

2022-09-09

Radiographic Patterns of Hip and Knee Osteoarthritis in Patients Visiting Orthopedic Clinic at Tibebe Ghion Specialized Hospital Bahir Dar, Ethiopia

Azmeraw, Birhan

<http://ir.bdu.edu.et/handle/123456789/14868>

Downloaded from DSpace Repository, DSpace Institution's institutional repository



**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCES SCHOOL OF MEDICINE**

DEPARTMENT Clinical Radiology

Radiographic Patterns of Hip and Knee

Osteoarthritis in Patients Visiting Orthopedic

Clinic at Tibebe Ghion Specialized Hospital

Bahir Dar, Ethiopia

By: Azmeraw Birhan (MD, RADIOLOGY RESIDENT)

**A THESIS SUBMITTED TO THE DEPARTMENT OF CLINICAL
RADIOLOGY, SCHOOL OF MEDICINE, COLLEGE OF MEDICINE
AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE SPECIALITY DEGREE IN CLINICAL
RADIOLOGY**

September, 2022

BAHIRDAR, ETHIOPIA

**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCES SCHOOL OF MEDICINE**

1	Thesis Title	Radiographic Patterns of Hip And Knee Osteoarthritis In Patients visiting Orthopedic Clinic At Tibebe Ghion Specialized Hospital Bahir Dar, Ethiopia
2	Name of investigator	Azmeraw Birhan (MD, Radiology Resident)
3	Address of Investigator	EMAIL: azmerawb05@gmail.com Phone: +251912345680
4	Name of Clinical advisor	Dr. Aklilu Tesega (MD, Assistant prof. of Radiology)
5	Name of public Advisor	Mr. Gebiyaw Wudie (Assistant prof. in Epidemiology)
7	Study Area	Tibebe Ghion Specialized Hospital Bahir Dar, Ethiopia
8	Duration of the Study	5 months (From February to June 2022)

September, 2022

BAHIR DAR, ETHIOPIA

Acknowledgment

First of all I would like to thank almighty God keeping me safe and his support in all of my activity. I would like to express my heart felts to Bahir Dar University Tibebe Ghion Specialized Hospital for giving me the chance to conduct a search about pattern of osteoarthritis in depth. I would like to express my deepest gratitude and respect for my advisors Dr Aklilu Tesega (MD, Assistant prof. of Radiology) and Mr. Gebiyaw Wudie (Assistant prof. in Epidemiology) for their devoted and unconditional help throughout my research work.

My heartfelt thanks also go to my instructors and all other members of the Department of Radiology and my fellow Residents

List of abbreviations

ACR: American College of Rheumatology

BDU: Bahirdar University

BMI: Body Mass Index

JSN: Joint Space Narrowing

OA: Osteoarthritis

PI: Principal Investigator

TGSH: Tibebe Gion Specialized Hospital

WHO: World Health Organization

Table of Contents

Contents

Acknowledgment	i
List of abbreviations.....	ii
Table of Contents.....	iii
<i>Abstract</i>	vii
1. Introduction.....	1
1.1 Back ground.....	1
1.2 Statement of the problem.....	3
1.3 Significance of the Study	4
2. Literature Review.....	5
3. Conceptual Frame Work	8
4. Objectives	9
4.1 General Objective	9
4.2 Specific Objectives	9
5. Material and methods.....	10
5.1. Study area and Study period	10
5.2 Study Design.....	11
5.3 source population	11
5.4. Study population	11
5.5. Inclusion and exclusion criteria	11
5.5.1 Inclusion Criteria	11
5.5.2 Exclusion Criteria	11
5.6. Study Variables.....	11

5.6.1 Dependent variables	11
Radiographic Pattern of Hip and Knee Osteoarthritis	11
5.6.2 Independent variable	11
5.7. Sample size determination	12
Sample size calculation for the first objective	12
5.8 Sampling technique	12
5.9. Operational definitions	13
5.10. Data Collection tools and data collection procedure	13
5.11. Data management and analysis	14
5.12. Data quality	14
5.13. Ethical Consideration	14
6. Result	15
1. Socio-Demographic Characteristic	15
2. Distribution in terms of Site of involvement, location and Radiologic manifestation	16
3. Pattern according to Compartment involvement in the knee and displacement in the hip of those with evidence of JSN	17
4. Chief complaint versus site of OA	18
5. Trauma versus knee compartment involvement	18
6. BMI distribution to pattern of OA of the study participants	19
7. Chronic illness versus types of joint involvement	19
8. Determinants of patterns of OA after adjusting for possible confounding factors	20
7. Discussion	22
8. Conclusion	23
9. Limitations of the Study	23
10. Recommendation	23

11. References	24
Information sheet and consent form	25
Annexes.....	26
ANNEX - I.....	26
Approval of Dissertation/thesis for defense.....	Error! Bookmark not defined.
Approval of Dissertation/thesis for defense result.....	Error! Bookmark not defined.

List of Figures

Figure 1: different patterns of hip and knee osteoarthritis	8
Figure 1: Chart showing distribution according to location of OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, Feb-June 2022	17
Figure 2: Chart showing distribution according to compartment of knee OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, February-June 2022	18

List of Tables

Table 1: Frequency distribution of sociodemographic variables of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, Feb-June 2022	15
Table 2: Frequency Distribution according to radiological manifestation of knee and hip OA in patients with knee and Hip OA in TGSH Hospital, Bahirdar, Ethiopia Feb-June 2022.....	16
Table 3: table showing trauma history according to compartment of knee OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, February-June 2022	19
Table 4: Distribution of BMI according to Knee and Hip OA patterns in patients presenting with knee and Hip OA in TGSH Hospital, Bahirdar, Ethiopia February-June 2022.....	19
Table 5: Multivariate logistic regression on determinants of joint side involvement and associated factors among Knee and Hip OA patients in TGSH Hospital, Bahirdar, Ethiopia February-June 2022	20

Abstract

Background; Osteoarthritis is the most common chronic rheumatic disorder in the world. It results in joint pain, tenderness and significant disability. Osteoarthritis of hip and knee is very important in terms of its public health significance. Significant morbidity and disability usually

results from osteoarthritis of these sites. Though osteoarthritis is common, the radiologic and socio demographic patterns vary among different studies. Delayed health seeking behavior of the community in our country makes the prevalence of osteoarthritis to be underestimated.

OBJECTIVE: The objective of this study is to determine the radiographic pattern of hip and Knee OA among in patients visiting orthopedic clinic at TGSB from Feb 2022 to June 2022.

Materials and Methods: Hospital based descriptive cross sectional study was conducted on 225 Hip and Knee Osteoarthritis patients in TGSB to determine the pattern of hip and knee OA.

Interviewer administered structured questioner was used in data collection. Data was cleaned for Completeness and then entered into SPSS version 25 manually then analysis was done.

Results: A total of 225 patients with Hip and Knee osteoarthritis were studied. 59.1% of the participants were female and 40.9% were male. Of these patients 163 had knee OA and 62 had Hip OA. The mean age was $45.67 \pm SD 13.607$ years. Among Knee OA Obese participants were 30 (18.4%) and 66 (40.49%) were overweight. Among Hip OA Obese participants were 8 (12.9%) and 35 (56.4%) were overweight. There were 106 (64.1%) participants with bilateral knee disease while 34 (54.8) had bilateral hip disease. Trauma history with AOR and 95% CI 27.038(12.200-59.926) was found to show significant association with unilateral joint involvement pattern.

Conclusion and recommendation: The study showed that Knee OA was more common than Hip osteoarthritis. MTF compartment and patellofemoral compartment involvement was more common compartment involvement. Females and middle aged were more commonly affected by OA. Majority of patients were obese and overweight. Educational status completed secondary and history of trauma were significantly associated with unilateral involvement pattern of osteoarthritis. We recommend population based study to be done on large sample size regarding prevalence and pattern of OA in Ethiopia and to evaluate the impact of obesity and trauma in the development of OA.

Key word: compartment, osteoarthritis, Hip and Knee osteoarthritis

1. Introduction

1.1 Back ground

Osteoarthritis (OA) is a highly prevalent disease affecting mainly knees, hips and hands. It has potentially devastating effects on health-related quality of life and will represent an increasing economic burden in the future (1). The Subcommittee on Osteoarthritis of the American College of Rheumatology Diagnostic and Therapeutic Criteria Committee defined osteoarthritis as "A heterogeneous group of conditions that lead to joint symptoms and signs which are associated with defective integrity of articular cartilage and related changes in the underlying bone at the joint margins" (2). The sites most commonly affected are the knee, lumbosacral, and cervical spine followed by the hip, ankle and wrist joints (3).

The clinical manifestations are joint pain, limitation of movement, tenderness, crepitus and variable degree of local inflammation. Pathologically OA is defined as a focal loss of articular cartilage in synovial joint with adjacent bone production changes like osteophytes and subchondral sclerosis. Basically it is a reaction to synovial injury. These changes start to be visualized by radiography when the severity increases (2).

The estimated population prevalence varies from 4-30%.The prevalence depends on the age, sex distribution and the disease definition. It estimated to be the fourth leading cause of disability in most countries worldwide. In fact its prevalence is increasing as populations are aging and obesity is increasing (4).

In Some studies done in Africa OA is the most common chronic rheumatic disorder. The reasons given were the increasing life expectancy. There were slight differences from western studies in terms of age, where earlier age is seen in African studies. However studies show similarity in sex pattern where female predominance is seen in both. Knee joint is also predominantly affected in these studies. However the burden of OA is estimated to be greater in African countries because treatments like arthroplasty and joint replacement are not as equally and as readily available (3, 5).

The most common joint sites affected by OA are spine, hand, hip and knee. From these OA of hip and Knee are most relevant in view point of public health, and especially based on their prevalence and associated disability. Knee OA is the most common form and it is associated with profound clinical and public health burden (3, 6).

It is difficult to diagnose OA. In fact it has remained mysterious for the clinicians and radiologists. This is because OA is a complex disease process with combination of systemic and local mechanisms resulting in characteristic pathological and radiologic changes which often but invariably associated with symptoms and disability. Definitions of osteoarthritis may therefore be based upon any combination of clinical features, radiographic changes and pathological findings, be it in joint tissue, synovial fluid or blood. The method should ideally be accurate, reproducible, noninvasive, convenient and relatively inexpensive. A radiographic system for assessing osteoarthritis would, if appropriately validated, meet these criteria (7, 8).

Radiography is commonly used in the evaluation for arthritis. The presence of osteophytes, bone sclerosis, and subchondral cysts and the absence of inflammatory features such as erosions suggest osteoarthritis. With regard to the knee joints, joint space narrowing is typically asymmetric and most commonly involves the medial tibio-femoral compartment, possibly with the patella-femoral compartment. Similarly, hip joint space narrowing is asymmetric, with superior migration of the femoral head more common than medial migration. Underlying acetabula dysplasia is associated with super lateral migration (7).

Osteoarthritis is usually described by its radiologic appearances. Severity may be graded based on the 0-4 scale developed by Kellgren and Lawrence in 1957. A Kellgren and Lawrence radiological OA score of 2-4 is still the most widely used definition of radiological OA in epidemiological studies. Because symptoms of OA are nonspecific there is no validated clinical definition of OA. The problem with only using radiological classification of OA is that it over estimates the burden of OA compared to the Clinical manifestations and disability status. Radiologic classification compared to the pathologic of OA underestimates the prevalence of OA because pathologic changes start to take place long before the radiologic changes manifest (9, 10).

1.2 Statement of the problem

Although OA occurs all over the world, the pattern of disease varies among populations. Studies describing the clinical pattern of OA in Ethiopian patients are lacking.

OA Patterns vary by age, sex, and BMI. With regard to age, it's more prevalent in older part of the population. The prevalence of OA increases as age increases because OA is a progressive non reversible disease. With regard to sex there are various different reports, but generally females are more frequently affected in older age groups and men are more affected on younger age groups, with exception of hip OA (3).

Ethiopia is a developing country where most of the populations' livelihood is agriculture, which is different from that of developed countries. However there is difference in occupation between the urban and rural part of the country. In Urban areas more people engage in sales and services than rural areas where most people living with agriculture (11). In recent years sedentary life style is increasing in the country where people are employed in sales and services is increasing. In recent years mortality in the country is declining and as the result life expectancy is increasing in the country (11). With the above mentioned reasons one can assume that the rate of osteoarthritis prevalence can be high. The other problem in our society is that peoples tend to delay decisions regarding going to treatment until the symptoms of their condition worsen, and most of the time people will not give attention to subtle problems unless they are incapacitating and this may aggravate their medical condition. Because of these factors, we can anticipate that the clinical pattern of OA could be different and the severity and pattern of OA would be different and greater than that of the Western world (15).

There are no adequate literatures done in Ethiopia because the Rheumatology service is not well developed in the country. So far there is limited data in Ethiopia on the pattern and prevalence of osteoarthritis and data exploring the prevalence and risk factors of OA are of paramount importance in establishing healthcare policies. Therefore, this study was conducted to assess the pattern of Osteoarthritis based on the two common sites, Knee and hip at TGSH Bahirdar.

1.3 Significance of the Study

TGSH is a tertiary hospital where people come from all over the Amhara Region and it will enable the medical community to see the difference in pattern of OA in those patients living in the cities and the rural regions.

Information obtained from this research of the pattern of the disease is important in planning for control and prevention and might contribute to a further understanding of the pathogenesis of the disease.

This study will serve as milestone for Minister of Health and other Governmental and non-governmental organization to particularly focus on intervention programs on Osteoarthritis focusing on the main risk groups.

These kinds of studies will also help as a source of reference for medical students, residents, seniors as a teaching purpose. It also serves as a comparison point and reference for anyone who likes to do a research on this area.

2. Literature Review

Osteoarthritis is one of the leading causes of morbidity in the world. It is the most common joint pathology in the world, accounting for 10-20% of population. The most commonly involved joints are the knee, hip, hands and spine. From these the commonest joint involved is the knee, followed by the hip in some studies or followed by spine in others (12).

Patterns of OA affected by obesity, previous joint trauma and related to occupational load on the joint. Previous trauma has association with unilateral pattern of joint OA. The mean BMI of OA patients is in the overweight and obese group. Obese and overweight patients predominantly have hip and knee arthritis and usually in this population bilateral OA is observed (5, 13).

The pattern of involvement of joints affected by OA, however differ in different parts of the world owing to differences in genetics and occupational status. For example primary OA of hip is rare in black American studies and west African studies while it has higher prevalence in east African studies and western studies (3).

The prevalence of OA in African studies showed variable results, some showing low prevalence while others show high prevalence. For example a research done by H.A Nouretal assessing patterns of knee, hip and hand OA in Kenyatta National Hospital show only 9.8% prevalence (5). However there are few studies done on OA in Africa. From these studies most of them confirm to the western OA pattern. Knee OA being first followed by hip and hand OA. Knee OA was very common and the majority of the patients were overweight and obese. These findings were seen in both eastern and western African studies. And mostly the joint findings were mono-articular (3).

The age range of OA varies between different populations. Most western studies show age range between 60-70 years. However lower age ranges are seen in African studies most patients being the mean age around 50 years and the range from 30 to 70 years. This might be attributable to the younger mean age of the population (3). A common observation with regard to age is that there is increase in prevalence directly proportional to age. The reason given for this is being the irreversibility and progressive pattern of the disease. This holds both for small joints and for large weight bearing joints and for both men and women (14). Some studies show that symptomatic OA occurs in later age, while radiological manifestations of the disease manifest at earlier age, so can see incidental radiological OA without any clinical presentation (7).

The pattern of OA with regard to Sex also varies among different populations. Hip OA is most often seen in men, while small joints of the hands, tarsometatarsal, and lateral metatarsophalangeal joints of the feet and both knees were more often involved in women of all ages (15). Another study also showed females have higher knee OA prevalence. The mean age of OA in females is slightly lower than in men (16).

The other risk factors trauma and occupation are also well proven in many researches. Trauma was implicated especially in knee OA of men. Most female OA patients were engaged in domestic work and trading, while males were involved in unskilled labor and farming (13). Less Hip OA was observed in patients who usually carry or lift objects in their day to day activities (16).

As has been discussed above knee OA is the commonest OA pattern in terms of joint involvement. Knee OA prevalence varies from place to place and it ranges from 7-20%. Like the other types of OA it is more common in females. And the prevalence increases with age, observed in mid to older age group (from 40-70years of age) (13). Knee OA has bilateral pattern in 45-85% of patients. And in about 60% it involves at least two compartments (10).

From the three compartments of the knee joint the medial tibiofemoral joint compartment and patellofemoral compartment are more commonly affected. Medial tibiofemoral compartment

is the most commonly affected. However in females lateral tibiofemoral compartment is more affected than in men (15).

The definition of knee OA considers presence of osteophytes and joint space narrowing. However from the two the most sensitive one is presence of osteophytes. Also the presence of osteophytes goes with the severity of the patients clinical symptoms. Presence of Patellofemoral joint osteophyte is more sensitive but less specific than presence of tibiofemoral joint osteophyte (15, 17).

From occupation groups highest knee OA prevalence was observed in farmers followed by traders. Other risk factors identified were heavy lifting, prolonged walking, kneeling for prayers, squatting and frequent bending and childhood rickets. Another risk factor for knee OA is obesity. Overweight and obese patients have propensity for bilateral knee joint involvement. From the risk factors obesity is a modifiable risk factor (15). Trauma was a significant risk factor of Knee OA in Caucasian studies, but in African studies it was less significant (9).

With regard to Hip Osteoarthritis it's said to primary hip OA was higher for men before 50 years and after 50 higher in females as found on one article with the following finding: mean prevalence of radiographic primary hip OA was higher for men in two of three age groups before 50 years (i.e., 40–44 years, 45–49 years) but in only three of eight age groups after age 50 years (i.e., 55–59 years, 60–64 years, 70–74 years). The higher incidence of hip OA in women after age 50 years may be related to hormonal changes from menopause (18).

The problem that we might expect in doing such researches regarding pattern of osteoarthritis are lack of well documented data, as found out in a research published in Netherlands. The conclusion of the research was that the only data that could be compared from a reasonable number of surveys were the radiological data. Data on body mass index, pain, limitation of movement, bone mass are not available from most of the populations (14).

3. Conceptual Frame Work

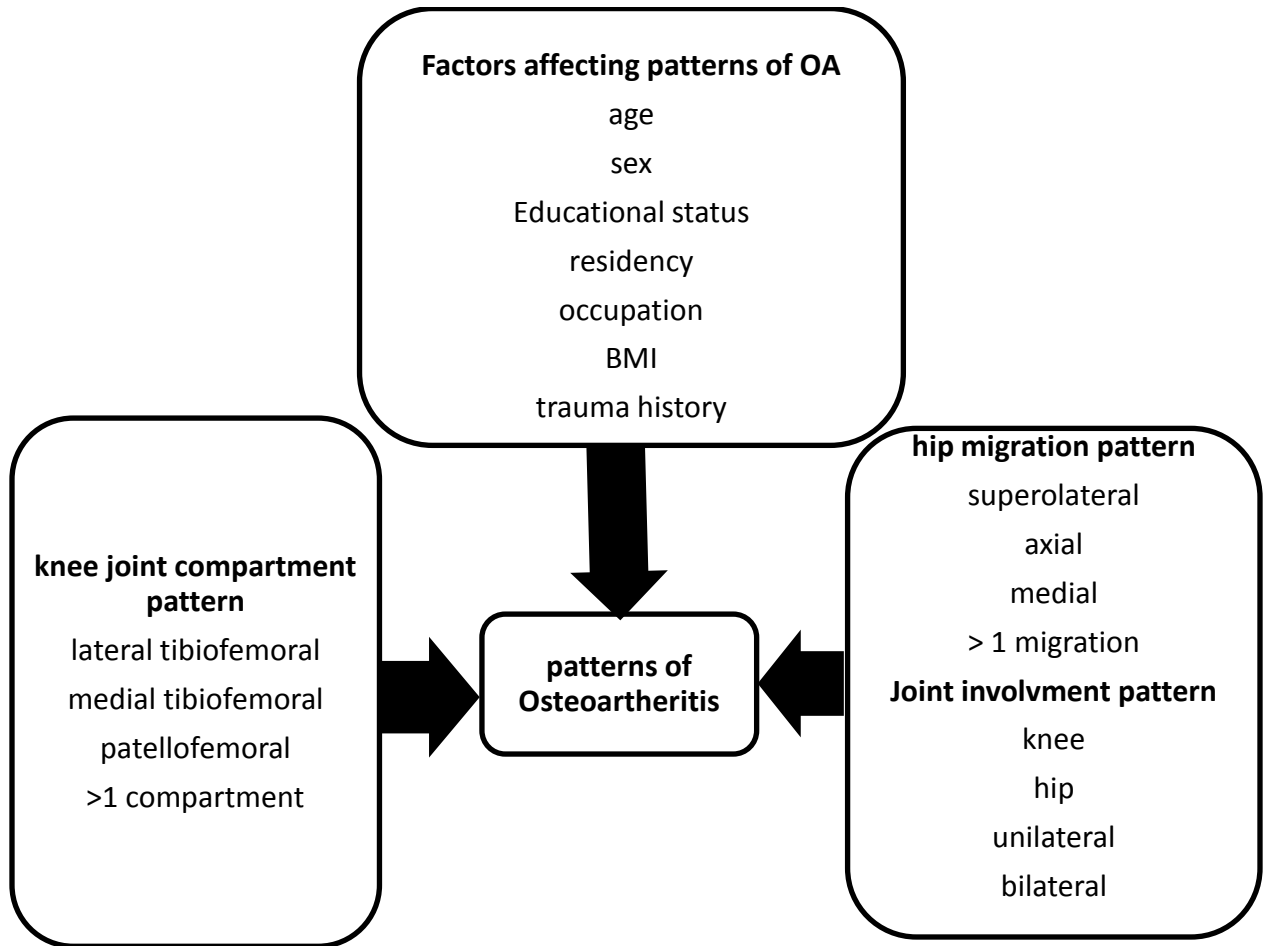


Figure 1: different patterns of hip and knee osteoarthritis

4. Objectives

4.1 General Objective

- To assess the radiological patterns of OA of Hip and Knee in TGSJ from February 2022 to June 2022.

4.2 Specific Objectives

- To determine the radiological pattern of OA based on anatomical location
- To determine the patterns of OA based on compartment on knee and migration on hip
- To identify the factors associated with radiological patterns on OA.

5. Material and methods

5.1. Study area and Study period

The study was conducted at Tibebe Ghion Specialized Hospital, found in Bahir Dar which is the capital city of Amhara regional state and 578km North West from Addis Ababa with an altitude of 1799 meters above sea level with warm and temperate climate. The total population of the city is 168,899 as per 2018 world population review. The city has 3 sub cities and 16 Kebeles. The city has two referrals, one district hospital, 4 private hospitals, six higher clinics and health centers owned by government and private sectors. TGSB is under Bahir Dar University College of Medicine and Health Sciences; about 10km south from the city center on the way to Adet District and about 23 km from the Blue Nile Falls.

The college provides health care at Tibebe Ghion Specialized Hospital (TGSB), a 500+ bed and serving more than 8 million peoples from parts Amhara and Benshangul Gumuz as in patient and outpatient treatment. Currently the college is giving clinical service in 15 primary and general hospitals in 8 different zones (West Gojjam, East Gojjam, Awi, North Gondar, South Gondar, South Wello, North Wello and North Showa) by assigning general surgeons, gynecologist/obstetricians, internists and pediatricians. The radiology department has 11 consultants, 31 residents and 9 radiology technicians [From BDU College of Medicine and Health Sciences website](19).

The study was conducted from February 2022 to June 2022.

.

5.2 Study Design

Hospital based cross sectional study design was used.

5.3 source population

All hip and knee Osteoarthritis patients visited orthopedic department, TGS

5.4. Study population

The study populations were all sampled patients who have visited orthopedic department with diagnosis of Osteoarthritis of Hip and knee from February 2022 to June 2022.

5.5. Inclusion and exclusion criteria

5.5.1 Inclusion Criteria

All patients who were visited orthopedic clinic with diagnosis of Osteoarthritis of Hip and knee and who have appropriate radiographs done.

5.5.2 Exclusion Criteria

Any erosions and/or per articular osteopenia was disregarded.

5.6. Study Variables

5.6.1 Dependent variables

Radiographic Pattern of Hip and Knee Osteoarthritis

5.6.2 Independent variable

- Age
- Sex
- Occupation
- BMI
- Compartments affected
- Residence
- Educational status

- History of trauma

5.7. Sample size determination

Sample size calculation for the first objective

The sample size is determined using the single population proportion formula. The three common factors to be taken into consideration for determining sample size are level of significance (α), margin of error (d) and estimated baseline level, of the indicator to be measured (p). Then, the initial sample size (n_0) is given by

$$n_0 = \frac{z_{\alpha/2}^2 \times p(1-p)}{d^2}$$

Where

N- Sample size

p- Proportion

Z- Level of confidence

d= margin of error

Taking p value of 50 %, the sample size becomes 384. The estimated study population is 440 and using correction formula it becomes 205 and adding 10% non-respondent rate: the total sample size was 225.

5.8 Sampling technique

Systematic random sampling was used as sampling technique. K value is calculated from the study population to sample size as 2. The first sample was taken by chance then other samples were taken with interval of 2.

5.9. Operational definitions

Unilateral: only the knee or hip is affected by osteoarthritis

Bilateral: when both knee or both hips are affected by osteoarthritis.

Uni-compartmental: when only medial tibiofemoral or lateral tibiofemoral or patellofemoral compartment is affected by osteoarthritis.

Bi-compartmental: when two the compartments are affected by osteoarthritis.

Tri-compartmental: when all the compartments are affected by osteoarthritis

BMI: BMI was calculated as weight in kilograms divided by height in meters squared, and BMI categories were defined as: underweight/normal ($\text{BMI} < 25$); overweight ($25 \leq \text{BMI} < 30$); obese ($30 \leq \text{BMI}$).

Radiography: is an imaging technique using X-rays to view the internal form of an object.

Standard Views:

For knee Radiograph: Appropriate AP and Lateral radiograph of the knee

For Hip Radiograph: Appropriate AP radiograph of Hip/Pelvis, Frog leg lateral view.

5.10. Data Collection tools and data collection procedure

Structured checklist was developed based on study objectives and available literature. The data was collected by trained 3rd year radiology residents using checklist. One-day training was given on how to collect data. All patients who are eligible with osteoarthritis of hip and knee who are visiting orthopedics department and voluntaries were interviewed.

5.11. Data management and analysis

Data entry and analysis was performed using SPSS version 25. Simple tabulation and descriptive statistics using cross tab and frequency table was used to look for the pattern of osteoarthritis. Both bivariate and Multivariate logistic regression was done. All variables in the bivariate analysis with p value less than 0.25 were entered in to multivariate logistic regression. Independent variables having a p value less than 0.05 in the analysis was considered as a significant association to that pattern and Hosmer and Lemeshow test at p value 0.9 shows the model were fitted.

5.12. Data quality

Pretesting of the questionnaire was done on 12 respondents to check the orders and the completeness of the tool then the participants were asked permission for interview and to measure their weight and height then the radiograph was read by senior radiology residents or the seniors report taken from the request sheet. After interview and filling the tool each checklist was checked for completeness. After entering the data in SPSS, the data was examined for possible data processing errors.

5.13. Ethical Consideration

Before conducting the study, ethical approval letter from Bahirdar University College of medicine and health science and permission letter from TGSH were taken. Oral informed consent obtained before the interviewing. The participants of the study were told that they can discontinue whenever they want. During the data collection procedure, the patient privacy and confidentiality was kept to the maximum by collecting data anonymously.

6. Result

1. Socio-Demographic Characteristic

Two hundred twenty five patients with knee and Hip OA were included in the study making response rate 100%. Out of the 225 patients Assessed 133 (59.1%) was females. The mean age study participants were $45.64 \pm \text{SD } 13.609$ years. From the study participants 69 (30.7%) was completed primary school. Out of 225 patients assessed 154 (68.4%) were from rural area. 99 (44%) of the study participants are daily labor workers. (Table 1)

Table 1: Frequency distribution of sociodemographic variables of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, Feb-June 2022

Variable	Category	Frequency	Percent
Age		$45.64 \pm \text{SD } 13.60$	
Sex	Male	92	40.1%
	Female	133	59.1%
Education	Unable to read and write	39	17.3%
	able to read and write	22	9.8%
	complete primary school	69	30.7%
	complete secondary school	45	20.0%
	college and above	50	22.2%
residency	Urban	71	31.6%
	Rural	154	68.4%
Occupation	Merchant	31	13.8%
	Farmer	18	8.0%
	Daily labor	99	44.0%
	Teacher	22	9.8%

	Housewife	42	18.7%
	Other	13	5.8%

2. Distribution in terms of Site of involvement, location and Radiologic manifestation

Out of the 225 patients assessed 163 (72.4%) had Knee OA and 62 (27.6%) had HIP OA.

89 (39.6%) of patients had osteophyte and joint space narrowing and 75 (33.3%) had osteophyte, sclerosis and joint space narrowing. (Table 2)

According to location of knee OA: 106 (64.1) had bilateral involvement and 57 (35.9) had unilateral involvement.

With regard to Hip OA: 34 (54.8%) patients had bilateral and 28 (45.2%) had unilateral hip joint involvement. (Figure 1)

Table 2: Frequency Distribution according to radiological manifestation of knee and hip OA in patients with knee and Hip OA in TGSH Hospital, Bahirdar, Ethiopia Feb-June 2022

Radiological finding	Frequency	Percent
Osteophyte	7	3.1
osteophyte, sclerosis and JSN	75	33.3
osteophyte and sclerosis	8	3.6
JSN and osteophyte	89	39.6
sclerosis, JSN, subchondral cyst, osteophyte	4	1.8
JSN, subchondral cyst, osteophyte	9	4.0
JSN, subchondral cyst, osteophyte, sclerosis	15	6.7
sclerosis, JSN, loose body, osteophytes	15	6.7
all findings	3	1.3
Total	225	100.0

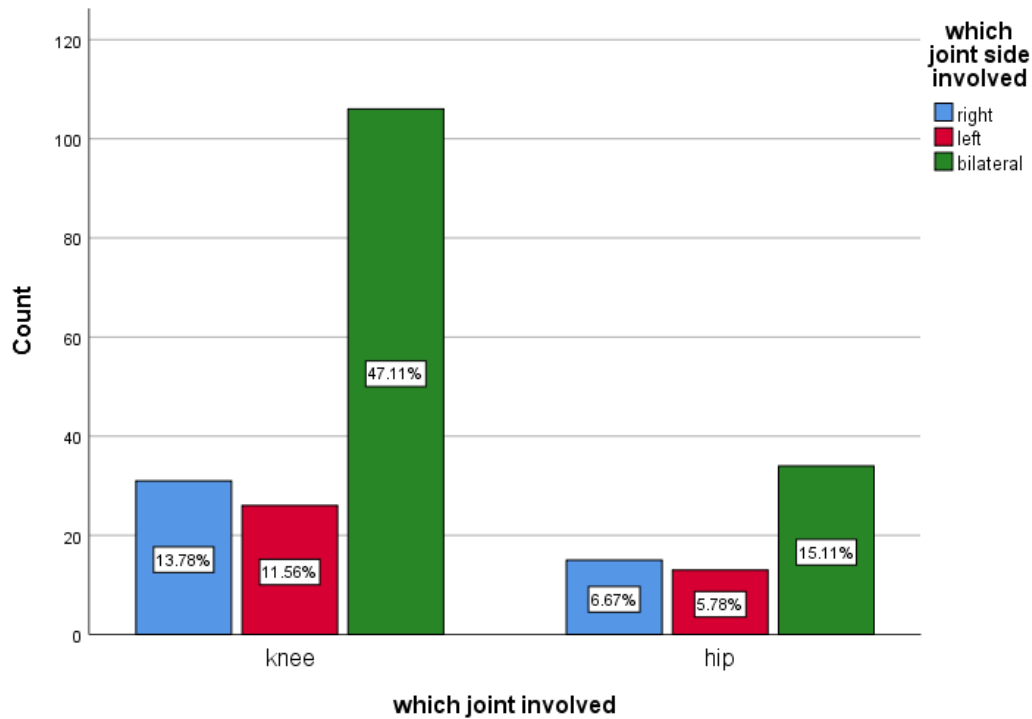


Figure 1: Chart showing distribution according to location of OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, Feb-June 2022

3. Pattern according to Compartment involvement in the knee and displacement in the hip of those with evidence of JSN

From 163 total patients with knee OA, 152 had evidence of Joint space narrowing. From the 152 total patients with joint space narrowing: 54 of them (35.5%) had MTF and patellofemoral compartment involvement, 46 (30.2%) had MTF involvement and 21 (13.8%) had evidence of MTF and LTF involvement. (Figure 2)

From 62 total patients with Hip OA, 57 had radiologic evidence of Joint space narrowing. 30 (52.6 %) of them had superolateral JSN, 21 (36.8%) of them had Superomedial (Axial) JSN, 4 (7%) of them had axial migration and 3 (5.2%) had medial migration.

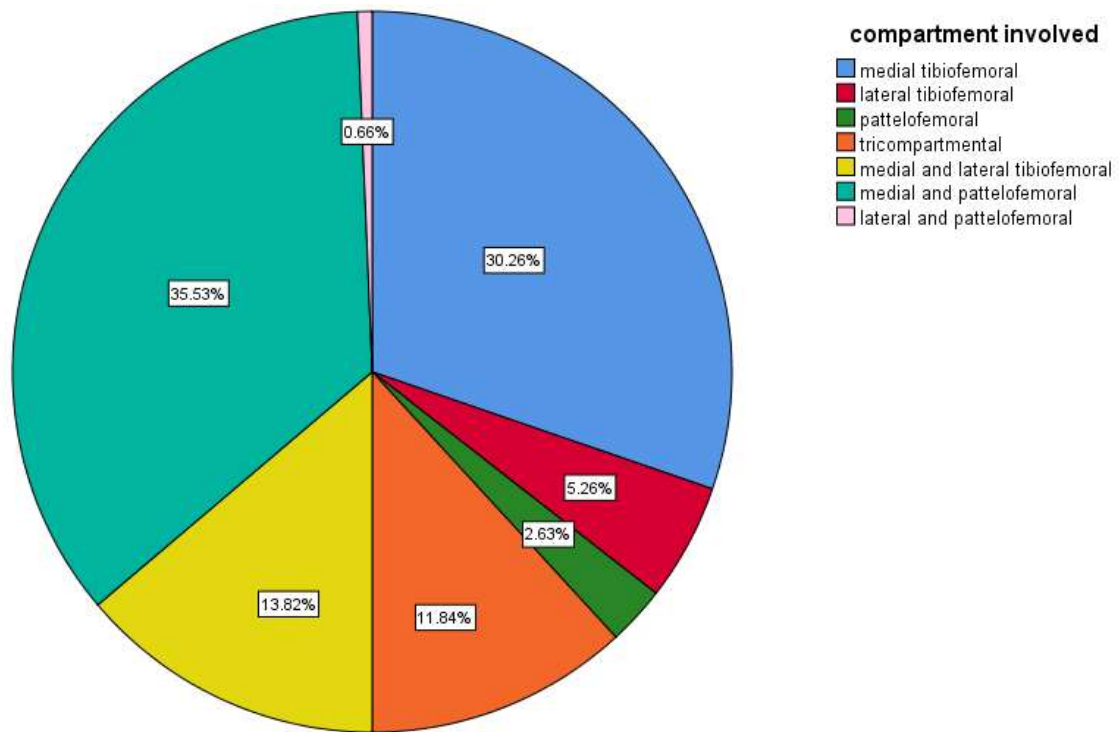


Figure 2: Chart showing distribution according to compartment of knee OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, February-June 2022

4. Chief complaint versus site of OA

98 (60.1%) of patient with knee OA and 50 (80.6%) of patients with hip OA came with chief complaint of pain, 59 (36.2%) of patients with knee OA presented with pain and swelling, 9 (14.5%) of patients with hip OA presents with pain and deformity.

5. Trauma versus knee compartment involvement

25 (16.4%) of patients with pattern of medial tibiofemoral and patellofemoral have trauma history to the site. (Table 3)

Table 3: table showing trauma history according to compartment of knee OA of patients with diagnosis of Hip and Knee OA in TGSH Hospital, Bahirdar, Ethiopia, February-June 2022

History of trauma		yes	No	Total
Compartment involved	medial tibiofemoral	20	26	46
	lateral tibiofemoral	5	3	8
	patellofemoral	2	2	4
	Tricompartmental	6	12	18
	medial and lateral tibiofemoral	11	10	21
	medial and patellofemoral	25	29	54
	lateral and patellofemoral	1	0	1
Total		70	82	152

6. BMI distribution to pattern of OA of the study participants

From 140 patients with bilateral joint involvement pattern 91 (65%) patients were overweight and from 85 patients with unilateral joint involvement pattern 48 (56%) patients were overweight. (Table 4)

Table 4: Distribution of BMI according to Knee and Hip OA patterns in patients presenting with knee and Hip OA in TGSH Hospital, Bahirdar, Ethiopia February-June 2022

BMI		<18	18-24.9	25-29.9	>30	Total
Joint involvement pattern	Bilateral	5	44	65	26	140
	Unilateral	2	35	36	12	85
Total		7	79	101	38	225

7. Chronic illness versus types of joint involvement

Twenty four participants (10.7%) from 225 participants have chronic illness and 16 (66.66%) of patients had asthma, 5 (20.8%) of patients had hypertension, 2 (8.3%) of patients had diabetes and 1 (4.1%) of patients had RVI. More chronic illness occurs in Knee OA 20 (83.33%) than Hip OA 4 (16.66%).

8. Determinants of patterns of OA after adjusting for possible confounding factors

After Bivariable logistic regression done variables with p value less than 0.25 were included in multivariate logistic regression. Candidate variables for multivariate logistic regression include sex, residency, educational status, history of chronic illness, history of trauma and body mass index.

In multivariate logistic regression educational status and history of trauma were significantly associated with joint side involvement of osteoarthritis at p value less than 0.05

Patients who had history of trauma (AOR=27.034(95%CI, 12.20-59.93)) are 27 times more likely to develop unilateral osteoarthritis as compared to those who had no history of trauma.

Patients who completed secondary school (AOR=6.065(95% CI, 1.502-24.497) were 6 times more likely to develop unilateral joint involvement of osteoarthritis as compared to those who couldn't able to read and write.

No significant association was found between age, residency, presence of chronic illness and BMI and pattern of involvement. (Table 5)

Table 5: Multivariate logistic regression on determinants of joint side involvement and associated factors among Knee and Hip OA patients in TGSH Hospital, Bahirdar, Ethiopia February-June 2022

Variables	Category	Joint side		COR 95%	AOR 95%
		unilateral	bilateral		
Sex	Male	43	49	1.901(1.098-3.292)	2.193(0.938-5.126)
	Female	42	91	1	1
Residency	Urban	25	46	0.85(0.474-1.528)	0.495(0.172-1.420)
	Rural	60	94	1	1
Educational status	Unable to read and write	15	24	1	1
	Able to read and write	9	13	1.120(0.311-2.624)	2.011(0.424-9.544)
	Complete primary School	28	41	1.093(0.409-2.046)	1.173(0.389-3.537)
	Complete secondary school	9	36	1.420(0.943-6.625)*	6.065(1.502-24.497)*
	College and above	24	26	1.480(0.289-1.586)	1.268(0.299-5.367)

History of trauma	Yes	72	26	24.284(11.724-50.301)**	27.038(12.200-59.926) **
	No	13	114	1	1
History of chronic illness	Yes	8	16	0.805(0.329-1.971)	0.945(0.274-3.256)
	No	77	124	1	1
BMI	<18	2	4	1	1
	18-25	35	44	1.590(0.109-3.633)	1.168(0.105-12.968)
	>25	48	92	1.043(0.169-5.421)	1.734(0.160-18.787)

*, P=0.022, **, P=0.01

7. Discussion

The study was done on 225 patients with hip and knee OA. This study found that Knee OA (72.44%) was much more common than Hip OA (27.55%) which is comparable to study done in Nairobi (77% Knee OA, 15% Hip OA)(5) and in Nigeria (3).

Bilateral involvement was more common in knee than Hip OA. 65% of knee OA participants had evidence of bilateral involvement which was also similar to study done by Joana et al which found that involvement of bilateral knee is more common than unilateral involvement (85%) (9).

Knee Joint compartment involvement different articles published variable results whether MTF compartment or PTF compartment was more common (9, 15). The study found that MTF compartment was most commonly involved (85.27%) followed by PTF (50.6%) and LTF was the least (31.57%) compartment affected. Lateral compartment was least commonly affected in study done in UK by Joanaetal (9).

In our study Osteophytes were seen in all joints affected by OA. It was followed by Joint space narrowing, sclerosis, subchondral cyst and loose bodies respectively in both hip and knee OA. This was comparable to study done in UK (9).

Most participants in our study were daily laborers (44%) and Compared to Nigerian study where most were either traders (13). This may be because of most of our participants are from rural area and most of the participants are below completed primary school in educational status.

Regarding obesity and OA the study shows obesity and overweight were prevalent in patients with OA. In our study 58.89% of knee OA patients and 69.35% of Hip OA patients were either overweight or obese. This finding is similar to study done in Nigeria (3). and study done in Kenya (5) . The Mean BMI of knee OA was 28.4kg while Hip OA was 26.57kg in the study at Nigeria (3).

Trauma history at the site of OA with AOR and 95% CI 27.038(12.200-59.926) was found to show significant association with unilateral involvement pattern of joints. This is similar to studies done in Kenya and Nigeria there were association between trauma and being unilateral joint involvement OA(5, 13).

8. Conclusion

Knee and Hip OA was more prevalent in female, middle aged and elderly population.

Knee OA was more common than Hip OA. Most knee OA were bilateral compared to Hip OA.

The commonest radiologic manifestations of OA observed in the study was osteophyte followed by JSN, sclerosis, subchondral cysts and intra-articular loose bodies respectively.

Regarding knee joint compartment involvement MTF was the most common compartment affected followed by PTF and LTF.

Regarding Hip Joint migration, Superolateral migration was the most common pattern followed by axial and medial migrations.

Patients having educational status that completed secondary school and had history of trauma were significantly associated with unilateral joint involvement pattern of osteoarthritis.

9. Limitations of the Study

1. There was no control group to study associations especially obesity and trauma with development of knee and Hip OA
2. The study was done in specific joints which doesn't necessarily predict the true pattern of OA

10. Recommendation

1. We recommend population based study to be done on large sample size regarding prevalence and pattern of OA in Ethiopia.
2. We recommend studies to evaluate the impact of obesity and trauma in the development of OA.

11. References

1. Till Uhlig BS-C, Rikke Helene Moe & Tore Kristian Kvien. The burden of osteoarthritis: the societal and the patient perspective. future science group. 2010 7(6):605–19.
2. Deborah Hart TS, Peter Egger, David Coggon, Cyrus Cooper. Defining osteoarthritis of the hand for epidemiological studies: The Chingford Study. *Annals of the Rheumatic Diseases*. 1994;53:220-3.
3. Adebajo A. Pattern of osteoarthritis in a West African teaching hospital. *Annals of the Rheumatic Diseases*. 1991;50:20-2.
4. Deborah Symmons CM, Bruce Pflieger. Global burden of osteoarthritis in the year. 2000.
5. H.A. Nour M, G.O. Oyoo et al. PATTERNS OF KNEE, HIP AND HAND OSTEOARTHRITIS IN KENYATTA NATIONAL HOSPITAL. *East African Orthopaedic Journal*. 2013;7 53-7.
6. Moskowitz R. The burden of osteoarthritis: clinical and quality-of-life issues. *The American journal of managed care*. 2009;15:S223-9.
7. Jon A. Jacobson M, Gandikota Girish, MD, Yebin Jiang, MD, PhD, Brian J. Sabb, DO. Radiographic Evaluation of Arthritis: Degenerative Joint Disease and Variations. *RSNA*. 2008;248:727-47.
8. Petersson IF. Occurrence of osteoarthritis of the peripheral joints in European populations. *Annals of the Rheumatic Diseases* 1996;55:659-64.
9. Joanna Ledingham MR, Adrian Jones, Michael Doherty. Radiographic patterns and associations of osteoarthritis of the knee in patients referred to hospital. *Annals of the Rheumatic Diseases*. 1993 52 520-6.
10. Ziad M. Hawamdeh JMA-A. The Clinical Pattern of Knee Osteoarthritis in Jordan: A Hospital Based Study. *International Journal of Medical Sciences*. 2013;10(6).
11. EDHS. 2016.
12. Colin D. Mathers CS, Doris Ma Fat et al. Global Burden of Disease : Version 2 methods and results. WHO. 2002.
13. EBONG WW. Osteoarthritis of the knee in Nigerians. *Annals of the Rheumatic Diseases*. 1985;44:682-4.
14. JAN L C M VAN SAASE LKJVR, ARNOLD CATS , JAN P VANDENBROUCKE AND HANS A VALKENBURG. Epidemiology of osteoarthritis: Zoetermeer survey. Comparison of radiological osteoarthritis in a Dutch population with that in 10 other populations. *Annals of the Rheumatic Diseases*. 1989;48:271-80.
15. BARTON L. WISE JN, MEI YANG et al. Patterns of Compartment Involvement in Tibiofemoral Osteoarthritis in Men and Women and in Whites and African Americans. *Arthritis Care & Research*. 2012;64 (6):847–52.
16. Ronald Plotnikoff NK, Ellina Lytvyak. Osteoarthritis prevalence and modifiable factors: a population study. *BMC Public Health* 2015 15(1195):1-10.
17. Metcalfe AJ. Is Knee Osteoarthritis a symmetrical disease? Analysis of 12 year prospective Cohort study. *BMC Musculoskeletal Disorders*. 2012;12(153).
18. Simon Dagenais DC P, Shawn Garbedian MD, Eugene K. Wai MD, MSc. Systematic Review of the Prevalence of Radiographic Primary Hip Osteoarthritis. *Clin Orthop Relat Res* 2008;467:623–37.
19. contributors W. College Of Medicine and Health Sciences bahir dar university. 27 June 2020 19:04 UTC.

Information sheet and consent form

Introduction

My name is Azmeraw Birhan (MD, 3rd year radiology resident). I am a student at Bahirdar University who are doing a research as a partial fulfillment for the requirement of clinical radiology specialty degree in college of Medicine and Health science at Bahirdar University, department of clinical radiology. I will do patterns of osteoarthritis of hip and knee and I am going to ask some questions that are very important to assess the pattern and factors affecting patterns of osteoarthritis. Your name will not be written in this form and the information you give are kept confidential. If you do not want to answer all of or some of the questions, you do have the right to do so. However your willingness to answer would be appreciated.

Would you participate in the study?

Yes

No

Name of the data collector who sought the consent.....

Signature.....

Date of data collection

Annexes

ANNEX - I

QUESTIONNAIRE

1. Sociodemographic characteristics

- A. Age of the patient.....
- B. Sex of the patient: a. Male b. Female
- C. Occupation a. domestic work b. trading c. farming d. labor e. teacher
- D. education a. primary b. secondary c. college d. can't read and write
- E. residency a. urban b. rural
- F. any known chronic illness
- G. Weight.....
- H. Height.....
- I. BMI.....

2. Clinical manifestation

- A. Main complaint.....
- B. Which joint is involved? a. right b. left
- C. trauma history to site of the complaint

3. Radiological findings

- A. Findings a. sclerosis b. joint space narrowing c. subchondral cyst d. loose bodies
- B. Compartments a. medial tibiofemoral b. lateral tibiofemoral c. patellofemoral d. if more than one please specify.....for knee
- C. If any joint space narrowing? a. Superolateral b. Medial c. Superomedial/axial.....for hip

**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCES SCHOOL OF MEDICINE
DEPARTMENT OF CLINICAL RADIOLOGY**

Declaration

This is to certify that the thesis entitled “Radiological pattern of hip and knee osteoarthritis in patients visiting orthopedics department at TGSB”, submitted in partial fulfillment of the requirements for the specialty degree in clinical radiology Department of clinical radiology, Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Dr. Azmeraw Birhan

11/01/2015

Bahirdar

Name of the candidate

Date

Place

**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE
AND HEALTH SCIENCES SCHOOL OF MEDICINE
DEPARTMENT OF CLINICAL RADIOLOGY**

Approval of Dissertation/thesis for defense

I hereby certify that I have supervised, read, and evaluated this thesis/dissertation titled "Radiological pattern of hip and knee osteoarthritis in patients visiting orthopedics department at TGSB" prepared under my guidance. I recommend the thesis/dissertation be submitted for oral defense (mock-viva and viva voce).

1. Dr. Aklilu Tesega

Advisor's name



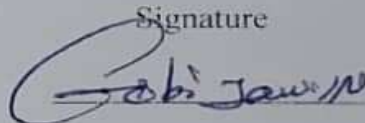
Signature

28/02/16

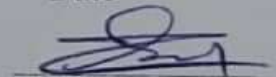
Date

2. Mr. Gebiyaw Wudie

Advisor's name



Signature



Date

