et al. (2022) and Musich et al. (2017), who reported lower activity levels among older adults with knee OA. The difference may be due to variations in study settings; the present sample consisted of outpatients attending physiotherapy, who are more likely to remain physically active than community-dwelling elders without treatment. Nonetheless, despite relatively high activity levels, over half of the participants reported low QoL, suggesting that pain and functional limitations still reduce subjective well-being even in active individuals.

Pain intensity measured by the Numerical Pain Rating Scale (mean =  $2.84 \pm 0.47$ ) indicated mild pain on average, yet 40% reported severe pain, emphasizing variability in pain perception. This aligns with the heterogeneity of OA progression and pain modulation mechanisms reported by Arif et al. (2023). Mild mean pain scores may reflect benefits of regular physiotherapy, analgesics, or self-management techniques. Studies by De Oliveira et al. (2019) and Aiyegbusi et

al. (2019) found that continuous physiotherapy and education reduce pain and disability severity among OA patients.

Categorically, 64% of respondents had low QoL and 88% had high physical activity levels. These seemingly contradictory findings suggest that physical activity alone may not guarantee higher QoL unless pain, psychological well-being, and environmental factors are simultaneously addressed. Consistent with this, Obara et al. (2023) noted that psychosocial factors—such as depression and social isolation—are stronger predictors of QoL in elderly OA patients than activity levels alone.

Gender differences in QoL, physical activity, and pain were statistically insignificant ( $p > 0.05$ ). This aligns with a Malaysian study by Latiff et al. (2020) and contrasts with global findings (e.g., Silverwood et al., 2015) which reported poorer QoL and lower activity among women. The lack of difference in this study may be due to similar lifestyle habits and treatment access among male and female elderly in the sampled population.

No significant relationships were found between QoL and physical activity ( $p = 0.480$ ), QoL and pain ( $p = 0.626$ ), or pain and physical activity ( $p = 0.830$ ). Although contrary to findings by Wang et al. (2020) and Jadhav et al. (2022) who observed inverse correlations between pain and QoL, this lack of statistical significance might stem from the small sample size ( $n=50$ ) or the moderate homogeneity in functional status among participants already receiving therapy. Physiotherapy interventions may have also moderated the negative effects of pain on QoL, as supported by Burke et al. (2015).

Similarly, no significant associations were found between age and QoL ( $p = 0.409$ ), age and physical activity ( $p = 0.620$ ), or age and pain intensity ( $p = 0.059$ ). While older age is often

associated with reduced physical functioning (Li et al., 2024), a study by Bija et al. (2015) suggests that the relationship between age and QoL becomes less pronounced when supportive rehabilitation services are available, which may explain the pattern observed in this sample.

Overall, the findings suggest that while knee OA significantly affects quality of life, the degree of impairment varies depending on personal, psychosocial, and rehabilitative factors rather than demographics alone. The absence of statistically significant associations in this study does not negate clinical relevance, as trends still demonstrate that pain and age tend to lower QoL and limit physical activity. These findings emphasize the multidimensional nature of OA management, highlighting the need for comprehensive physiotherapeutic care that integrates physical, psychological, and social interventions.

## **5.2 Conclusion**

This study revealed that elderly outpatients with knee osteoarthritis experience moderate quality of life and generally high physical activity levels, with mild-to-severe variations in pain intensity. Although no statistically significant associations were found among QoL, physical activity, pain, and age, the descriptive trends and literature evidence indicate that pain intensity and functional limitations remain key determinants of well-being in OA. The findings highlight the importance of multidimensional management of knee OA, emphasizing physical therapy, pain control, and psychosocial support to optimize patient outcomes.

## **5.3 Recommendations**

- i. Physiotherapy interventions for knee OA should incorporate both exercise therapy and psychosocial counseling to address the multifactorial determinants of QoL.

- ii. Regular assessments of pain, mobility, and emotional well-being should be integrated into outpatient physiotherapy programs to ensure holistic care.
- iii. Health education campaigns targeting elderly populations should emphasize the benefits of consistent physical activity, weight management, and early medical consultation.
- iv. Policy makers should invest in geriatric-friendly outpatient facilities and subsidized physiotherapy to promote active aging and reduce OA-related disability.
- v. Further research should employ longitudinal or multicenter designs to validate relationships between QoL, physical activity, and pain among diverse elderly populations.

#### **5.4 Implications for Further Study**

Future research should explore larger and more diverse samples to confirm the observed trends and examine causal pathways between QoL, pain, and physical activity. Mixed-methods approaches combining quantitative data with qualitative interviews could yield deeper insights into personal coping mechanisms, gender roles, and socio-cultural influences on osteoarthritis management among Nigerian elders. Investigating the effects of specific physiotherapy interventions (e.g., aquatic therapy, strength training, or neuromuscular re-education) on QoL outcomes could further inform clinical practice and policy development.

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# **APPENDIX 1**

## **INFORMED CONSENT FORM**

**Title of study:** Impact of Knee Osteoarthritis on Quality of Life and Physical Activity Levels among Elderly Outpatients.

**Investigator:** Ineatah Chinedu Fidel

**Supervisor:** Dr. S.O Bolarinde

**Financial Sponsorship:** This research project is self-sponsored

**Purpose of the research:** The purpose of the research is to determine the Impact of Knee Osteoarthritis on Quality of Life and Physical Activity Levels among Elderly Outpatients.

### **Procedures and protocol involved in the study**

You are politely approached to respond to an interviewer-administered questionnaire interview.

This questionnaire would be only used for research purpose and will determine the Impact of Knee Osteoarthritis on Quality of Life and Physical Activity Levels among Elderly Outpatients.

### **Compensation**

There will be no financial compensation for participating in this study.

### **Voluntary Participation**

Please note that your participation in this research is entirely voluntary. No form of discrimination will be meted to you, should you decide not to participate in this study; You are entirely free to change your mind and stop participating even if you agreed earlier.

### **Side Effects**

There is no anticipated adverse effect associated with participating in this study.

### **Benefits**

The purpose of the research is to assess the Impact of Knee Osteoarthritis on Quality of Life and Physical Activity Levels among Elderly Outpatients.

### **Confidentiality**

All information and data obtained in the course of this study will be treated confidentially. The names of the participants will not be written on the questionnaire, and all information collected will be encoded in a file in my personal computer and passworded. Thereafter the questionnaires will be shelved and locked in my personal document cabinet.

**CONTACT INFORMATION**

INEATAH CHINEDU FIDEL

PROJECT STUDENT

Email: Ineatahchinedu@gmail.com

Ethics and Research Committee

University of Benin Teaching Hospital

Benin City.

Phone Number: 09066736828

**APPENDIX 2**  
**WORLD HEALTH ORGANISATION QUALITY OF LIFE**  
**QUESTIONNAIRE (WHOQOL-BREF)**

This aspect assesses your general quality of life in the last two weeks.

Tick as appropriate.

1. How would you rate your quality of life?

Very poor [ ] Poor [ ] Neither poor nor good [ ] good [ ] Very good [ ]

2. How satisfied are you with your health?

Very dissatisfied [ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied [ ]

3. To what extent do you feel that physical pain prevents you from doing what you need to do?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] An extreme much [ ]

4. How much do you need medical treatment to function in your daily life?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] An extreme much [ ]

5. How much do you enjoy life?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] An extreme much [ ]

6. To what extent do you feel your life to be meaningful?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] An extreme much [ ]

7. How well are you able to concentrate?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] Extremely [ ]

8. How safe do you feel in your daily life?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] Extremely [ ]

9. How healthy is your physical environment (climate, noise, pollution, appeals)?

Not at all [ ] A little [ ] A moderate amount [ ] Very much [ ] Extremely [ ]

10. Do you have enough energy for everyday life?

Not at all [ ] A little [ ] Moderately [ ] Mostly [ ] Completely [ ]

11. Are you able to accept your physical appearance?

Not at all [ ] A little [ ] Moderately [ ] Mostly [ ] Completely [ ]

12. Do you have you enough money to meet your needs?

Not at all[ ] A little [ ] Moderately[ ] Mostly[ ] Completely[ ]

13. How available to you is the information that you need in your day-to-day life?

Not at all[ ] A little [ ] Moderately[ ] Mostly[ ] Completely[ ]

14. Do what extent do you have the opportunity for leisure activities?

Not at all[ ] A little [ ] Moderately[ ] Mostly[ ] Completely[ ]

15. How well are you able to get around?

Very poor[ ] Poor [ ] Neither poor nor good [ ] Good [ ] Very good[ ]

16. How satisfied are you with your sleep?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

17. How satisfied are you with your ability to perform your daily living activities?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

18. How satisfied are you with your capacity for work?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

19. How satisfied are you with yourself?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

20. How satisfied are you with your personal relationships?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

21. How satisfied are you with your sex life?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

22. How satisfied are you with the support you get from your friends?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

23. How satisfied are you with the conditions of your living?

Very dissatisfied[ ] Dissatisfied [ ] Neither Satisfied nor dissatisfied [ ] Satisfied [ ] Very satisfied[ ]

24. How satisfied are you with your access to health services?

Very dissatisfied[  ]Dissatisfied [  ]Neither Satisfied nor dissatisfied [  ]Satisfied [  ]Very satisfied[  ]

25. How satisfied are you with your transportation?

Very dissatisfied[  ]Dissatisfied [  ]Neither Satisfied nor dissatisfied [  ]Satisfied [  ]Very satisfied[  ]

26. How often do you have negative feelings such as bad mood, anxiety, and depression?

Never [  ] Seldom [  ] Quite often [  ] Very often [  ] Always[  ]

## APPENDIX 3

### PHYSICAL ACTIVITY SCALE FOR THE ELDERLY

Instructions: The following questions ask about the activities you performed during the past 7 days. Please answer each question by checking the appropriate box or filling in the blank where indicated. This questionnaire is designed for individuals aged 65 years and older.

#### Section 1: Leisure Time Activities (Past 7 Days)

1. 1. Walking outside your home or yard (for any reason). How often?

Never  Seldom (1–2 days)  Sometimes (3–4 days)  Often (5–7 days)

Average duration per day: \_\_\_\_\_ minutes

2. 2. Light sport or recreational activities (e.g., bowling, dancing, golf with a cart). How often?

Never  Seldom (1–2 days)  Sometimes (3–4 days)  Often (5–7 days)

Average duration per day: \_\_\_\_\_ minutes

3. 3. Moderate sport or recreational activities (e.g., doubles tennis, golf without a cart). How often?

Never  Seldom (1–2 days)  Sometimes (3–4 days)  Often (5–7 days)

Average duration per day: \_\_\_\_\_ minutes

4. 4. Strenuous sport or recreational activities (e.g., jogging, swimming, cycling). How often?

Never  Seldom (1–2 days)  Sometimes (3–4 days)  Often (5–7 days)

Average duration per day: \_\_\_\_\_ minutes

5. 5. Muscle strength/endurance exercises (e.g., weight lifting, push-ups). How often?

Never  Seldom (1–2 days)  Sometimes (3–4 days)  Often (5–7 days)

Average duration per day: \_\_\_\_\_ minutes

#### Section 2: Household Activities (Past 7 Days)

6. 1. Light housework (e.g., dusting, washing dishes)

Yes  No

7. 2. Heavy housework or chores (e.g., vacuuming, scrubbing floors)

Yes  No

8. 3. Home repairs (e.g., painting, fixing leaky faucets)

Yes  No

9. 4. Lawn work or yard care (e.g., mowing, raking leaves)

Yes  No

10. 5. Outdoor gardening

Yes  No

11. 6. Caring for another person (e.g., child, dependent adult)

Yes  No

### Section 3: Work-Related Activities (Past 7 Days)

1. Did you work for pay or as a volunteer?  Yes  No

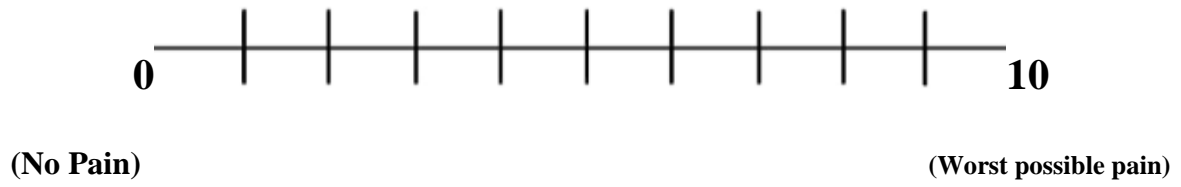
If yes, number of hours worked per week: \_\_\_\_\_ hours

Describe the physical activity involved in your work: \_\_\_\_\_

Thank you for completing the Physical Activity Scale for the Elderly.

## APPENDIX 4

### NUMERAL PAIN RATING SCALE



# APPENDIX 5

<b>HEALTH RESEARCH ETHICS COMMITTEE (HREC)</b>		
<b>UNIVERSITY OF BENIN TEACHING HOSPITAL</b>		
P.O. Box 111, Benin City, Nigeria Telephone: 052 600470 Website: ubth.org		
<b>DEPUTY MEDICAL DIRECTOR</b> Prof. Dr. Orlington E. Oboasili Email: orli@ubth.gov.ng	<b>DIRECTOR OF ADMINISTRATION</b> Jim Uvuwala, Esq.	<b>CHAIRMAN</b> Prof. (Mrs) Annetette N. Ogbi
<b>HREC OFFICE:</b> Committee email: ubthresearchethics@gmail.com Registration Number: NHREC/UBTH/HREC/04/12/2023		
<b>PROTOCOL NUMBER: ADM/EE 22/A/VOL.VI/2025/134</b>		
<b>PROPOSAL TITLE: "IMPACT OF KNEE OSTEOARTHRITIS ON QUALITY OF LIFE AND PHYSICAL ACTIVITY LEVELS AMONG ELDERLY OUTPATIENTS"</b>		
<b>PRINCIPAL INVESTIGATOR(S):</b> TSEATAR CHINEDU FIDEL		
<b>DEPARTMENT/INSTITUTION:</b> DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE		
<b>DATE CONSIDERED:</b> JULY 14 <sup>TH</sup> , 2025		
<b>DECISION OF THE COMMITTEE:</b> APPROVED		
<i>THIS APPROVAL DATES 14/07/2025 TO 13/07/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY</i>		
<b>REMARK:</b>		
<b>CHAIRMAN: PROF. (MRS) A.N. OGBI</b>	<b>SIGNATURE &amp; DATE:</b>  14/7/2025	
<b>SUPERVISOR (S): DR. S.O. BOLARENDI</b>		
<b>DECLARATION BY INVESTIGATOR(S):</b> PROTOCOL NUMBER (youse quote in all enquiries) Note that no participant enrol or activity related to this research may be conducted outside of those dates. All informed consent forms and in this study must carry the HREC assigned number and duration of HREC approval of the study. In multi-year research, endeavour to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification		
<b>Signature &amp; Date:</b> _____		
 <b>ubthresearchethics@gmail.com</b>	<b>Registration Number: NHREC/24/01/202</b>	