COLLEGE OF HEALTH SCIENCES

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DEPARTMENT OF ANATOMY

Magnitude of Knee Osteoarthritis and Associated Factors among Patients who visited Orthopedics Outpatient Department in Addis Ababa, Ethiopia: A Facility Based Study, 2024.

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List of Acronyms

BMI……..Body Mass Index

CHD…….Chronic Heart Disease

CI…….Confidence Interval

KOA……..…Knee Osteoarthritis

KL……Kellgren Lawrence

MS……Metabolic Syndrome

MSK…….Musculoskeletal

MSDs……...Musculoskeletal Disorders

NCDs……...Non Communicable Diseases

OA……Osteoarthritis

OPD……..Out Patient Department

OR…….Odd Ratio

RKOA……..Radiographic Knee Osteoarthritis

SPSS……..…Statistical Package for Social science

UK……United Kingdom

US…….United States

WHO…… World Health Organization

VIF…….Variation Inflation Factor

Abstract

Introduction: Osteoarthritis (OA) is a musculoskeletal disorder characterized by progressive damage to articular cartilage, bone remodeling, and new bone formation (osteophytes). This condition often leads to inflammation of the synovial membrane and fibrosis of joint structures, eventually leading to joint stiffness, swelling, and loss of mobility. It is expected that the prevalence of osteoarthritis (OA) will be higher in developing nations due to rising life expectancy and limited access to joint replacement therapy. The increasing incidence of chronic non-communicable diseases (NCDs) is an important issue around the world because they are the leading cause of disease, disability, and mortality. Multiple factors, including modifiable and non-modifiable factors, contribute to OA. Among the various forms of osteoarthritis, knee osteoarthritis has the highest prevalence.

Objectives: The main objective of this study is to assess the magnitude and associated factors of knee osteoarthritis among orthopedic outpatient department (OPD) patients who visited the selected governmental hospitals in Addis Ababa, Ethiopia, 2024.

Methods: An institution- based cross-sectional study was conducted from April 01 to June 15, 2024, at three governmental hospitals in Addis Ababa. Study subjects were selected using a systematic sampling technique by using K interval for sample size allocated for each hospital. The data were collected by using a pretested structured interviewer-administered questionnaire. The collected data were exported to Statistical Package for Social Science (SPSS) version 26.0 for analysis. Binary logistic regression test was used to test the associations between dependent and independent variables which will be followed by multivariate binary logistic regression for categorical variables.

Result: In this study, the prevalence of knee osteoarthritis (KOA) at the three governmental hospitals in Addis Ababa was found to be 7.5%. From the total 13 patients bilateral knee involvement was 9(5.2%) and mechanical pain was the major sign and symptom. About 11 (6.4%) developed complications, with the majority experiencing knee deformity and complications related to other chronic diseases. In multivariate logistic regression analysis, age (40-54) (AOR =130.628(CI 1.433-11.905), sex (AOR= 0.036 CI 0.003-0.465), standing working condition (AOR = 0.043, CI=0.003-0.562) and working hour greater than eight (AOR=0.090 CI 0.008-0.965) were significantly associated with KOA.

Conclusion: The present study showed that the prevalence of knee osteoarthritis in our study area is 7.5%, which is relatively lower than reported prevalence studies from other countries.

Key words: Osteoarthritis, Knee osteoarthritis, Magnitude, Associated factor

1. Introduction

1.1 Background

The most prevalent form of degenerative joint disease is osteoarthritis (OA), which is caused by the biochemical degradation of articular (hyaline) cartilage across the subchondral bone and synovium (1). It can be recognized by the gradual deterioration of articular cartilage, bone remodeling, and the production of new bone (2, 3). Due to its primary effects on the knees, hips, and spine, it primarily affects these joints, which results in severe localized pain, loss of joint function, and eventual disability, as well as a significant financial and medical burden on society (4). Osteoarthritis was once thought to be an age-related degenerative joint condition. Nonetheless, an increasing number of studies indicate that inflammation happens when metalloproteinase and cytokines are released into the joint (5). It has traditionally been subdivided by etiology into either idiopathic or secondary forms. Idiopathic OA can be categorized into localized or generalized forms of the disease. Localized OA most commonly affects the hands, feet, knee, hip, and spine. Generalized OA consists of involvement of three or more joint sites. In secondary osteoarthritis, specific conditions may cause or enhance the risk of developing osteoarthritis like trauma, congenital or developmental disorders and other bone and joint disorders (6).

Worldwide, there are around 1.71 billion individuals who suffer from musculoskeletal (MSK) disorders (7). According to a 2010 study by the Global Burden of Disease, hip and knee OA scored as the eleventh largest contributors to worldwide disability (8). According to a 2012 WHO report, OA is the leading cause of disability among older individuals. Globally, approximately 10% of men and 18% of women over 60 have OA symptoms; of these, 80% have movement restrictions, and 25% are unable to carry out significant activities of daily living. According to WHO predictions, 40 million people will be seriously harmed by OA by 2050, and 130 million people will have OA overall (5). It is anticipated that the prevalence of osteoarthritis (OA) will be higher in developing nations due to rising life expectancy and limited access to joint replacement therapy (9). The increasing incidence of chronic non-communicable diseases (NCDs) is an important issue around the world, as they are the leading cause of disease, disability, and mortality (7). In addition to impairing a patient's activities and quality of life, OA often results in significant financial burden, anxiety, and depression (10). Osteoarthritis (OA) is frequently triggered by degenerative changes in the weight-bearing knee and hip joints (3, 11). As one of the most

common diseases affecting the elderly population and a major source of disability, osteoarthritis (OA) is ranked highest (2, 12).The pooled prevalence of KOA in the China meta-analysis was 21.51%. The age-standardized prevalence of knee OA worldwide was 3.8% in 2010 (14,15). It typically develops slowly over ten to fifteen years, affecting the medial, lateral, and patella femoral joints of the knee and interfering with day-to-day activity (5).

Risk factors of oa: The pathophysiology of osteoarthritis (OA) is influenced by a number of risk factors, some of which are modifiable like obesity, diet, joint-level factors, and factors specific to a given joint, such as activity, type of occupation, injury, and muscle strength and non-modifiable like age, sex, hereditary and congenital anomalies (13, 14). Less research has been done on the effects of obesity how it relates to musculoskeletal conditions and disabilities (14). Obesity and the co-morbid disorders that accompany it have become global epidemics and significant national health concerns (15). The highest occurrence of KOA is caused by trauma, relative articular instability, increased joint stress, and physical activity (5, 13, 16, 17). Trauma can cause it to develop prematurely or manifest later with a more gradually increasing joint degeneration (18). In English and Nigerian study female preponderance was high (12).

Signs and symptoms of oa: Pain in soft tissue structures is one of the main signs and effects of joint OA (19). Additional signs and symptoms of osteoarthritis (OA) include decreased range of motion, deformity, instability, buckling, or "giving way," as well as joint swelling, clicking, locking, grating, and crepitus (18). Since the majority of KOA symptoms are mechanical, physical impairment is currently a significant public health issue among elderly subjects (2, 20, 21).

1.2 Statement of the problem

One of the main causes of disability in the US and throughout the world is knee OA. While the etiology of the illness is still poorly understood and being investigated, it has been accepted that knee OA has a complex origin (13). In Saudi Arabia, it affects 70.0% of people, and the knee joint is the most commonly affected due to the knee's increased susceptibility to both direct and indirect damage and the heavy loads it supports (3). Numerous studies in the United States(US), United Kingdom(UK), China, and other developed and developing nations have looked into the risk factors for KOA (22). However, there is no studies on KOA that have been conducted in our country and considering substantial differences in race, socioeconomic status, environmental factors, and lifestyle patterns, this study has great implications for our populations.

The burden of OA comprises psychological damage such as distress and low self-worth in addition to physical impairment and related costs like higher treatment burden, higher healthcare expenditures, lower quality of life, and increased work incapacity (5). The impact is typically greater in under developed nations because of limited access to specialized interventions such as joint replacement, arthroplasty, and rehabilitation, as well as delays in diagnosis (9). Less is known about the potential effects of intermittent or regular exercise on normally aging joints and their soft tissue support structures (18).There isn't ample information on trustworthy indicators of osteoarthritis development and prognosis for specific individuals (17). Its endemicity is demonstrated by the estimated 300 million people living with OA worldwide and the 30.8 million adults in the US (6).

Population aging and rising obesity rates likely cause the growth of OA in the US from 21 million in 1995 to an estimated 27 million (14). Asian elders over 65 made up 7% of the population in 2008; by 2040, that number is expected to rise to 16 (18). Additionally, the condition is linked to a higher mortality risk; in hip and knee OA, this risk is projected to increase by 1.5 (5). A strategic method of primary prevention for OA through lifestyle modification is reducing and treating concomitant cardiovascular disease and obesity are principals for primary prevention of OA. Therefore, in order to gather meaningful planning data on future cost-effective preventive techniques and healthcare services, it is required to determine the region-specific OA size and investigate related risk factors (8).

It is anticipated that the number of KOA sufferers will rise sharply over the next several decades, making it the most common chronic illness in the Netherlands by 2040 (23). The worst quality of

life among musculoskeletal illnesses is reported by individuals with osteoarthritis (OA) of the knee (14). It has the highest magnitude in sub-Saharan Africa among osteoarthritis with an evolution to a bad functional prognosis (24). Therefore likely to provide a major contribution to disability in the general population (21). There is no clear published data available about the prevalence of knee osteoarthritis due to different types of defining of the disease (25).

The majority of research has examined the effects of obesity on diabetes and chronic heart disease (CHD), but fewer studies have examined the connection between obesity and musculoskeletal conditions and impairments such as osteoarthritis (26). While most research favors using exercise and weight loss as ways to manage OA pain, certain findings are in conflict with this (15, 27). Despite the fact that changing one's lifestyle is a crucial aspect of preventing osteoarthritis (OA), many people choose to ignore their musculoskeletal symptoms and accept them as a natural part of aging. As a result, current OA therapies focus on symptom management, maintaining function, and minimizing additional joint deterioration in the absence of effective preventive measures (2) . Even if exercise is recommended, the major chronic injury severed by professional soccer players has been reported to be osteoarthritis (OA) (19). Joint pain attributable to osteoarthritis (OA) is complex and influenced by a myriad of factors beyond local joint pathology like Higher comorbidity (27). Even though osteoarthritis (OA) is the most common joint illness in Africa, it is also one of the least researched rheumatic conditions (28). In the world, long term NCDs, which usually include MSDs, are bearing a greater burden of disease than communicable diseases. Studies indicate that in Ethiopia, between 35 and 74.5% of adults have work-related MSD (7).

1.3 Significance of the study

Knee osteoarthritis (KOA) greatly affects human's quality of life and result in physical, social, psychological, sexual and economic problems. Knowledge of risk factors of KOA is very important to prevent or reduce the incidence of KOA and related complications. The prevalence and associated risk factors of KOA were not studied and documented enough yet in our country. So, this study investigated the prevalence and determinants of knee osteoarthritis in patients admitted to the selected Addis Ababa city governmental hospitals. The result of the study would help health professionals and provides preliminary information for future study or intervention. The study also provides baseline information for policymakers to allocate the necessary budget to manage OA in our country.

2. Literature review

In the US, the prevalence of knee OA is 33.6% (12.4 million), with 42.1% of women and 31.2% of men 65 years of age or older affected.Prolonged standing, intense physical activity, and knee t rauma and injury are linked to an increase in symptomatic knee OA (13). According to a large study by Fautrel and colleagues (2005) involving 10,000 patients, 81.5% of patients with OA reported difficulties in their everyday activities; 61.1% reported reduced mobility outside the home, and 12.8% within (6). Radiographic knee osteoarthritis (RKOA) with symptoms was 12.1% in the adult US population. Body mass index (BMI ≥30), older age, and males working in manual labor occupations and reported having trouble walking, stopping, standing from a seated posture, and mounting stairs significantly higher risks of symptomatic RKOA (29).

A comprehensive review and meta-analysis conducted in Brazil revealed the prevalence of KOA in former athletes. Knee OA was 30.0% (95% CI 20.0 to 40.0%) prevalent. According to earlier research, the general population had a prevalence of knee OA ranging from 19.0 to 28.0%. Consequently, OA of the knee was more common in former athletes than in the general population, which could be linked to an increased risk of knee injuries and greater knee loading from sports activity (1). A Canadian research conducted in a community the province of Alberta revealed that the participants' average age was 52.5 (±16.5) years, and 55.2% of them held a university degree. With an average BMI of 28.3 ± 6.0 kg/m2, the prevalence of knee OA was 4.4% in men and 6.7% in women. Level of physical activity was not substantially correlated with the prevalence of knee OA for either sex, but it was significantly related to older age (females and males; $p < 0.001$) and BMI >30 kg/m2 (OR: 4.37; 95% CI: 2.08- 9.20; $p < 0.001$) (14).
A research conducted in East London by ChingfordJoint misalignment, trauma, age, gender, obes ity, and genetic susceptibility are among the factors that might lead to the development of osteoar thritis (OA).The most robust association among these is with age.Under 50, women are less likel y than men to get osteoarthritis (OA), but the situation is reversed after that age.Based on their fi ndings, the authors concluded that knee injuries, obesity, and physical activity (OR, 3.2; 95% CI, 1.1 to 9.1) had a higher impact on the incidence of OA (18). According to a systematic review conducted in England, nearly one in six study participants reported having OA, indicating that the condition is highly prevalent in lower middle-class and low-income countries (30). An estimated 10.2% of adults in the general population have knee pain that may be indicative of osteoarthritis (95% confidence interval: 7.9–12.5), according to a survey conducted in Spain.

Obesity, older women from lower socioeconomic classes with fewer education, people in physically demanding employment, and these factors are more commonly influenced (31).

According to a Dutch cohort study, 44.9% of participants were overweight, and 9.3% were obese. The degree of overweight and the prevalence of OA also seemed to be related in a dose-response manner. The odds ratios for moderate overweight and obesity in OA were 1.6 (95% CI 1.4, 1.9) and 2.6 (95% CI 2.1, 3.4), respectively (26). A California cohort study revealed that of the OA patients, the knees were impacted the most frequently (58.6%), and nearly half of the patients had multiple damaged joints (46%) upon presentation (15). In a cohort study conducted in a southwest Swedish district, 41 out of 94 patients (44%) experienced incident osteoarthritis. The following factors did not predict incidence osteoarthritis: age, sex, BMI, or baseline pain. Walking time, the quantity of well executed one-leg rises, and timed one-leg standing were not substantially correlated (17). According to a Denmark population-based cross-sectional study, 27% of people had persistent knee pain in one month's study. All age groups, with the exception of men aged 29 to 39, had a family history of osteoarthritis, which was linked to continuing knee pain (32).

According to a review conducted in 2019 at Shahid Sadoughi University of Medical Sciences in Yazd, Iran, the prevalence of OA ranges from 20.5% to 68.0%. In a variety of nations, the prevalence of Asians with knee OA ranges from 13.1% to 71.1%. Risk factors for osteoporosis, osteoarthritis, high body mass index, low educational attainment, OA in the family history, smoking, and environmental factors were found to be significant (8). In a UK Sports Institute survey of retired football players, osteoarthritis in at least one lower limb joint was medically diagnosed in 32% of the respondents, with the knee joint ranking highest (19). In a cross-sectional investigation utilizing information from the fifth National Health and Nutrition Examination Survey in Korea, radiographic knee OA was found in 36.3% of cases. The female participants were 44.8% and the male 24.9%. Higher prevalence of knee OA and knee symptoms was linked to lower income, lower education, and non-managerial or no job (33).

In the China Health and Retirement Study from 2016, 8.1% of participants had knee OA with symptoms. Women had a higher prevalence of symptomatic knee OA (10.3%) than men did (5.7%). increased with age, was more prevalent in rural than in urban regions (OR 1.84 [95% CI 1.46–2.31]), and was less common among those who were better educated as well as in more developed areas. The North and East regions of China had the lowest prevalence of symptomatic

knee OA (5.4% and 5.5%, respectively), followed by the North-East (7.0%), South-Central (7.8%), and North-West (10.8%) regions. The prevalence was highest (13.7%) in subjects living in the South-West region (34). The Beijing osteoarthritis study shows: Symptomatic OA was determined to be present in 9.7% of men and 20.3% of women(20). The age-adjusted relative risk of OA of the knees for women 50% over ideal body weight was 8.98 in white women (35).
In Tianjin, northern China, a population-based cross-sectional survey found that the prevalence of KOA was 10.3%. Women were more likely than men to have KOA (14.1% vs. 6.5%). Age increases in KOA risk; for example, those over 75 years old, 65–74 years old, and 55–64 years old had a risk of 2.913 times (95%CI 2.123–3.997), 2.784 times (95%CI 1.959–3.956), and 3.439 times higher than those under 55 years old (95%CI 1.999–5.917). Individuals who walked regularly, were overweight, had medium sleep quality, or felt they had bad sleep quality had a greater chance of developing KOA compared to those who had adequate sleep quality. Individuals with an elementary education had a decreased risk (22).

According to an epidemiological study conducted in rural China, there were no appreciable sex-based differences in the overall prevalence of KOA, which was found to be 16.57% in women and 17.40% in men. In the age category of 70 years and older, the total prevalence of knee OA increased considerably with age, reaching 29.55% of women and 24.71% of men (10). According to a multicenter cross-sectional study conducted by Baqai Medical University in Karachi, Pakistan, body mass index, ethnicity, and residential status are all substantially correlated with the development of KOA, according to multiple regression analysis (36). According to a cross-sectional study carried out at Sri Krishna Rajendra Hospital in Mysore, India, the prevalence of knee OA rises with age, with approximately 11% of all women over 60 experiencing symptoms. The population ranged in age from 40 to 65 years, with 46% of individuals with normal BMIs falling into the 50–65 range or higher. The disease's risk factors include age, socioeconomic position, engagement in regular activities, etc. (25). An Indian epidemiological study indicated that the overall prevalence of knee OA was 28.7% and that the related factors were age, sedentary job, female gender (prevalence of 31.6%), and obesity (37).

According to a population-based study conducted in a rural South African environment, 33.1% of persons over 35 have knee osteoarthritis. According to a Burkina Faso study, 0.5% of adult HIV patients receiving very aggressive antiretroviral therapy had the virus. Studies in Tunisia and Cameroon revealed a prevalence of 4.7% and 9.9%, respectively, among senior primary care patientsand musculoskeletal disorders (38). According to a transversal and analytical survey

carried out at Brazzaville University Teaching Hospital (Congo), knee osteoarthritis was most common in men between the ages of 60 and 69 (38%) and 50 and 59 (36%).The knee osteoarthritis was mainly secondary in 81% (24). According to a cross-sectional study conducted in Nigeria, 11.5% of people had knee osteoarthritis. Knee osteoarthritis was substantially correlated with advancing age, female gender, married status, low educational attainment, financial dependence, low income, obesity, history of knee injury, and poor health. Aging was the most significant predictor linked to knee osteoarthritis, according to a logistic regression study (12). In another community-based study conducted in Nigeria, 39.5% of participants reported knee pain and other KOA symptoms. Of the individuals exhibiting KOA symptoms, 41 (87.2%) were female. The degree of pain and academic qualification were significantly inversely correlated. Age was also discovered to be strongly correlated with every KOA symptom (39). In a cross-sectional descriptive survey conducted among adults aged 30 years or older in a rural Northeastern community in Nigeria, the point prevalence was 16.3%. Among the participants, 40.1% of the females and 13.5% of the males had symptomatic knee OA. The prevalence for individuals over 40 was 20.6%. Participants aged ≤50 years had considerably more severe knee osteoarthritis than those aged ≥60 years. The prevalence is higher in women, rises with aging, and rises with increased body fat (40).

A hospital-based cross-sectional study conducted in Cameroon revealed that of the patients, 9.9% had knee OA. The participants' mean age was 56.9±10.7 years, and 75% were female. Fifty-two percent of patients had obesity (BMI > 30), 37.2% had hypertension, and 8.8% had diabetes (9). According to a hospital-based cross-sectional study conducted at the University of Kinshasa in the Democratic Republic of the Congo, 31.4% of all OA patients had a diagnosis of knee OA. The primary complaints were 100% mechanical pain, 40.6% edema, and 79.2% crepitus. Some patients have noted abnormalities of the knee (28). A cross-sectional study conducted in East Gojam found that, after back pain, osteoarthritis was the second most common musculoskeletal condition (10%). The patterns of comorbidity (multimorbidity) that were most prevalent were obesity (3.9%), diabetes (5.6%), hypertension (9.8%), and other conditions (2.2%). The prevalence of OA was higher in females than in males (6.3% vs. 3.7%) (7).

Conceptual framework

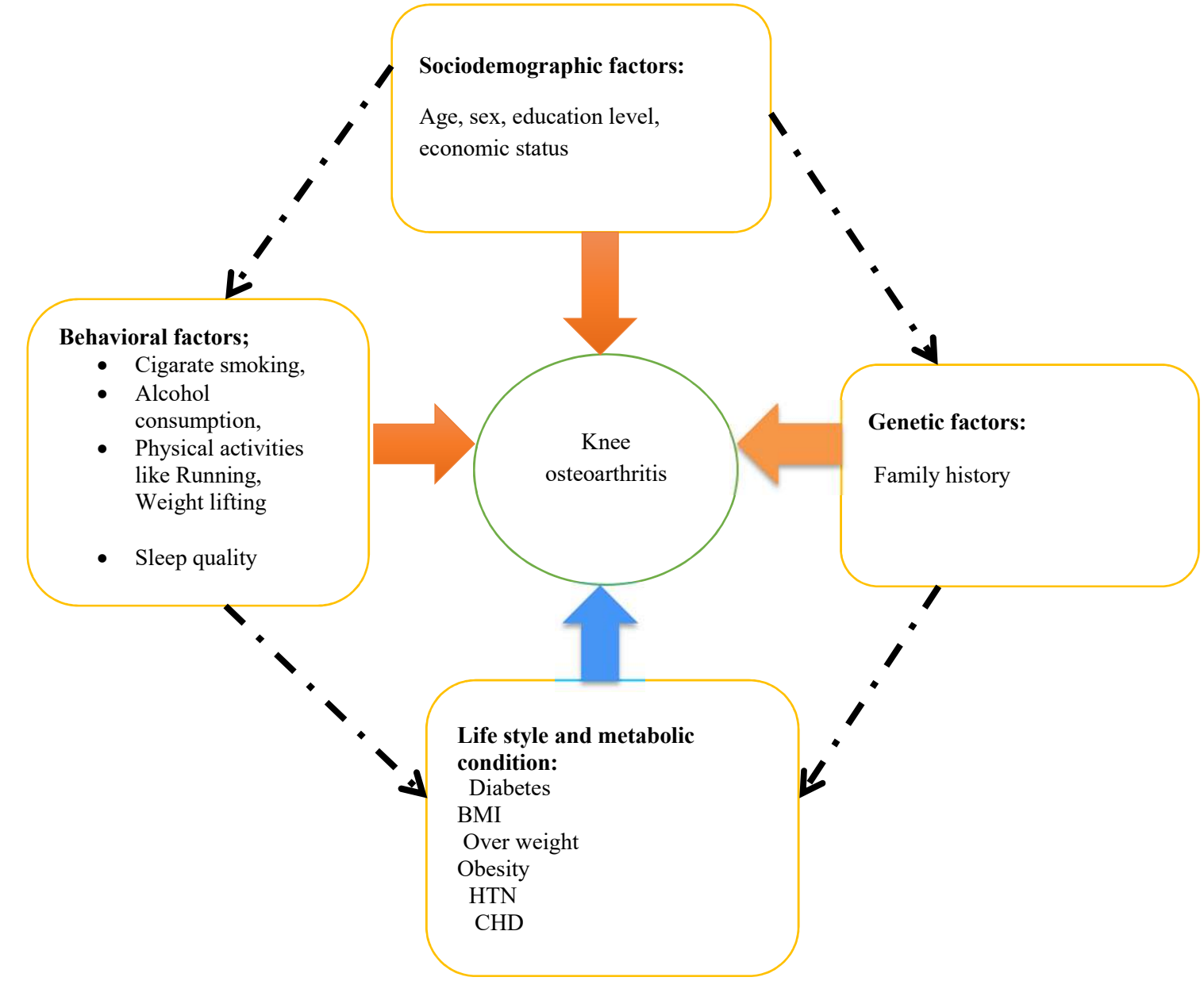


Figure 1: **Conceptual frame work of KOA(7,8,22).**

3. Objectives

3.1 General objective:

- To assess the magnitude and associated factors of Knee osteoarthritis among patients who visited orthopedic OPD in Tikur Anbessa, Abet and Yekatit 12 Hospitals from April 01 – June 15, Addis Ababa, Ethiopia, 2024.

3.2 Specific Objectives:

- ✓ To assess the magnitude of knee osteoarthritis among patients who visited orthopedic OPD in Tikur Anbessa, Abet and Yekatit 12 Hospitals from April 01 –June 15, Addis Ababa, Ethiopia,2024
- ✓ To identify associated factors of Knee OA among patients who visited orthopedic OPD in Tikur Anbessa, Abet and Yekatit 12 Hospitals from April 01 –June15, Addis Ababa, Ethiopia,2024
- ✓ To determine major complications and clinical manifestations of KOA among patients who visited orthopedic OPD in Tikur Anbessa, Abet and Yekatit 12 Hospitals from April 01 –June15, Addis Ababa, Ethiopia,2024

4. Material and Methods

4.1 Study area

The study was conducted among orthopedic OPD patients who have visited the selected governmental hospitals in, Addis Ababa. It is the capital and largest city in the country of Ethiopia. It is located on a well-watered plateau surrounded by hills and mountains, in the geographic center of the country. Administratively, it is divided in to eleven sub cities and 116 Woreda with an area of 540 Square kilometers and hosting more 5,704,000 populations.

There are 8 federals, 6 regionals, above 38 private hospitals, and more than 850 private clinics which provide different health services. There are also a total of 86 public health centers which provide services.

4.2 Study period:

Study was conducted from April 01 –June15, 2024

4.3 Study design

An institutional based cross-sectional study was conducted to assess the magnitude and associated factors of knee osteoarthritis among patients who have visited orthopedic OPD in the selected governmental hospitals from April 01 –June15, Addis Ababa, Ethiopia, 2024

4.4 Population:

4.4.1 Target population

All patients who have visited adult Orthopedic OPD in governmental hospitals in Addis Ababa, Ethiopia, 2024 are target population.

4.4.2 Study population

Patients who have visited adult orthopedic OPD in the selected govenmental hospitals during the study period Addis Ababa Ethiopia,2024.

4.5 Inclusion and exclusion criteria

Inclusion Criteria

- ✓ Patients willing to provide voluntary written consent for participation in the study.
- ✓ All Patients age ≥ 40

Exclusion Criteria:

- ✓ Patients who cannot be measured his/her weight and height due to extreme physical disability.

4.6 Sample size determination and sampling technique

4.6.1 Sample size

The sample size is determined using single population proportion formula. By taking the prevalence knee osteoarthritis is 11.5 in Nigeria take as a proportion, 95% CI and maximum discrepancy of 5% between the sample size and the underlining population.

The following single proportion formula:

$N= (Z\alpha/2)^2 p (1-p)/d^2 = 1.96^2 (0.115\times0.885)/0.05^2=156.75\approx157$

Where, n =sample size,

P = prevalence knee osteoarthritis is 11.5% in Nigeria (12).

by taking 10% proportion

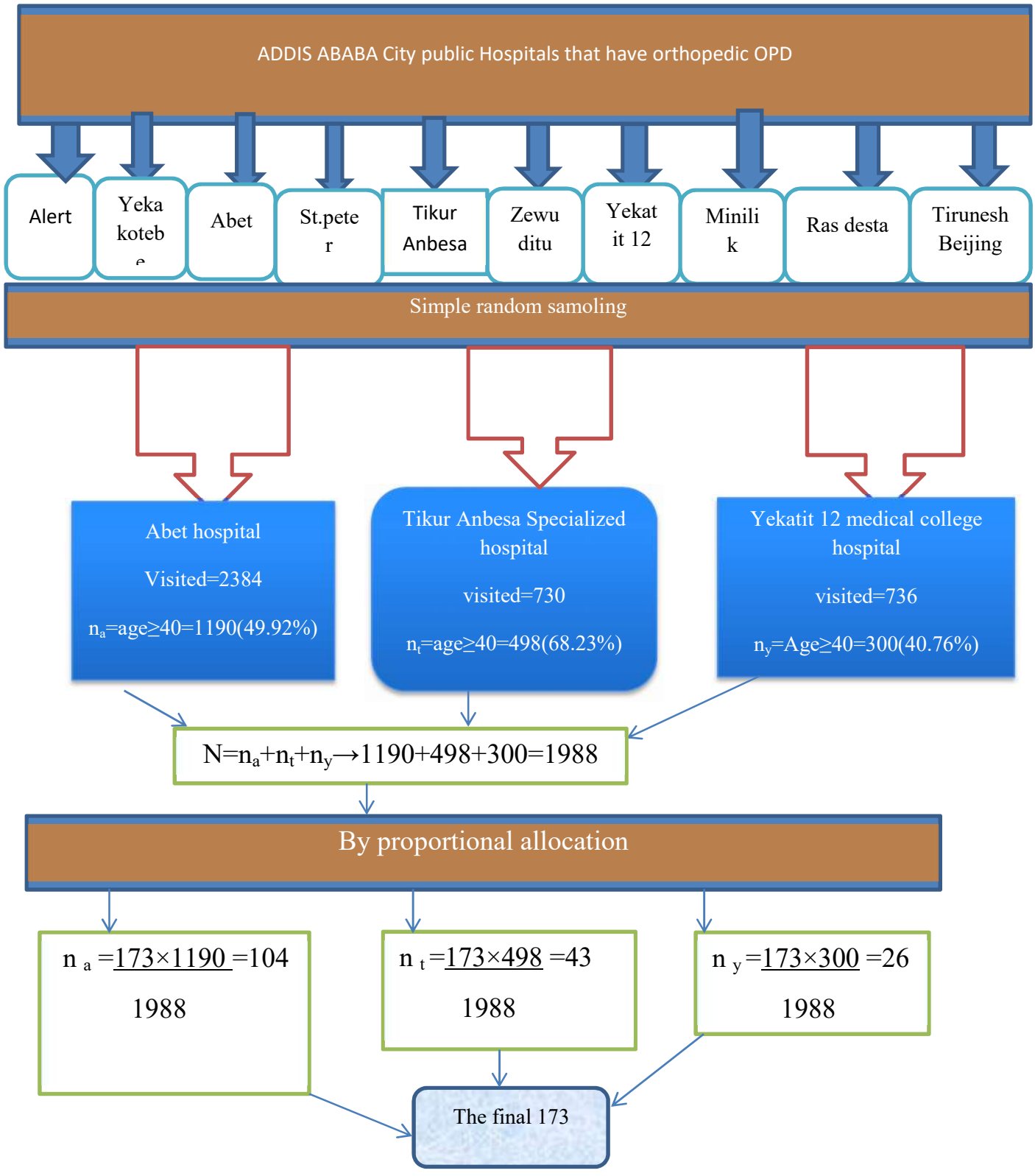
D=error allowed 5%, Zα/2= critical value at 95% CI is 1.96.

By taking 10% non-response rate the total sample size is (157+16) = 173.

4.6.2 Sampling technique

Simple random sampling technique is employed for the selection of the sampling units. From the total public hospitals which have orthopedic OPD found in Addis Ababa, Abet, Yekatit 12 hospital and Tikur Anbesa were selected.

The sample size is proportionally allocated to each respective hospital by considering client flow. Lastly, study subjects were selected by using a systematic sampling technique by using a K interval. The K value was 12 by using the previous year patient flow as a sampling frame.



n_a : sample fom abet, n_t : sample from Tikur anbesa, n_y : sample from Yekatit hospitals

Figure 2: Schematic presentation of sampling technique

4.7 Study variables

4.7.1 Dependent variables

Knee Osteoarthritis

4.7.2 Independent variable

Age, Sex, Economic status, Occupation, BMI, Physical Exercise, Sleepquality, Cigarate smoking, Alcohol drinking, Over weight, Obesity, Comorbidity, Family history, History of trauma

4.8 Terms and operational definitions

Bone Sclerosis: Abnormal increase in density detected by radiograph.

Higher prevalence: - the prevalence of the studies is higher than studies conducted in Ethiopia.

Disability: - is a measurement of the impact of an illness on quality of life before it resolved

Sleepquality: Described as a person's contentment with every facet of their sleep experience.

Physical Exercise: activity that involves the generation of forces by the activated muscle at least the equivalent of 30 minutes of moderate intensity five days a week.

Drinking was characterized as consuming more than 500 g weekly for a minimum of one year. (22).

Ex-drinker: defined as quitting drinking for at least half year (22).

Smoker: Smoking for at least half a year

ex-smoker: quitting smoking for a minimum of six months (22).

4.9 Data collection procedure

During data collection, open data kit (ODK) version 2022.4.0 software were used to gather data and also kobo-toolbox was used to keep the collected records online. A structured questionnaire was used (which investigate all quintessential statistics for our research thesis such as socio-demographic status of patients, associated factors, occurrence of KOA and complications of the case). For the diagnosis of KOA Doctors use the 1995 American College of Rheumatology clinical diagnostic criteria for KOA are as follows: (1) repeated knee pain in the past month; (2) age≥50 years; (3) morning stifness≥30 min; (4) crepitus on motion; and (5) radiographs (standing or weight-bearing) show joint space narrowing, subchondral sclerosis, and/or cystic degeneration, along with articular edge osteophyte formation. KOA can be diagnosed if the above criteria 1, 2, 3, and 4 are met at the same time, or if the criteria 1, 5 are met. Four nurses and two health officer expert were assigned to collect data. And the principal investigator supervised all data collectors.

4.10 Data quality control

To assure the quality of data, we took some measurements which amplify the high-quality of data. We have done pretest (5 %) data collection in Yekatit and Tikur Anbesa hospitals to check the quality of the questionnaire. The questionnaires were prepared in English version then translated into the Amharic language. After this, Amharic version was again translated back to English version by other person who can read and speak both Amharic and English to ascertain the consistency of the questionnaire. Two days training has been given for data collectors on how to use ODK software. I was supervising all data collectors and I have checked all accrued data every day to forestall information incompleteness and ambiguity.

4.11 Data processing and analysis

After Collection of patient data, it has been checked for completeness on a weekly basis. Then lastly, exported into SPSS version-26 for analysis. Incomplete and inconsistent data has been excluded from the analysis. Data has been processed by using descriptive analysis, including frequency distribution and summary measures.

Test of association between the outcome variable and the independent variables have been investigated with bi-variant logistic regression analysis method.Then variables which has $P < 0.2$ has followed by multivarate logistic regeression method and adjusted odds ratios (OR) and 95% confidence interval (CI)) was used to determine the association. P values less than 0.05 was considerd statistically significant.The fitness of the model was highly significant $p=0.000$ which indicates the calculated value was greater than the expected value.There was no multiclinearity problem as all variables have been checked by Tolerance greater than 0.10 and variance inflation factor(VIF) less than 10.

4.12 Ethical consideration

The study was conducted after full approval and ethical clearance were obtained from Addis Ababa University, College of Health Sciences, School of Medicine, Department of Anatomy, and the Addis Ababa public health and emergency management directorate. Written permission was obtained from the selected hospital to conduct the study on their premises with the reference numbers of St. Poulos ref. No. PM23/1171 and Yekatit ref. No. 431/24 in order to collect the data.

Before participants sign the consent form, which has been written in Amharic and English, the researcher ensures that participants understood the information given by using the language of their choice and at the level of their understanding. For all study participants, consent forms have been forwarded for the indication of their voluntary participation in the study and permission for the interviews. Participation in this study has been voluntary; the right of the participants to refuse to answer for a few or to withdraw at any time from the study was respected.

To protect the participant's rights to anonymity and confidentiality, the participants' information has been treated in strict confidence and only used for the purpose of the study. The collected raw data was kept safe and confidential, locked up in a secure place, and the files were password-protected. The names of the participants have not been written in the study, and data has been reported in a manner that doesn't identify or link the participants with the information.

5. Result

5.1 Socio-demographic characteristics of the study participants

This study was conducted on 173 adult patients from three governmental hospitals in Addis Ababa. The mean age of the study participants was 55.91± 10.724 years. Ages were ranging from 40 to 85 years. Notably, around 52% of the study participants fell within the age category of 40 to 54 years, representing the highest percentage among all age groups.

In terms of gender distribution, 54.33% of the study participants were male. The religious affiliations of the participants included 49.13% Orthodox Christians, 34.68% Muslims, 10.98% Protestants, and 5.2% Catholics. Additionally, approximately 62.43% of the participants were married.

Educational attainment among the participants was relatively high, with 53.75% having completed college or higher education. Regarding financial status, 50.87% of participants reported a monthly income of less than 5,000 birr. Furthermore, 50 out of 173 participants (28.9%) were government employees. The general socio demographic characteristics of the study participants are summarized in Table 1.

Table 1: Descriptive Analysis of Socio-demographic Result of the three governmental hospitals

No	Variables	Categories	KNOA		frequency	percentage
			Yes	No		
1	Age	40-54	1	89	90	52%
		55-64	5	37	42	24.3%
		65-74	5	27	32	18.5%
		75 and above	2	7	9	5.2%
2	Sex	Female	9	70	79	45.67%
		Male	4	90	94	54.33%
3	Religion	Catholic	0	9	9	5.2%
		Muslim	5	55	60	34.68%
		Orthodox	7	78	85	49.13%
		Protestant	1	18	19	10.98%
4	Marriage	Divorced	1	25	26	15.03%
		Married	8	100	108	62.43%
		Single	4	19	23	13.2%
		Widowed	0	16	16	9.25%
5	Family	≤4	6	100	106	61.3%
		>4	7	60	67	38.7%
6	Residence	Urban	11	101	112	64.74%
		Rural	2	59	61	35.26%
7	Education	Unable to read and write	1	10	11	6.36%
		Primary School	3	35	38	21.97%
		Secondary School	0	31	31	17.92%
		College and above	9	84	93	53.75%
8	Occupation	Farmer	1	25	26	15.03%
		Government employer	2	48	50	28.90%
		House wife	1	12	13	7.51%
		Pension	0	1	1	0.58%
		Private employer	5	38	43	24.86%
		Other	4	36	40	23.12%
9	Income	5000 ETB and below	5	83	88	50.87%
		5000-10,000 ETB	7	67	74	42.77%
		10,000 ETB and above	1	10	11	6.36%

5.2 Prevalence of KOA

The present study revealed that the overall prevalence of symptomatic knee osteoarthritis (KOA) at Tikur Anbessa,Yekatit and Abet hospitals was found to be 13 patients, representing 7.5% and out of 13 patients 9 (69.23%) were female and 4 (30.77%) were male.

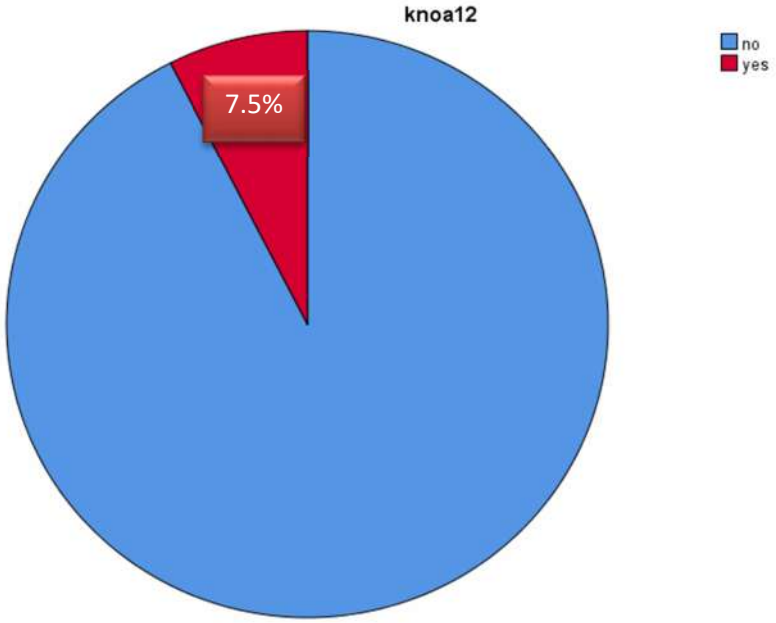


Figure 3: Prevalence of symptomatic KOA at Tikur Anbessa ,Yekatit and Abet hospitals

5.3 Age specific analysis prevalence of KOA

This research assessed the frequency of symptomatic KOA across four age categories. Among the total of 13 KOA patients,1 patient (7.69%) was in the 40-54 age category,5 patients (38.46%) were in the 55-64 age group, 5 patients (38.46%) were in the 65-74 age group, and 2 patients (15.39%) were aged 75 years and above.

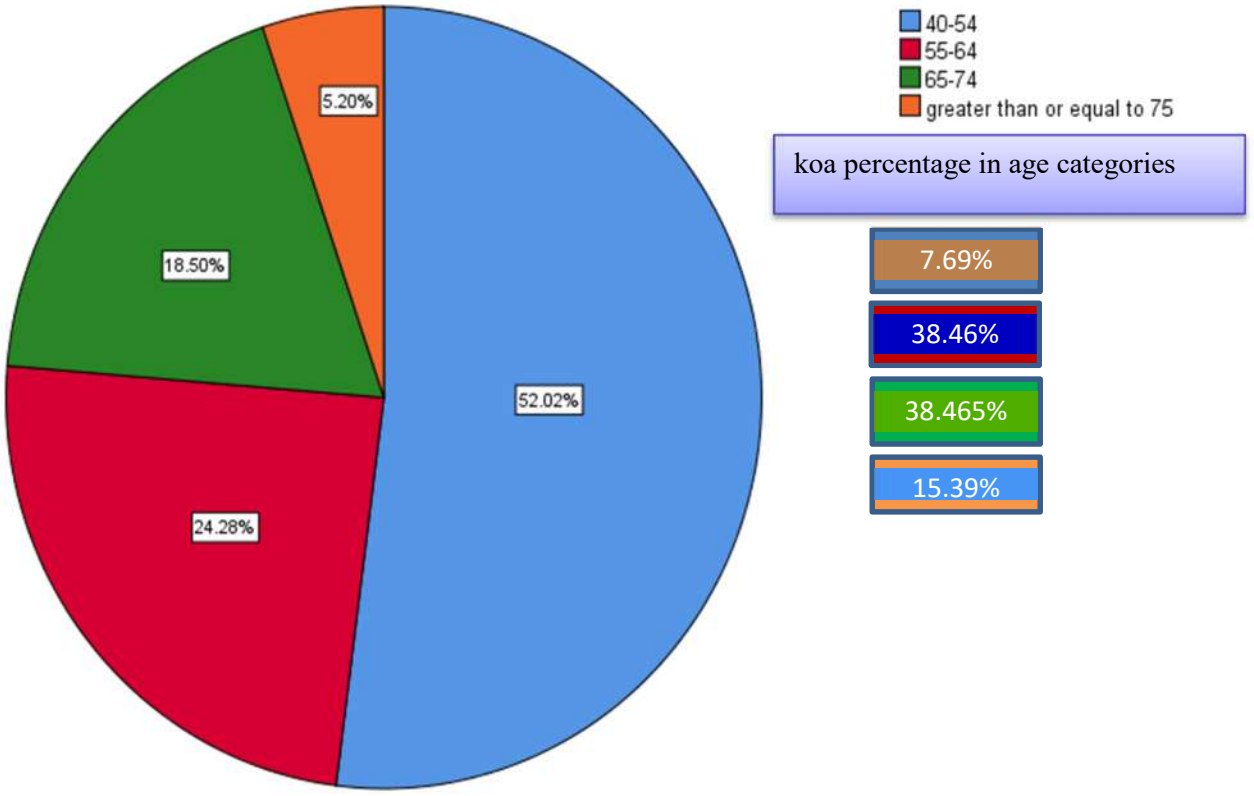


Figure 4- Prevalence of KOA in specific Age group at selected governmental hospital in Addis Ababa

5.4 Descriptive analysis of associated factors of KOA

5, 4.1 Life style and Behavioral factors

In this study, approximately 56 out of 173 (32.37%) had chronic disease. Of the 173 participants, 88 (50.87%) traveled by foot, and 76 (43.93%) engaged in physical exercise, with the majority 55 (72.37%) participating in running or jumping activities. Most of these participants (43.58%) exercised on asphalt or cobblestone surfaces. Additionally, 58 participants (69.88%) were current drinkers. About 130 participants (75.14%) reported sleeping less than eight hours per night, while 82 (47.4%) experienced satisfaction with their sleeping situation.

Among 173 participants, 133 (76.88%) had a normal range of body mass index (BMI), while 12 (6.94%) were underweight, 20 (11.56%) were overweight, and 8 (4.62%) were classified as obese. The entire descriptive analysis of life style and behavioral factors associated with KOA conducted at the selected governmental hospitals is presented in the table below (Table 2).

Table 2.Descriptive analysis of life style and behavioral factors at the selected governmental hospitals

No	Variables	Categories	KOA		Frequency	Percentage
			Yes	No		
1	Chronic disease	Yes	9	47	56	32.37 %
		No	4	113	117	67.63 %
2	Transportation	By foot	7	81	88	50.87 %
		By bus	6	34	40	23.12 %
		By taxi	0	45	45	26.01 %
3	Bus transport status	Sitting	0	20	20	50.00 %
		Standing	6	14	20	50.00 %
4	Exercise	Yes	8	68	76	43.93 %
		No	5	92	97	56.07 %
5	Type of exercise	Running/jumping	8	47	55	72.37 %
		Weight lifting	0	14	14	18.42 %
		Pullup/setup	0	7	7	9.21 %
6	Area of Exercise	Asphal/cobblestone	6	37	43	56.58 %
		Garden/grass area	2	31	33	43.42 %
7	Working condition	Bending	1	31	32	18.50 %
		Stand	11	42	53	30.64 %
		Sitting	1	87	88	50.86 %
8	Working hour	>8 hour	8	38	46	26.59 %
		≤8 hour	5	122	127	73.41 %
9	Smoking	Yes	2	14	16	9.25 %
		No	11	146	157	90.75 %
10	Smoking status	Ex-smoker	0	9	9	56.25 %
		Current smoker	2	5	7	43.75 %
11	Drinking	Yes	10	73	83	47.98 %
		No	3	87	90	52.02 %
12	Drinking	Ex-drinker	4	21	25	30.12 %

	status	Current drinker	6	52	58	69.88 %
13	Sleeping hour	.≥8 hour	9	34	43	24.86 %
		<8 hour	4	126	130	75.14 %
14	Sleeping situation	Satisfy	1	81	82	47.40 %
		Not bad	2	50	52	30.06 %
		Insufficient	10	29	39	22.54 %
15	BMI	Under weight	0	12	12	6.94 %
		Normal	1	132	133	76.88 %
		Over weight	4	16	20	11.56 %
		Obese	8	0	8	4.62 %

5.4.2 Case related factors

In this study, patients primarily complained mechanical pain, which affected approximately 4.6% of the cases. Bilateral knee involvement was observed, affecting nearly double the number of patients compared to unilateral cases. About 11 patients (6.4%) developed complications, with the majority experiencing knee deformity and complications related to other chronic diseases. Among the 56 patients with chronic diseases, around 5.2% had family history.

Among the 56 patients with chronic disease, 40 (16%) had hypertension, 25 (10%) had diabetes, and 3.2% had either congestive heart failure (CHF) or nerve abnormality. Out of 56 patients with chronic disease, 44 (25.6%) were advised by health professionals to engage in sports activity. Recommendations included 29 (16.8%) for running or jumping, 13 (7.5%) for pull-ups or sit-ups, and 14 (8.1%) participating in sports on bare land or grassy areas. However, 26 (15%) did not receive specific recommendations regarding the type of area for physical activity.

Table 3: Case related factors of the participants with KOA

Variables	**Response**	**Frequency**	**Percent**
Sign/Symptoms	Mechanical pain	8	4.6%
	Crepitus	3	1.7%
	Mobility reduction	2	1.2%
Affected leg	Right	2	1.2%
	Left	2	1.2%
	Both	9	5.2%
Complication	Yes	11	6.4%
	No	2	1.2%

Complication type	Knee deformity	4	2.3%
	Other disease	4	2.3%
	Reducing production	3	1.7%
Family affected	Yes	9	5.2%
	No	4	2.3%
Chronic disease	Yes	56	32.4%
	No	117	67.6%
Chronic disease type	HTN	40	16%
	DM	25	10%
	CHF	8	3.2%
	Nerve abnormality	8	3.2%
HealthProfessionals Recommend sport	Yes	44	25.4%
	No	12	6.9%
RecommendedSport type	Running/jumping	29	16.8%
	Weight lifting	2	1.2%
	Pull up/setup	13	7.5%
Recommended Sport area	Asphalt/coble stone	4	2.3%
	Bare land /grass area	14	8.1%
	Not recommended	26	15%

5.5 Associated factors of KNOA

5.5.1 Bi-variant analysis

A. Socio-demographic factor analysis

In this research, variables affecting the prevalence of KOA were entered into bivariate analysis individually with the dependent variable (KOA). Variables whose p values were less than 0.2 were included in the multivariate analysis. The variables entered into the bi-variant analysis included socio-demographic variables (sex, income, marital status, religion, occupation, and others) as well as behavioral or lifestyle-related variables (smoking, alcohol consumption, physical exercise, chronic diseases, obesity, etc.).

In this analysis, all socio-demographic variables (sex, income, marital status, religion, occupation, and others) were entered into the analysis individually. Variables with p-values less than 0.2 were considered significantly associated with KOA and passed to the next analysis. The p-values and crude odd ratio for age, sex, marriage, and residence were strongly associated with symptomatic KOA. These three variables were included in the next analysis. The entire analysis is reported below in the accompanying table (Table 4).

Table 4-Bi-variant analysis of socio-demographic associated factor result of the study

No	Variables	Categories	Crude odd ratios	P value
1	Age	40-54	1	1
		55-64	12.027(1.358-106.501)	0.025
		65-74	18.481(1.845-147.235)	0.012
		75 and above	25.429(2.044-316.275)	0.012
2	Sex	Female	2.893(0.855-9.784)	0.088
		Male	1	1
3	Religion	Catholic	0	0.999
		Muslim	1.636(0.179-14.9470	0.663
		Orthodox	1.615(0.187-13.966)	0.663
		Protestant	1	1
4	Marriage	Divorced	1	1
		Married	2.00(0.239-16.738)	0.523
		Single	5.263(0.543-50.998)	0.152
		Widowed	0	0.999
5	Family	≤4	1	1
		>4	1.944(0.624-6.058)	0.251
6	Residence	Urban	3.213(0.688-14.994)	0.138
		Rural	1	1
7	Education	Unable to read and write	1	1
		Primary School	0.857(0.080-9.167)	0.899
		Secondary School	0.000	0.998
		College and above	1.071(0.123-9.361)	0.950
8	Occupation	Farmer	0.360(0.038-3.415)	0.373
		Government employer	0.375(0.065-2.161)	0.272
		House wife	0.750(0.076-7.381)	0.805
		Pension	.000	1
		Private employer	1.184(0.294-4.762)	0.812
		Other	1	1
9	Income	5000 ETB and below	0.602(0.064-5.687)	0.658
		5000-10,000 ETB	1.045(0.116-9.411)	0.969
		10,000 ETB and above	1	1

B. Lifestyle or behavioral factors analysis

In this analysis, all pathological and behavioral or lifestyle related variables (smoking, alcohol drinking, physical exercise, chronic diseases method of transportation, working conditions, working hours, sleeping hours, sleeping situation and BMI) were entered into the analysis individually . Variables with p-values less than 0.2 were considered significantly associated with KOA and advanced to the next analysis. The p- values of chronic disease, exercise, working conditions, working hours, alcohol consumption , sleeping hours and sleeping situation were all less than 0.2; therefore, these variables pass to the next analysis. The entire analysis is reported below in the accompanying table (Table 5).

Table 5- Bi-variant analysis of life style as well as behavioral related factors.

No	Variables	Categories	Crude odd ratio	P- value
1	Chronic disease	Yes	5.410(1.588-18.432)	0.007
		No	1	1
2	Transportation	By foot	1	1
		Bus	2.042(0.6339-6.525)	0.228
		Taxi	0	0.998
3	Exercise	Yes	2.165(0.678-6.909)	0.192
		No	1	1
4	Working condition	Bending	2.806(0.170-46.242)	0.470
		Stand	22.786(2.847-182.383)	0.003
		Sitting	1	1
5	Working hour	>8 hour	5.137(1.586-16.637)	0.006
		≤8 hour	1	1
6	Smoking	Yes	1.896(0.382-9.423)	0.432
		No	1	1
7	Drinking	Yes	3.973(1.054-14.978)	0.042
		No	1	1
8	Sleeping hour	≥8 hour	8.338(2.240-28.733)	0.001
		<8 hour	1	1
9	Sleeping situation	Satisfy	1	1
		Not bad	3.240(0.286-36.663)	0.342
		Insufficient	27.931(3.424-327.845)	0.002
10	BMI	Lower weight	0	0.998
		Normal	0	0.999
		Over weight	0	0.999
		Obese	1	1

5.5.2 Multi-variant analysis of associated factors of KNOA

In this analysis, all variables that were significantly associated with the dependent variable in the bivariate analysis were entered collectively. Age, sex, working condition, and working hours were significantly associated with KOA ($p<0.05$).

The risk of KOA in participants aged 40–54 was 130.268 times higher than in participants aged 75 years and above. Female participants had a risk of KOA that was 0.036 times lower (95%CI: 0.003-0.465) compared to males. Participants who worked in a standing position were 0.043 times less likely to develop KOA (95% CI: 0.003-0.562) than those who worked while sitting.

Additionally, participants who worked greater than 8 hours were 0.090 times less likely to develop KOA (95% CI: 0.008-0.965) compared to those who worked 8 hours and less. The remaining variables that passed bivariate analysis were not significantly associated with KOA. The entire analysis is summarized in the table below (Table 6).

Table 6-Multi-variate analysis with their level of significance of the study.

No	Variables	Categories	Adjusted odd ratio(AOR)	P value
1	Age	40-54	130.628(1.433-11.905)	0.034
		55- 64	7.391(0.301-181.437)	0.221
		65-74	3.336(0.149-74.579)	0.447
		75 and above	1	1
2	Sex	Female	0.036(0.003-0.465)	0.011
		Male	1	1
3	Chronic disease	Yes	0.447(0.080-2.495)	0.359
		No	1	1
4	Exercise	Yes	1.006(0.186-5.433)	0.994
		No	1	1
5	Working condition	Bending	1.361(0.042-43.718)	0.862
		Standing	0.043(0.003-0.562)	0.016
		Sitting	1	1
6	Working hour	Greater than 8hr	0.090(0.008-0.965)	0.047
		≤8 hour	1	1
7	Drinking	Yes	0.783(0.118-5.203)	0.800
		No	1	1
8	Sleeping hour	1. ≥8 hour	0.362(0.052-2.548)	0.308
		2.<8 hour	1	1

5.6. Complication and symptoms of KOA

A. Symptom suggestive of KOA

The present study also assessed and determined the frequency and percentage of symptoms suggestive of KOA in all 13 patients diagnosed with symptomatic KOA. Out of the 13 symptomatic KOA patients, approximately 8 (61.5%) complained of mechanical pain, 3 (23.1%) had crepitus, and 2 (15.4%) experienced reduced mobility.

The results indicated that bilateral knees were affected more frequently than unilateral knees. Bilateral involvement accounted for 9 patients (69.2%), while unilateral involvement was observed in 2 patients (15.4%) for each leg (left and right).

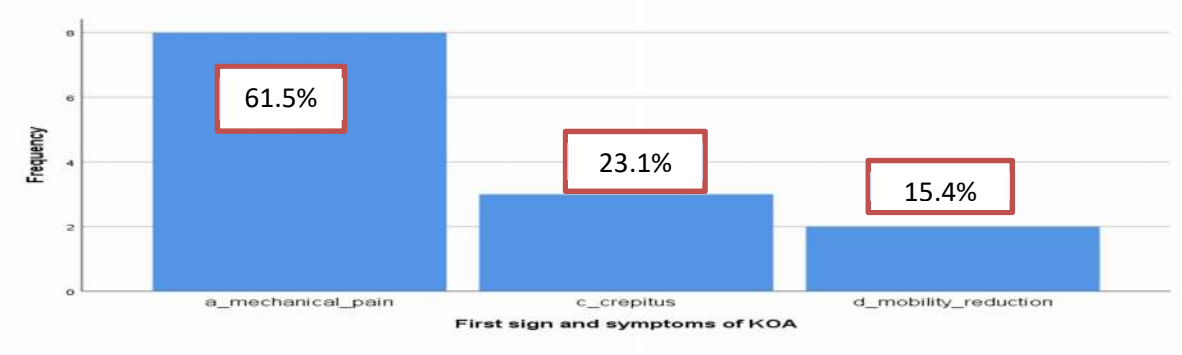


Figure 5: Sign and symptoms

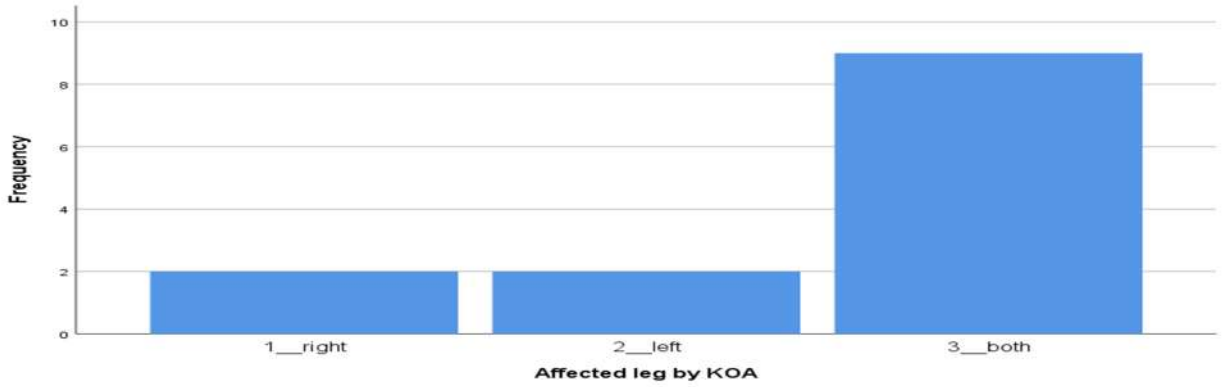


Figure 6: Affected type of leg

B. Complication associated with KOA

In the present study, out of 13 symptomatic KOA patients, 11 (84.6%) had complications associated with KOA. Among these 11 patients, 4 (36.4%) experienced knee deformities, and 4 (36.4%) had chronic disease. Additionally, around 3 (27.3%) of the participants reported a reduction in productivity.

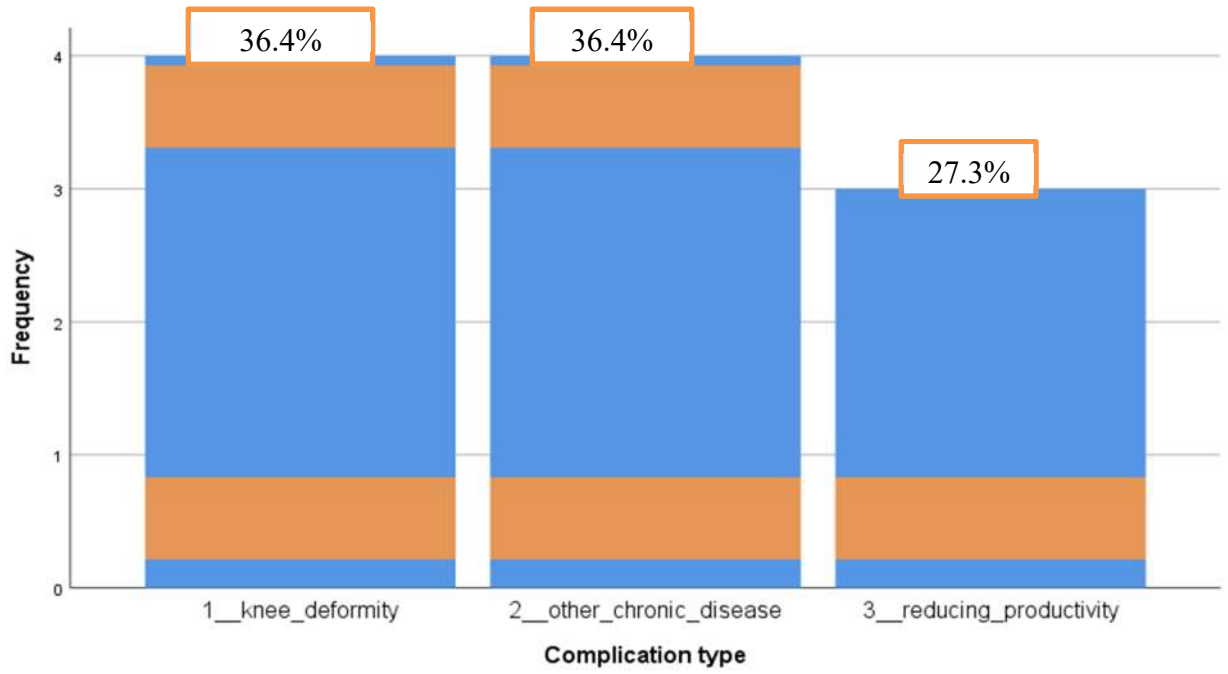


Figure 7: Complication of KOA

6. Discussion

This study was conducted in the orthopedic department of three governmental hospitals in Addis Ababa, utilizing an institutional-based cross-sectional design. Data were collected from patients and medical charts to extract cases from individuals who visited the selected hospitals during the data collection period. In the present study, the prevalence of KOA at selected governmental hospitals in Addis Ababa was found to be 7.5%. The risk of KOA in individuals under the age of 55 years was higher than in those aged 75 and above. Furthermore, the risk of KOA was lower among females in standing working conditions and for those working eight hours or less.

When compared to a similar prevalence study , it is nearly identical to a study conducted among Asian elderly individuals aged ≥65 years, which reported a prevalence of 7% (20). This may due to relatively reviewed similar study settings and in older age studies stem from socio-demographic factors. The findings are also nearly consistent with the China Health and Retirement Study in 2016, which reported 8.1% of participants had symptomatic knee OA, with regional prevalence of 7% in the north-east,7.8% in the South-Central, 10.8% in the North-West (34). Similarly, a population-based cross-sectional study in Northern China found a prevalence of KOA of 10.3%, with 14.1% in women and 6.5% in men (15). The prevalence found in this study is also similar to a survey conducted in Spain, which estimated that the prevalence of knee pain suggesting OA in the general adult population is 10.2% (95% confidence interval 7.9-12.5) (31). In Cameroon, approximately 9.9% of patients in hospitals with musculoskeletal conditions were reported to have knee OA (30). This minimal difference may be due to sociodemographic variation between Cameroon and Ethiopian society, with a mean age of 56±10.7 years.

The prevalence of KOA in the present study was much lower than that reported in a meta-analysis from China, which found a pooled prevalence of 21.51% (14,15). An epidemiological survey in Gaoyu, rural China, reported a prevalence of 16.57% (10). In Beijing, the prevalence of KOA was 21.9% (22), while the South-West region reported a prevalence of 13.7% (34). These differences may be due to variations in socio-demographic patterns and available resources between Ethiopia and China. Additionally, a review at Shahid Sadoughi University in Iran reported a prevalence range of 20.5% to 68% (8). Likely due to differences in study design and socio-demographic factors.

The Fifth Korean National Health and Nutrition Examination Survey reported a prevalence of knee osteoarthritis (KOA) of 36.3% (33). This higher prevalence may be attributed to a larger sample size and the use of secondary data. In the U.S., a study found a prevalence of KOA at 33.6% (16), while an Indian epidemiological study reported a prevalence of 28.7% (37). In England, the prevalence of symptomatic KOA was 19.6% (12). These higher rates may be due to differences in socio-demographic pattern, resources available for detecting KOA, and the infrastructure for accessing medical care. A population-based study from a rural setting in South Africa reported a prevalence of KOA of 33.1% among individuals over 35 years old (30). In contrast, a study at Brazzaville University Teaching Hospital in Congo found a prevalence of 81%, which is the highest reported figure and may be attributed to a difference in study design (25). In Nigeria, two studies reported a point prevalence rate of KOA of 11.5% (12) and 16.3% in a rural Northeastern community (40). Additionally, at the University of Kinshasa in Congo, the prevalence of KOA was found to be 14.06% among participants with a mean age of 58.9±10 years (28). These differences may be attributed to better access to resources in the facilities used for diagnosis and treatment, as well as a higher mean age among participants. Generally, the analysis suggests that diagnosis made using imaging may overestimate the prevalence of knee OA when compared to self-reported and clinical diagnosis.

The prevalence found in the current study was higher than that reported in a community-based study in Canada, which accounted for 3.8% (16). This difference may be due to the nature of the community-based study and the lower mean age of participants, with a mean age of 52.5±16.5 years. The North and East regions of China reported the lowest prevalence of symptomatic knee OA at 5.4% and 5.5%, respectively, which is lower than the prevalence found in the current study. This discrepancy may be attributed to differences in socio-demographic patterns and available resources between Ethiopia and China. Additionally, the prevalence in this study is significantly higher than that reported in Burkina Faso, which was 0.5%. This lower prevalence in Burkina Faso is likely due to it being a case-specific study focused on HIV patients. The present prevalence is also higher than that reported in a study conducted in Tunisia, which found a rate of 4.4% among elderly primary care patients in rural areas (30). Generally, the data indicate differences in the prevalence of KOA between these regions; these variations may be related to factors such as ethnicity, environmental conditions, geography, or lifestyle.

Additionally, potential biases arising from differences in research methods and demographics may also impact the findings

In this study, age (40–54 years) was significantly associated with an increased likelihood of acquiring KOA, with an adjusted odds ratio of 130.628 (95% CI: 1.433–11.905) and a p-value of 0.034. This finding aligns with a cross-sectional descriptive survey conducted in a rural northeastern community in Nigeria, which found that KOA severity was significantly higher in participants aged ≤ 50 years compared to those aged ≥60 years (40). May be due to study design and settings. Additionally, a study of middle-aged individuals in China indicated a trend where the prevalence of KOA increased with age up to 70 years and slightly decreased in the oldest age groups (14). May be due to similar study settings. A Nigerian community-based study also showed a significant negative relationship between age and knee osteoarthritis (OA), with a p value less than 0.001 (31).

This finding is incongruent with two study in the U.S., which indicated that older age is strongly associated with knee OA (16, 29). as well as the Chingford study in East London (20).may be due to potential biases arising from differences in research methods and demographics may also impact the findings. A community-based study in Canada found that the prevalence of knee OA was strongly associated with age, with a p-value of <0.001 (17). Advanced age is also strongly associated with knee OA, according to a review from Shahid Sadoughi University in Iran (8). Similarly, a population-based study in northern China reported that the risk of knee OA increased with age (15). Another epidemiological survey in rural China and the China Health and Retirement Study in 2016 showed that the prevalence of knee OA increased significantly with age, with a p-value of <0.01 (10). Additionally, a survey in Spain indicated that elderly women are more frequently affected by knee OA. A cross-sectional study conducted at Sri Krishna Rajendra Hospital in Mysore, India, found that the prevalence of knee OA increases with age, with approximately 11% of all women over the age of 60 experiencing symptoms (25).

Another Indian epidemiological study also revealed age as an associated factor, with a p-value of 0.001(37). This may be due to the narrow age range of the population studied (40 to 65 years) and the extended study period. Based on a cross-sectional study in Nigeria, age was significantly associated with an odds ratio of 2.874 (95% CI: 1.294-6.381) (12). Age was also significantly associated with knee osteoarthritis (KOA), according to a systematic review conducted in England. May be due to sociodemographic differences. Conversely, a study conducted in a

district of Sweden indicated that age did not predict the occurrence of KOA (19). Due to their different feeding styles as well as different socio demographic pattern.

In this study, sex was significantly associated with knee OA, showing an odds ratio (OR) of 0.036 (95%CI: 0.003-0.465) and a p-value of 0.011. This finding is consistent with a review from Shahid Sadoughi University, which also indicated a strong association between sex and knee OA (8). According to an Indian epidemiological study, the female gender was found to be significantly associated with knee OA ($p = 0.007$) (37). May be the study incorporated a variety of nations in the country. In contrast, a population-based study in northern China reported that the risk of knee OA was reversed, with females having a 1.764 times higher risk than males (15). Furthermore, the Fifth Korean National Health and Nutrition Examination Survey (2010–2012) and a survey in Spain indicated that women were more frequently affected by knee OA (31,33). These differences may be due to various socio demographic and life style patterns. In contrast, an epidemiological survey in rural China reported no significant difference by sex (10). Similarly, a study in east London indicated that while sex was not a significant factor, it was identified as a precipitating factor (20). Likewise, a study conducted in a district in south-west Sweden found that sex didn't predict KOA. These may also due to the methodology they discover and study settings.

Based on working conditions, standing is significantly associated with the prevalence of knee OA, with an odds ratio (OR) of 0.043 (95% CI: 0.003–0.562) and a p-value of 0.016. This finding is consistent with an Indian epidemiological study, which reported that participants with sedentary jobs were significantly associated with a higher prevalence of knee OA ($p = 0.001$).
The prevalence was highest among participants with sedentary lifestyles, followed by those with a physically demanding lifestyle and an active lifestyle (37). According to a study among U.S. adults, there was no risk of knee OA by occupation but a separate analysis by sex revealed that among men, there was a significantly increased adjusted odds ratio (AOR) for manual labor occupations (29). Furthermore, working hours greater than eight hours were strongly associated with an odds ratio of 0.090 (95 CI: 0.008-0.965) and a p-value of 0.047. But it is in contrast with a study in china Taiwan which dictated that time length of occupation service was not significantly related. This discrepancy may arise from differences of the population's livelihood in occupation.

7. Conclusion

This study provides important insights into the prevalence and associated factors of knee osteoarthritis (OA) in Ethiopia. We found that the prevalence of knee osteoarthritis is 7.5%. Additionally, age (40-54 years), sex, standing work conditions and working more than eight hour are significantly associated with symptomatic cases of knee OA.

Bilateral knee osteoarthritis is more prevalent than unilateral knees. Additionally, pain during mobility emerged as the most common symptom, while reduced productivity was identified as the primary complication. The implications of these findings highlight the urgent need for targeted interventions and awareness programs, particularly in the elderly population, to improve mobility and quality of life.

8. Strength and Limitation of the study

One of the major strength of this study is its combined data collection, which allows for a more robust assessment of the complications associated with knee osteoarthritis (KOA) compared to other studies conducted in different countries. The combination of primary data collected through patient interviews and the review of medical records enhances the reliability of our findings. However there are limitations to consider. Although reviewing patients' medical records provided valuable information, it also posed challenges in obtaining all necessary details for a comprehensive analysis.

Additionally, applying the Kellgren**-Lawrence (KL) grading system of OA** method to classify and analyze KOA patients based on diseases severity was difficult due to the limited imaging data available. Furthermore, this research did not include assessments of quality of life for patients with knee osteoarthritis.

9. Recommendation

Based on our finding, we recommend that for the Ministry of health and Addis Ababa Public Health and Emergency Management Directorate to formulate a new policy aimed at reducing the magnitude and complications of KOA while increasing resources for diagnosis and treatment of this condition in the country.

We also recommend that health professionals prioritize accurate diagnose and provide comprehensive care for patients with KOA. Additionally, we urge responsible bodies to prepare health education and screening campaign to raise community awareness and facilitate early identification of case before they lead to disability.

A hospital based cross sectional study is recommended to further investigate why bilateral knoa is more prevalent than unilateral knoa and associated risk factors, associated disease comorbidity and diseases severity as well as applying Kellgren-Lawrence (KL) grading system for OA by directly assessing KOA patients.

With changing population demographics and the rise of non-communicable diseases, targeted public health strategies are urgently needed to address this growing epidemic in the aging population.

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11. Annexes

11.1. Annex A: Participant information sheet and informed consent form

My name is----------. I am working as a data collector for the study being conducted in Addis Ababa University by Sanni Semmagn on the assessment of the magnitude and associated factors of knee osteoarthritis among patients who visited orthopedic opd of the selected governmental hospitals in Addis Ababa, Ethiopia, in 2024. I am currently a student at Addis Ababa College of Health Science School of Medicine Department of Anatomy. I kindly request that you give me your attention to explain to you about the study and being selected as a study participant.

The study title is Assessment of magnitude and associated factors of knee osteoarthritis among orthopedic OPD patients in the selected government hospitals, Addis Ababa, Ethiopia, 2024.

Purpose of the study: The purpose of this research is to see the determinants of knee osteoarthritis in the selected governmental hospitals in Addis Ababa, Ethiopia, in 2024. The study will be helpful in determining the current level of KOA and contribute much to designing appropriate intervention strategies to improve the health of individuals. It also will serve as a reference for subsequent studies in the country.

Procedure and duration: To assess determinants of knee osteoarthritis, we invite you to take part in this project. If you are willing to participate in this project, you need to understand and give oral informed consent. Then after, you were given the self-administered questionnaire to give your response. You do not need to tell your name to the data collector, and all your responses and the results obtained were kept confidentially by using a coding system whereby no one will have access to your response. Risks and benefits: The risk of participating in this study is very minimal, but only taking 30 minutes of your time. There would not be a direct benefit for participating in this study. But your participation is likely to help us in assessing the magnitude and associated factors of KOA. Ultimately, this will help us to work on awareness creation and providing other interventions.

Confidentiality: The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular about an individual person or housing. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Contact address: If there are any questions or enquires any time about the study or procedures, please contact this address.

Principal investigator: sanni semmagn;

Email; abumuhamedsanni2215@gmail.com or phone 0909532184

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating, and the contact address for any queries. I have been given the opportunity to ask questions about things that may have been unclear. I will be informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature) as indicated below.

N.B this is to be signed face to face in the presence of the data collector. Please provide a copy of this signed consent to the participant. Identification code_____

Name of the data collector _____signature_____

Thank you for your cooperation

11.2. Annex B: English version questionnaire form

This questionnaire is prepared for collecting information on the magnitude and associated factors of knee osteoarthritis in the selected governmental hospitals in Addis Ababa, Ethiopia. We would like to inform you that the privacy of the respondent will be protected, and we will also request that you answer kindly because your answer is important in the whole research and to determine the outcome of the study.

Thank you so much for your willingness.

1. Participant's code number: _____

2. Date of interview: _____dd/_____mm/2016 E.C.

Part one: Sociodemographic characteristics

No.	Characteristics	Responses	Skip to
1.1	How old are you?	Age in completed years_____	
1.2	What is your sex?	1. Female 2. Male	
1.3	What is your religion?	1.Orthodox 2.Protestant 3.Muslim 4. Others specify	
1.4	What is your current marital status?	1.Single 2.Married 3.Divorced 4. Widowed	
1.5	What is your family size?	_____	
1.6	Where did you come from?	1. urban 2. Rural	
1.7	What is your level of education?	1. Unable to read and write 2. Primary 3. Secondary 4. College & above	
1.8	What is your occupation?	1. government employee 2.private employee 3.house wife 4. pension 5. farmer 6. Others specify…	
1.9	With whom you are living now?	1. With family/ mother and father 2. With relatives	

		3. With boy/girl friend 4. With peers 5. Others (alone, others)	

Part two:pathhological and genetic factores

no	questions	response	skip
2.1	What is your chief complaint?		
2.2	Have you knee osteoarthrities?	1.yes 2.no	
2.3	If yes what was its first symptom?	a.mechanical pain b.swelling c.crepitus d.mobility reduction e.knee deformity	
2,4	On which leg does the symptom occur?	1.right 2.left 3.both	
2.5	Is there any complication of KOA?	1 yes 2 no	
2.6	If yes what is it what is it?	1 Knee deformity 2 Other chronic disease 3 Reducing productivity	
2.7	Have you ever had previous injury on the affected leg?	1.Yes 2. no	
2.8	Does your family ever affected by such disease?	1.yes 2.no	
2.9	Have you chronic disease?	A, yes B, no	
2.10	If yes,what is it	A, HTN B, DM C, CHF D, other specify	
2.11	Is there health profesionals recommed to do sports for the improvement of the disease?	1.yes 2.no	
2.12	If yes what kind of sports?	A, running or jumpping B, weight lifting C, pullups/setup	
2.13	On which area they recommand?	A, asphalt/couble stone B, garden/grass area C,not recommended	

Part three:Behavioral and Biophysical charactreristics of the participant

No	**Questions**	**Response**	**Skip to**
3.1	What is your usual transportation mechanism?	A, by foot B, by bus C, taxi/automobile	

3.2	If you use a bus,what is your traveling status?	A, sitting B, standing	
3.3	Have you done physical exscercise regularly?	A, yes B, no	
3.4	If yes, what type of exercise?	A, running or jumpping B, weight lifting C, pullups/setup	
3.5	If you have done exercise,on which type of area?	A, asphalt/couble stone B, garden/grass area C,	
3.6	What is your working posture \condition?	A, bending B, standing C, static	
3.7	Working hours |day	A, >8 B, ≤8	
3.8	Have you ever smoking?	A, yes B, no	
3.9	If yes, what is your smoking status?	A, ex- smoker B, current smoker	
3.10	Have you ever drinking?	A,yes B, no	
3.11	If yes, what is your drinking status?	A, ex- drinker B, current drinker	
3.12	What is your sleeping hours?	A, ≥8 B, <8	
3.13	How is your sleeping situation	A, satisfy B, not bad C, insuficient	
3.14	What is your height?		
3.15	What is your weight?		

11.3 Annex C: Amharic questionnaire

የአማረኛ ቃለ-መጠይቅ

በጥናቱ ለሚሳተፉ የስምምነት ዉል እና አጠቃላይ መረጃ

አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ አናቶሚ ትምህርት ክፍል

ይህ መጠይቅ የተዘጋጀው ስለ ጉልበት ኦስትዮ አርትሪቲስ ብዛት እና ተያያዥ ጉዳዮች በአዲስ አበባ በተመረጡ የመንግሥት ሆስፒታሎች በአጥንት ክፍል ውስጥ ገብተው በሚታከሙ ታማሚዎች መረጃን ለመዳሰስ የተዘጋጀ ምርምር ነዉ።

ዉድ የጥናቱ ተሳታፊዎች!

ጤና ይስጥልኝ፣ስሜ _____ይባላል። በአሁኑ ወቅት በአዲስ አበባ ዩኒቨርሲቲ በአናቶሚ ትምህርት ክፍል የሁለተኛ ዲግሪ ተማሪ የሆነዉ_ሳኒ ሰማኝ አስናቀ ትምህርቱን እየተከታተለ ይገኛል።የሁለተኛ ዴግሪዬን/ዉን ለመጨረስ ይረዳ ዘንዴ ስለ ጉልበት ኦስትዮ አርትሪቲስ ብዛት እና ተያያዥ ጉዳዮች በአዲስ አበባ በተመረጡ የመንግሥት ሆስፒታሎች በአጥንት ክፍል ውስጥ ገብተው በሚታከሙ ታማሚዎች መረጃን ለመዳሰስ የተዘጋጀ ርዕሰ ጉዳይ ላይ ጥናት እያደረኩ እገኛለሁ።ጥናቱ አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ትምህርት ቤት አናቶሚ ትምህርት ክፍል የጸደቀ ነዉ። ስለሆነም ከላይ የተዘረዘሩት የጥናቱ ዓላማዎች ይሳኩ ዘንድ በእናንተ በኩል በእውነታ ላይ የተመሠረተና ትክክለኛ የሆነ መረጃ እንድትሰጡኝ እየጠየኩ ለቃለ መጠይቁ የምትሰጡኝ መልስ ግላዊ እና ስማችሁን ያላካተተ በመሆኑ በከፍተኛ ሚስጥራዊነት የሚጠበቅ ይሆናል። ከዚህም በተጨማሪ በጥናቱ

ላይ የምትሳተፉት በፍቃደኝነት ስለሆነ ካልተመቻችሁ ባስፈለጋችሁ ጊዜ ማቆም/ማቋረጥ መብታችሁ ነው። እርስዎ ጥያቄ በመመለስ ብትተባበሩኝ ለጥናቱ መሳካት የራስዎን ጉልህ ድርሻ ተወጡ ማለት ነው።

መጠይቁን ለመመለስ ፍቃደኛ ነሽ/ነዎት

1. አዎ 2. አይደለሁም

አመሠግናለሁ።

ጥናቱን የምሰራዉ፡ ሳኒ ሰማኝ

ስልክ ቁጥር፡ (+251)0909532184

ኢ-ሜል፡ abumuhamedsanni2215@gmail.com

የተሳታፊው ኮድ ቁጥር: _____

1. የቃለ መጠይቁ ቀን: _____ወር/_____አም/2024 G.C.

ክፍል አንድ. መሠረታዊና ማህበራዊ ጥያቄዎች

ተ.ቁ	ባህሪያት	ምላሾች	ይዝለሉ
1.1	ስንት አመትህ/ሽ ነው?	ዕድሜ በተጠናቀቁ ዓመታት _____	
1.2	ጸታ	1.ሴት 2.ወንድ	
1.3	ሃይማኖትህ ምንድን ነው?	1. ሙስሊም 2. ኦርቶዶክስ 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ	
1.4	አሁን ያለህበት/ሽበት የትዳር ሁኔታ	1.ያላገባ 2.ያገባ 3.የተፋታ 4.ባልየሞተባት/የሞተችበት	
1.5	የቤተሰብዎ መጠን ስንት ነው?		
1.6	ከየት ነዉ የመጣህ/የመጣሽ?	1. ከከተማ 2. ከገጠር	

1.7	የትምህርት ደረጃዎ ስንት ነው?	1. ማንበብና መፃፍ የማይችል 2.የመጀመሪያ ደረጃ 3. ሁለተኛ ደረጃ 4. ኮሌጅ እና ከዚያ በላይ	
1.8		1.የመንግስት ሰራተኛ 2.የግል ተቀጣሪ 3.የቤት እመቤት 4. ጡረታ 5.ገበሬ 6.ሌላ ጥቀስ	
1.9	አሁን ከማን ጋር ነው የምትኖረው/ሪ?	1. ከቤተሰብ/እናትና ከአባት ጋር 2. ከዘመዶች ጋር 3. ከባለቤቴ ጋር 4. ከጓደገኛ ጋር 5. ብቻየን	

ክፍል ሁለት፡የበሽታ እና የዘር ፋክተሮች

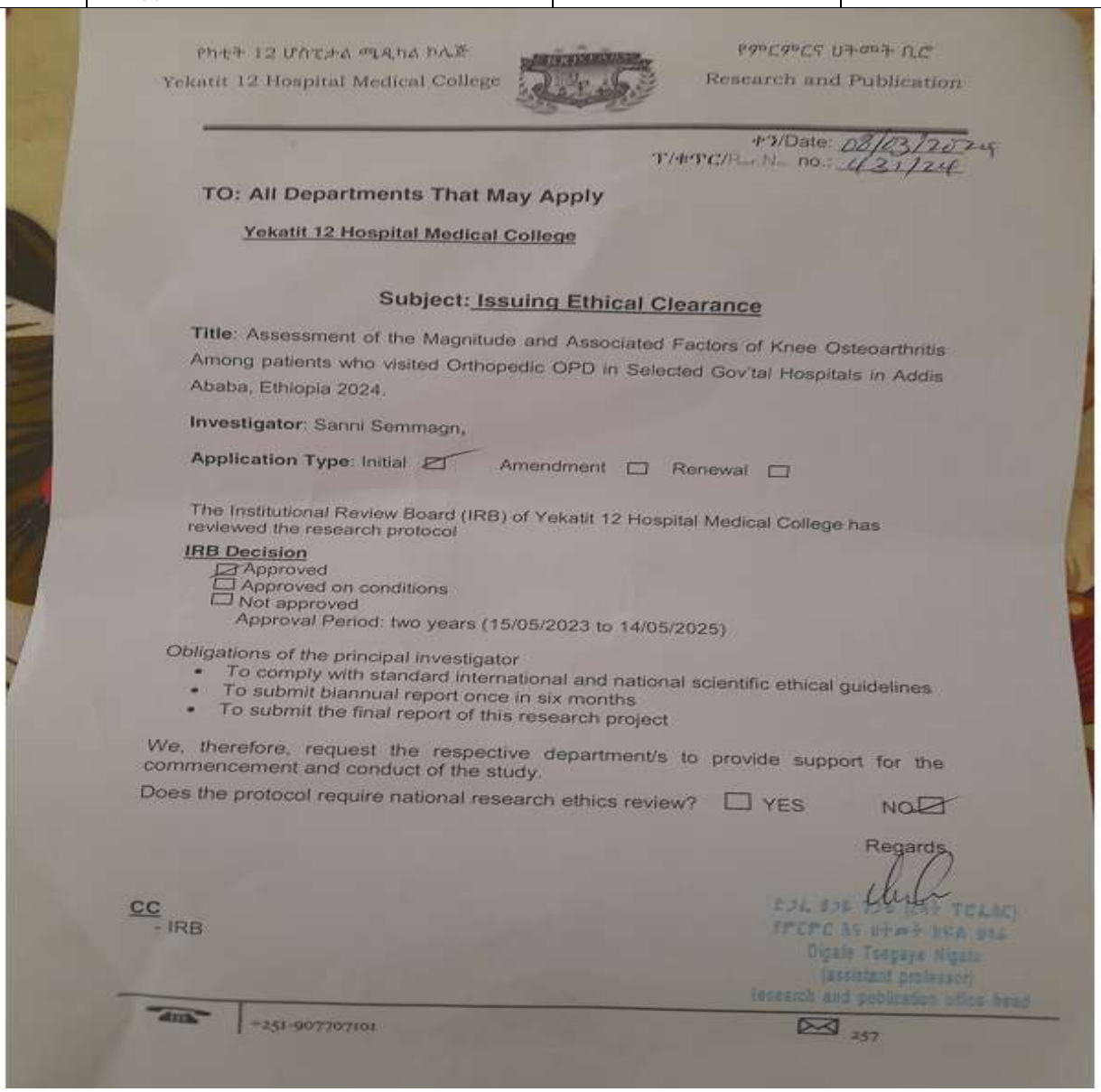
ተ.ቁ	ጥያቄዎች	ምላሽ	ይዝለሉ
2.1	የመጣህበት ምከናየት		
2.2	የጉልበት አስትዮአርትሪቲስ ህመም አለብወት?	1አዎ 2 የለም	
2.3	አዎ ካሉ የመጀመሪያ ምልክቱ ምን ነበር?	1.በእንቅስቃሴ ጊዜዉጋት 2. እብጠት 3. የግጭት ድምፅ 4.እንቅስቃሴ መቀነስ 5.የጉልበት ብልሽት	
2.4	ምልክቱ የትኛዉ እግር ላይ ተከሰተ?	1.ቀኝ 2.ግራ 3.ሁለቱም	
2.5	የጉልበት አስትዮ አርትሪቲሱ ያመጣዉ ዉስብስብ ነገር አለ?	1 አዎ 2 የለም	
2.6	አዎ ካሉ ምን?	1 የጉልበት ብልሽት 2 ሌሎች ተጉዳኝ በሽታዎች 3 ስራ ማስተጋጎል	

2.7	አመመህ እግር ላይ ከዚህ ቀደም ጉዳት ደርሶብህ ያዉቃል?	1.አዎ 2. የለም	
2.8	በዚህ አይነት ህመም ከቤተሰብ ታሞ የሚያዉቅ አለ?	1.አዎ 2. የለም	
2.9	የቆዩ ተያያዥ በሽታዎች አሉ?	1.አዎ 2. የለም	
2.10	አዎ ካሉ ምን አይነት በሽታ?	1.የግፊት 2.የሱካር 3.የልብ ህመም 4.ሌላ ይገለፅ	
2.11	የጤና ባለሙያዎች ለበሽታው መሻሻል ስፖርት እንድሰሩ መኪረዋል?	1.አዎ 2. የለም	
2.12	አዎ ካሉ ምን አይነት ስፖርት?	1.ሩጫ/ዝላይ 2.ክብደት 3.ፑል አፕ/ሴት አፕ	
2.13	በምን አአይነት ቦታ ላይ?	1.አስፋልት/ድንጋይ ንጣፍ ላይ 2. ባዶ ቦታ/ሳር ላይ 3.ምንም አልተባለ	

ክፍል ሶስት፡ የተሳታፊዉን አካላዊ እና በህሪያዊ ገፅታ በሚመለከት

ተ.ቁ	ጥያቄዎች	ምላሽ	ይዝለሉ
3.1	የተለመደ ጉዞህ/ሽ በምንድን ነዉ?	1.በግር 2 በባስ 3 በታክሲ	
3.2	በባስ የምትሄድ/ጂ ከሆነ በምን ሁኔታ?	1.በመቀመጥ 2 በመቆም	
3.3	በተከታታይ ስፖርት ትሰራለህ?	1.አዎ 2. የለም	
3.4	አዎ ካልክ/ሽ ምን አይነት ስፖርት?	.ሩጫ/ዝላይ 2.ክብደት 3.ፑል አፕ/ሴት አፕ	
3.5	በምን አይነት ቦታ ላይ?	1.አስፋልት/ድንጋይ ንጣፍ 2.ሳር ላይ	
3.6	ስራ ምትሰሩት በምን ሁኔታ ላይ ነዉ ?	1.በመታጠፍ 2.በመቆም 3. በመቀመጥ	
3.7	በቀን የስራ ስአትህ/ሽ ስንት ነው?	1. >8 2., ≤8	
3.8	አጭሰህ/ሽ ታዉቃለህ?	1.አዎ 2.አይደለም	
3.9	አዎ ካልክ/ሽ በምን ሁኔታ ላይ ነህ?	1.የበፊት አጫሽ 2.አሁን ላይ	
3.10	ጠጥተህ/ሽ ታዉቃለህ?	1.አዎ 2.አይደለም	

3.11	አዎ ካልክ/ሽ በምን ሁኔታ ላይ ነህ?	1.የበፊት ጠጭ 2. የአሁን ጠጭ	
3.12	የምኝታ ሰአትህ/ሽ ስንት ነዉ?	1. ≥8 2. <8	
3.13	የምኝታ እርካታህ/ሽ እንደት ነዉ?	1.አርኪ 2.መጥፎ አይደለም 3.በቂ አይደለም	
3.14	ቁመት		
3.15	ክብደት		



የካቲት 12 ሆስፒታል ሜዲካል ኮሌጅ
Yekatit 12 Hospital Medical College

የምርምርና ህትመት ቢሮ
Research and Publication

ቀን/Date: 08/03/2024
ፕ/ቁጥር/Ref. no.: 421/24

TO: All Departments That May Apply

Yekatit 12 Hospital Medical College

Subject: Issuing Ethical Clearance

Title: Assessment of the Magnitude and Associated Factors of Knee Osteoarthritis Among patients who visited Orthopedic OPD in Selected Gov'tal Hospitals in Addis Ababa, Ethiopia 2024.

Investigator: Sanni Semmagn,

Application Type: Initial ☑ Amendment ☐ Renewal ☐

The Institutional Review Board (IRB) of Yekatit 12 Hospital Medical College has reviewed the research protocol

IRB Decision
- ☑ Approved
- ☐ Approved on conditions
- ☐ Not approved

Approval Period: two years (15/05/2023 to 14/05/2025)

Obligations of the principal investigator
- *To comply with standard international and national scientific ethical guidelines*
- *To submit biannual report once in six months*
- *To submit the final report of this research project*

We, therefore, request the respective department/s to provide support for the commencement and conduct of the study.

Does the protocol require national research ethics review? ☐ YES NO☑

Regards,

Digale Tsegaye Nigatu
(assistant professor)
research and publication office head

CC
- IRB

+251-907707101

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St. Paul's Hospital Millennium
Medical College
Research Directorate

ቅዱስ ጳውሎስ ሆስፒታል
ሚሊኒየም ሜዲካል ኮሌጅ

Ref. No. Pm23/1171
Date: 23/04/2024

Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College (SPHMMC)

Ethical Clearance

Research Title: Assessment of the magnitude and associated factors of knee osteoarthritis among patients who visited orthopedic OPD in the selected governmental hospitals, Addis Ababa, Ethiopia, 2024

Principal Investigator Sanni Semmagn

The IRB of SPHMMC has reviewed the above mentioned research proposal and made the following decision:

- Approved:- x
- Approved with recommendation:- _____
- Approved on condition :- _____
- Disapproved:- _____

The decision is valid for 12 months and the research should be conducted in compliance with the protocol/proposal approved by the IRB of SPHMMC. Any subsequent revision/amendment of the protocol/proposal needs approval before conduct of the research. The researcher should also submit written summaries of the research status to the IRB every 03 months. Upon the conclusion of the study, manuscripts and thesis work to the final/completed research project needs to be submitted to the IRB.

IRB Chair:
Signature:
Date: Apirl 18, 2024
Cc:

Gadissa Bedada (PHD)
Research Directorate
Director

Federal Ministry of Health
St. Paul's Hospital Millennium Medical College

- Vice Provost for Academic and Research
- IRB
- Sanni Semmagn

Tel: +251112732639 P.O. Box: 1271 E-mail: irb@sphmmc.edu.et