Chapter one

1.1 Introduction:

The **knee** Joint joins the thigh with the leg and consists of two articulation: one between the femur and tibia, and one between the femur and patella. It is the largest joint in the human body and is very complicated. The knee is a mobile trocho-ginglymus (a pivotal hinge joint), which permits flexion and extension as well as a slight medial and lateral rotation. The bony structures, ligament and tendons of the knee joint, Patella: protects quadriceps tendons as tendon move across the knee joint. The lateral and medial femoral condyles articulate with tibia. The lateral and medial tibia condayles are articulate with femoral condayles. The medial collateral ligament ”MCL” are provides stability to inner (medial) aspect of the knee. Lateral cruciate ligament “LCL” is provides stability to outer (lateral) aspect of the knee. The anterior cruciate ligaments “ACL” are limits rotation and the forward movement of the tibia. Posterior cruciate ligament “PCL” are limits backward movement of the tibia. The quadriceps tendons are connects the quadriceps muscle to the patella and provide power to extend the legend. The patella tendon are connecting the patella to the tibia. The menisci are act as shock absorbers.

Since in humans the knee supports nearly the whole weight of the body, it is vulnerable to both acute injury and the development of osteoarthritis, and it is one of the most frequency injured regions of the body, and knee injuries of both an acute and chronic nature constitutes a major cause of pain and disability of among the athletic and non athletic population.

Over the last decade, advances have been made in the treatment of the knee disorders of equal importance have been improved in the diagnosis of these disorders. (C.K.Warrick 1969)

MRI of the knee provides detailed images of structures within the knee joint, including bones, cartilage, tendons, ligaments, muscles and blood vessels, from many angles. Magnetic resonance imaging (MRI) is aNoninvasive medical test that physicians use to diagnose and treat medical conditions.MRI uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs, soft tissues, bone and virtually all other internal body structures. MRI does not use ionizing Radiation (x-rays).Detailed MR images allow physicians to evaluate various parts of the body and determine the presence ofcertain diseases. The images can then be examined on a computer monitor, transmitted electronically, printed or copied to a CD. (http://WWW.radiology Info.org)

1.2Problem of the Study:

Although the knee joint is the most important joint where it can carry the whole body weight, many problems may happen as pathological changes which may affect the joint space, therefore it needs a proper technique to demonstrate that joint, request for MRI of the knee joint are most often made when patients present with painful knee. This pain may be due to trauma or infection or inflammation complete clinical examination is not possible in such situation due to severe pain.

1.3 objectives of the study:

1.3.1 General objective:

The general Objective of this study is to characterization knee joint diseases use MRI in order to find the associated factors.

1.3.2Specific Objectives:

- To find knee joint disease using MRI.
- To find the frequencies of knee joint disease.
- To find the patient bodies characteristics (age, weight, height and occupation of gender).
- To cross-correlate between body characteristics and knee joint disease.
- To measure the joint space in coronal section.
- To correlate the measurements with patients age and BMI.

1.4 Research overview:

The research will fall in five chapters : chapter one deal with the introduction, objectives, problem ,where chapter two deal with literature review and previous studies ,chapter three deal with materials and methods where chapter four presents the results and five deal with discussion ,conclusion and recommendations.

Chapter two

Background and literature review

2.1 Anatomy of The Knee joint:

The knee is the most complicated and largest joint in our body. It's also the most vulnerable because it bears enormous weight and pressure loads while providing flexible movement. It is support 1.5 times our body weight; climbing stairs is about 3-4 times of body weight and squatting about 8 times.

The knee joint is a synovial joint which connects the femur, thigh bone and longest bone in the body, to the tibia, shinbone and second longest bone. There are two joints in the knee the tibiofemoral joint, which joins the tibia to the femur and the patellofemoral joint which joins the knee cap to the femur. These two joints work together to form a modified hinge joint that allows the knee to bend and straighten, but also to rotate slightly and from side to Side.

Anatomically allow describing the body clearly and precisely using planes, areas and lines there are Anterior facing the knee, this is the front of the knee, Posterior facing the knee, this is the back of the knee, also used to describe the back of the knee cap, that is the side of the kneecap that is next to the femur. Medial the side of the knee that is closest to the other knee, , the medial side of each knee would touch .Lateral the side of the knee that is farthest from the other knee (opposite of the medial side) Structures often have their anatomical reference as part of their name, such as the medial meniscus or anterior cruciate ligament. The medial meniscus would refer to the meniscus on the inside of the knee; the anterior crucial ligament would be on the anterior side (front) of the knee. (C.K.Warrick 1969)

2.1.1 Bones of the Knee joint:

The main parts of the knee joint are bones, ligaments, tendons, cartilages and a joint capsule, all of which are made of collagen. Collagen is a fibrous tissue present throughout our body. Due to age, collagen breaks down. Bone and cartilages are both connective tissues, with specialized cells called chondrocytes embedded in a gel-like matrix of collagen and elastin fibers. Cartilage can be hyaline, fibrocartilage and elastic and differ based on the proportions of collagen and elastin. The bones give strength, stability and flexibility in the knee. Four bones make up the knee Tibia commonly called the shin bone, runs from the knee to the ankle. The top of the tibia is made of two plateaus and a knuckle-like protuberance called the tibia tubercle. Attached to the top of the tibia on each side of the tibia plateau are two crescent-shaped shock-absorbing cartilages called menisci which help stabilize the knee.(www.healthpage.org/wp-content/uplaods/2012.07/knee-bones)

Patella the kneecap is a flat, triangular bone; the patella moves when the leg moves. The kneecap glides along the bottom front surface of the femur between two protuberances called femoral condyles. These condyles form a groove called the patellofemoral groove .Femur commonly called the thigh bone; it’s the largest, longest and strongest bone in the body. The round knobs at the end of the bone are called condyles. Fibula long, thin bone in the lower leg on the lateral side. (www.healthpage.org/wp-content/uplaods/2012.07/knee-bones)

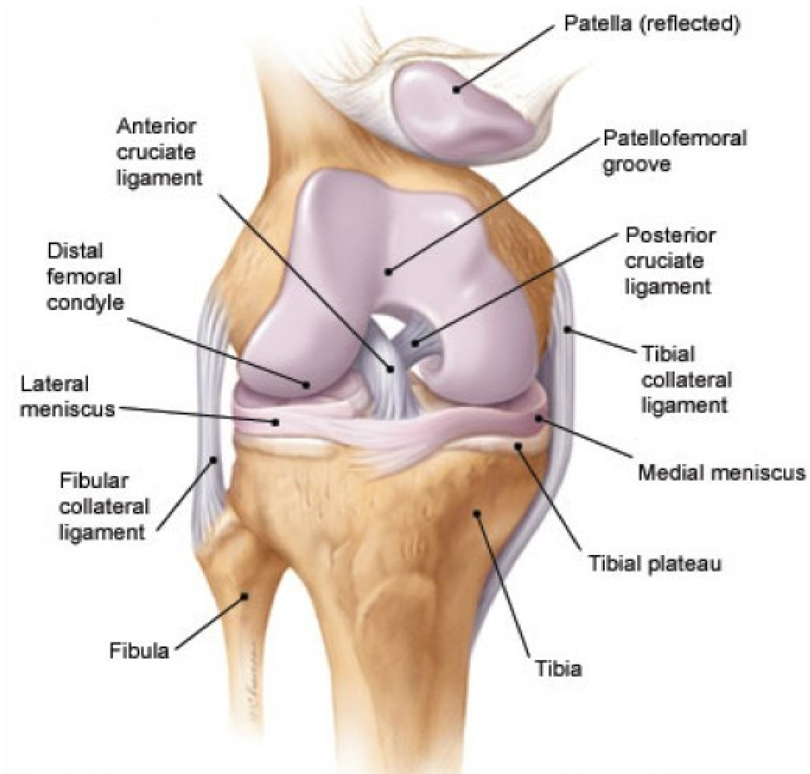


Figure (2.1.1) Bone Of The Knee

(www.healthpage.org/wpcontent/uplaods/2012.07/knee-bones)

2.1.2 Ligaments of The Knee joint:

The ligaments attach bones to bones and give strength and stability to the knee. There is Medial Collateral Ligament (tibia collateral ligament) attaches the medial side of the femur to the medial side of the tibia and limits sideways motion of knee. Lateral Collateral Ligament (fibular collateral ligament) attaches the lateral side of the femur to the lateral side of the fibula and limits sideways motion of knee. Anterior cruciate ligament attaches the tibia and the femur in the center of knee, Posterior cruciate ligament is the strongest ligament and attaches the tibia and the femur; it's also deep inside the knee behind the anterior cruciate ligament. It limits the backwards motion of the knee. Patellar ligament attaches the knee cap to the tibia; the pair of collateral ligaments keeps the knee from moving too far side-to-side. The cruciate ligaments crisscross each other in the center of the knee. They allow the tibia to “swing” back and forth under the femur without the tibia sliding too far forward or backward under the femur. Working together, the four ligaments are the most important in structures in controlling stability of the knee. There is also a patellar ligament that attaches the kneecap to the tibia and aids in stability. A belt of fascia called the iliotibial band runs along the outside of the leg from the hip down to the knee and helps limit the lateral movement of the knee. (www.healthpage.org/wp-content/uplaods/2012.07/knee-ligament)

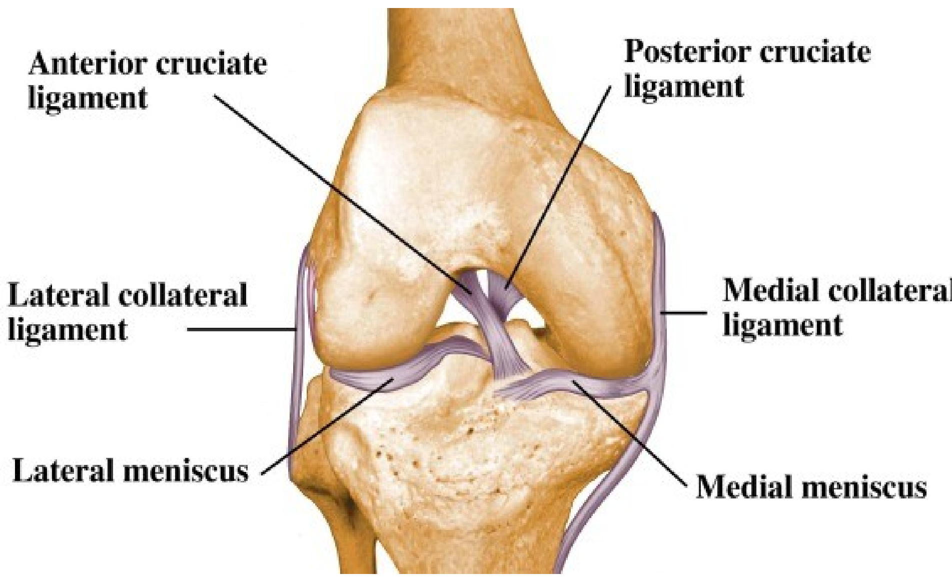


Figure (2.1.2) Ligaments of the Knee

(www.healthpage.org/wp-content/uplaods/2012.07/knee-ligament)

2.1.3 Tendons of The Knee:

Tendons are elastic tissues that technically part of the muscle and connect muscles to bones. Many of the tendons serve to stabilize the knee. There are two major tendons in the knee the quadriceps and patellar. Quadriceps tendon connects the quadriceps muscles of the thigh to the kneecap and provides the power for straightening the knee. It also helps hold the patella in the patellofemoral groove in the femur. The patellar tendon connects the kneecap to the shinbone (tibia) which meansit’sreallya ligament.

(www.healthpage.org/wp-content/uplaods/2012.07/knee-tendons)

2.1.4 Cartilage of the knee:

The ends of bones that touch other bones a joint are covered with articular cartilage. Articular cartilage is a white, smooth, fibrous connective tissue that covers the ends of bones and protects the bones as the joint moves. It also allows the bones to move more against each other. The articular cartilages of the knee cover the ends of the femur, the top of the tibia and the back of the patella. In the middle of the knee are menisci disc shaped cushions that act .medial meniscus made of fibrous, crescent shaped cartilage and attached to the tibia. Lateral meniscus made of fibrous, crescent shaped cartilage and attached to the tibia .articular cartilage is on the ends of all bones as shock absorbers. In the knee joint it covers the ends of the femur and tibia and the back of the patella. The articular cartilage is kept slippery by synovial fluid (which looks like egg white) made by the synovial membrane (joint lining). Since the cartilage is smooth and slippery, the bones move against each other easily and without pain. In the knee, the rubbery meniscus cartilage absorbs shock and the side forces placed on the knee. Together, the menisci sit on top of the tibia and help spread the weight bearing force over a larger area. Because the menisci are shaped like a shallow socket to accommodate the end of the femur, they help the ligaments in making the knee stable. Because the menisci help spread out the weight bearing across the joint, they keep the articular cartilage from wearing away at friction points. The weight bearing bones in the body usually protected with articular cartilage, which is a thin, tough, flexible, slippery surface which is lubricated by synovial fluid. The synovial fluid is both viscous and sticky lubricant. Synovial fluid and articular cartilage are a very slippery combination 3 times more slippery than skating on ice, 4 to 10 times more slippery than a metal on plastic knee replacement. Synovial fluid is what allows us to flex our joints under great pressure without wear. (www.healthpage.org/wp-content/uplaods/2012.07/knee-cartilage)

Figure (2.1.3) Cartilage of the knee

(www.healthpage.org/wp-content/uplaods/2012.07/knee-cartilage)

2.1.5 Muscles around the Knee:

The muscles in the leg keep the knee stable, well aligned and moving the quadriceps (thigh) and hamstrings. There are two main muscle groups, the quadriceps and hamstrings. The quadriceps are a collection of four muscles on the front of the thigh and are responsible for straightening the knee by bringing a bent knee to a straight position. The hamstrings are a group of three muscles on the back of the thigh and control the knee moving from a straight position to a bent.

(www.healthpage.org/anatomy-function/knee)

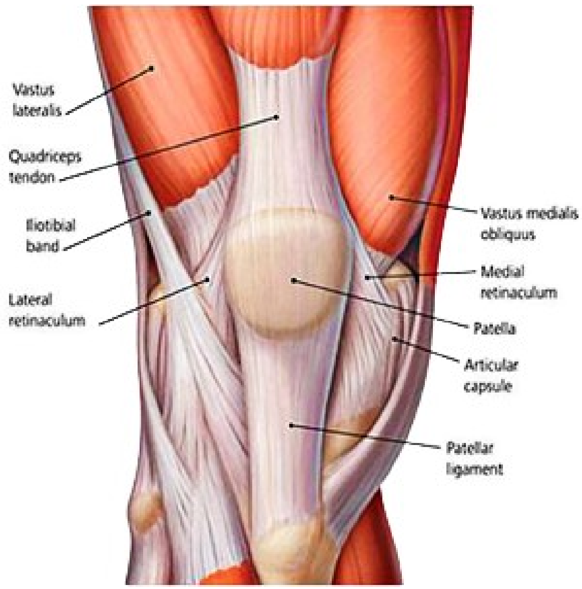


Figure (2.1.4) muscles Around the Knee

(www.healthpage.org/anatomy-function/knee)

2.1.6 The Joint Capsule:

The capsule is a thick, fibrous structure that wraps around the knee joint. Inside the capsule is the synovial membrane which is line by the synovial, a soft tissue that secretes synovial fluid when it gets inflamed and provides lubrication for the knee. (www.healthpage.org/anatomy-function/knee)

2.1.7 Bursa:

There are up to 13 bursa of various sizes in and around the knee. These fluid filled sacs cushion the joint and reduce friction between muscles, bones, tendons and ligaments. The prepatellar bursa is one of the most significant bursa and is located on the front of the knee. (www.healthpage.org/anatomy-function/knee)

2.1.8 Plaice:

Plaice are folds in the synovial. Plaice rarely cause problems but sometimes they can get caught between the femur and kneecap and cause pain. (www.healthpage.org/anatomy-function/knee)

2.1.9 Knee Arteries and Veins:

The knee joint received it is blood supply from branches of the femoral artery, the popliteal artery and the anterior tibia artery. (C.K.Warrick 1969)

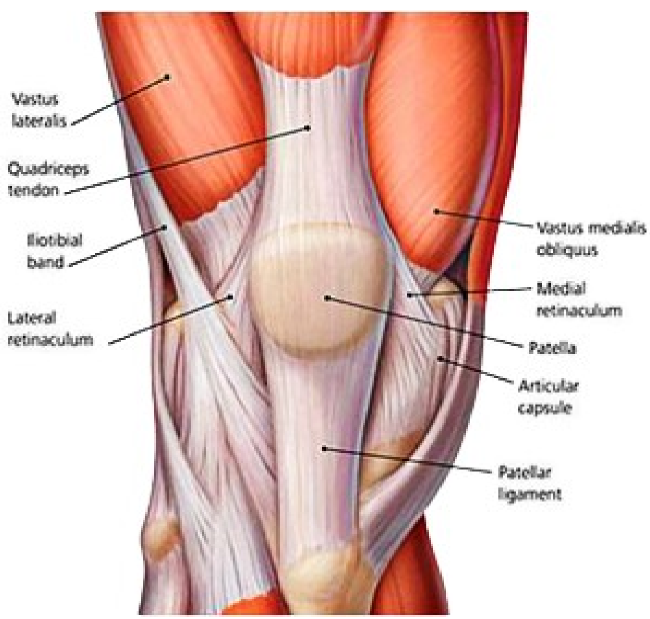


Figure (2.1.5) Knee Arteries and Veins (www.healthpage.org/artries/viens/jpg)

2.2 Physiology of knee joint:

The knee has limited movement and is designed to move like a hinge .The Quadriceps Mechanism is made up of the patella (kneecap), patellar tendon, and the quadriceps muscles (thigh) on the front of the upper leg. The patella fits into the patella-femoral groove on the front of the femur and acts like a fulcrum to give the leg its power. The patella slides up and down the groove as the knee bends. When the quadriceps muscles contract they cause the knee to straighten. When they relax, the knee bends .In addition the hamstring and calf muscles help flex and support the knee. (C.K.Warrick 1969)

2.3 Pathology of the knee:

2.3.1trauma or stress (pressure or force):

Knee symptoms come in many varieties. Pain can be dull, sharp, constant or off-and on. Pain can also be mild to agonizing. The range of motion in the knee can be too much or too little. Some knee problems only need rest and ice; others need physical therapy or even surgery.(www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.2 Osteoarthritis:

In this disease, the cartilage gradually wears away and changes occur in the adjacent bone. Osteoarthritis may be caused by joint injury or being overweight. It is associated with aging and most typically begins in people age 50 or older. A young person who develops osteoarthritis typically has had an injury to the knee or may have an inherited form of the disease. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.3 Rheumatoid arthritis:

Generally affects people at a younger age than does osteoarthritis, is an autoimmune disease. This means it occurs as a result of the immune system attacking components of the body. In rheumatoid arthritis, the primary site of the immune system's attack is the synovial, the membrane that lines the joint. This attack causes inflammation of the joint. It can lead to destruction of the cartilage and bone and, in some cases, muscles, tendons, and ligaments as well. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.4 Gout:

An acute and intensely painful form of arthritis that occurs when crystals of the bodily waste product uric acid are deposited in the joints. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.5 Systemic lupus erythematosus (lupus):

An autoimmune disease characterized by destructive inflammation of the skin, internal organs, and other body systems, as well as the joint. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.6 Ankylosing spondylitis:

An inflammatory form of arthritis that primarily affects the spine, leading to stiffening and in some cases fusing into a stooped position. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.7 Psoriatic arthritis:

A condition in which inflamed joints produce symptoms of arthritis for patients who have or will develop psoriasis.(www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.8 Infectious arthritis:

It is caused by infectious agents, such as bacteria or viruses. Prompt medical attention is essential to treat the infection and minimize damage to joints, particularly if fever is present.(www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.9 Chondromalacia:

Called chondromalacia patellae, refers to softening of the articular cartilage of the knee cap. This disorder occurs most often in young adults and can be caused by injury, overuse, misalignment of the patella, or muscle weakness. Instead of gliding smoothly across the lower end of the thigh bone, the kneecap rubs against it, thereby roughening the cartilage underneath the kneecap. The damage may range from a slightly abnormal surface of the cartilage to a surface that has been worn away to the bone. Chondromalacia related to injury occurs when a blow to the kneecap tears off either a small piece of cartilage or a large fragment containing a piece of bone (osteochondral fracture).The most symptom dull pain around or under the kneecap, also pain when climbing stairs or when the knee bears weight as it straightens. The disorder is common in runners and is also seen in skiers, cyclists, and soccer players. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.10 Meniscal Injuries (Injuries to the Menisci):

The menisci can be easily injured by the force of rotating the knee while bearing weight. A partial or total tear may occur .If the tear is tiny, the meniscus stays connected to the front and back of the knee; if the tear is large, the meniscus may be left hanging by a thread of cartilage. The seriousness of a tear depends on its location and extent .The Symptoms is pain mild or severe and swelling may occur. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.11 Cruciate Ligament Injuries:

It referred to as sprains. Don’t necessarily cause pain, but they are disabling. Most often stretched or torn (or both) by a sudden twisting motion. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.12 Medial and Lateral Collateral Ligament Injuries:

The cause of collateral ligament injuries is most often a blow to the outer side of the knee that stretches and tears the ligament on the inner side of the knee. Such blows frequently occur in contact sports such as football or hockey .the Symptoms pop, buckle sideways, Pain and swelling. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.13 Tendon Injuries:

Knee tendon injuries range from tendinitis. Tendinitis of the patellar tendon is sometimes called “jumper’s knee. The Symptoms is pain during running, hurried walking, or jumping. (www.healthpage.org /anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.14 Iliotibial Band Syndrome:

Is an inflammatory condition caused when a band of tissue rubs over the outer bone (lateral condyle) of the knee . The symptoms ache or burning sensation at the side of the knee during activity. Pain may be localized at the side of the knee or radiate up the side of the thigh, a snap when the knee is bent and then straight tended and swelling. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached)

2.3.15 Osteochondritis Dissecans:

Results from a loss of the blood supply to an area of bone underneath a joint surface Types of Knee Surgery are Knee Replacement, Knee Arthroscopy. (www.healthpage.org/anatomy-function/knee-joint-structure-function-problems/ - Cached**)**

4.1 imaging for knee joint:

4.2.1 X-ray:

Radiography is the first step in the evaluation of knee pain. It is quick and inexpensive and can yield many diagnostic clues. It can readily reveal fractures, osteochondral defects, bony lesions, joint effusions, joint space narrowing, and bone misalignment. In patients with knee trauma, supine anteroposterior and cross-table lateral radiographic images are generally obtained. In patients whose knee pain is not due to trauma, standing projections are done, as well as dedicated projection of the patella femoral articulation. A standing series is most helpful for evaluating joint space and alignment.(Clark 2005)

4.2.2 MRI (Magnetic Resonance Imaging):

In MRI can show the ligament, muscle and any pathology in them without using contrast media. Limitations of it no signal from bone, long scan time and no signal from even number proton. (Dr .Hans 1990)

4.2.3 CT (Computed Tomography):

In CT can show the fracture and its fragment with good detail. (Euclid seeram 1994)

4.2.4 US (Ultrasound):

In US can show the muscle which can't be detected by other modality .basic images are anterior compartment include quadriceps tendon, patellar tendon, supra-patellar tendon, infrapatelar bursa and pesansieine bursa. Posterior compartment include blood supply, medial gastrocenmuis muscle, lower 1/3posterior CL, Gastrocenmuis bursa3. Medial compartment include MCL, MM, MR, Pes.Anseriuns bursa. Lateral compartments include LCL, LM, LR and It. (Frederic 1980)

4.2.5 Nuclear Medicine:

Is a science and clinical application of radiopharmaceutical for diagnostic, therapeutic and investigation, the Indications of it Pain, Fractures, Infection sand Bone tumors. Used Tc99m with MDP Procedure Dynamic or Static. (F.W.Smith 1989)

4.2.6 Interventional Radiology:

Interventional radiology can be used for investigation by take biopsy if there is cyst or any accumulation of fluid, or to remove any abnormality of the knee joint. (Wilfrido1988)

2.5 Previous Study:

D. J. Hunter etal (2006) had studied Change in Joint Space Width Hyaline Articular Cartilage Loss or Alteration in Meniscus .Their Objective to explore the relative contribution of hyaline cartilage morphologic features and the meniscus to the radiographic joint spaces. The Boston Osteoarthritis of the Knee Study is a natural history study of symptomatic knee osteoarthritis (OA). Baseline and 30-month follow up assessments included knee magnetic resonance imaging (MRI) and fluoroscopically positioned weight-bearing knee radiographs. Cartilage and meniscal degeneration were scored on MRI in the medial and lateral tibiofemoral joints using a semi quantitative grading system. Meniscal position was measured to the nearest millimeter. The dependent variable was joint space narrowing (JSN) on the plain radiograph (possible range 0–3). The predictor variables were MRI cartilage score, meniscal degeneration, and meniscal position measures. We first conducted a cross-sectional analysis using multi variateregression to determine the relative contribution of meniscus factors and cartilage morphologic features to JSN, adjusting for body mass index (BMI), age, and sex .The same approach was used for change in JSN and change in predictor variables. Results we evaluated 264 study participants with knee OA (mean age 66.7years, 59% men, and mean BMI 31.4 kg/m2). The results from the models demonstrated that meniscus position and meniscal degeneration each contributed to prediction of JSN, in addition to the contribution by cartilage morphologic features .For change in medial joint space, both change in meniscus position and change in articular cartilage score contributed substantially to narrowing of the joint space.

Loss of joint space on plain radiographs has been equated with loss of hyaline articular cartilage, in clinical trials of OA. However, hyaline articular cartilage is not the only structure occupying the joint space on plain Supported by the NIH (grant AR-47785), the Arthritis Foundation (Clinical Sciences grant), and OA Biomarkers. (D. J. Hunter 2006)

Shreyasee Amin etal (2005) had studied The Relationship between cartilage loss on magnetic resonance imaging and radiographic progression in men and women with knee osteoarthritis .Their objectives to determine the relationship between radiographic progression of joint space narrowing and cartilage loss on magnetic resonance imaging (MRI) in patients with symptomatic knee osteoarthritis (OA),and to investigate the location of MRI-based cartilage loss in the knee and its relation to radiographic progression .Two hundred twenty-four men and women (mean age 66 years) were studied. Radiographs and MRI of the more symptomatic knee were obtained at baseline and at 15- and 30-month followup. Radio-graphs of the knee (with weight-bearing) were read for joint space narrowing (scale 0–3), with progression defined as any worsening in score. We used a semiquantitative method to score cartilage morphology in all 5 regions of the tibiofemoral joint, and defined cartilage loss as an increase in score (scale 0–4) at any region. We examined the relationship between progression of joint space narrowing on radiographic images and cartilage loss on MRI, using a generalized estimating equation proportional odds logistic regression, adjusted for base-line cartilage score, age, body mass index, and sex. The medial and lateral compartments were analyzed separately. Results in the medial compartment, 104 knees (46%) had cartilage loss detected by MRI. The adjusted odds ratio was 3.7 (95% confidence interval 2.2–6.3) for radiographic progression being predictive of cartilage loss on MRI. However, there was still a substantial proportion of knees (80 of 189 [42%]) with cartilage loss visible on MRI when no radiographic progression was apparent. Cartilage loss occurred frequently in the central regions of the femur and tibia as well as the posterior femur region, but radiographic progression was less likely to be observed when posterior femur regions showed cartilage loss. Radiographic progression appeared specific (91%) but not sensitive (23%) for cartilage loss. Overall findings were similar for the lateral compartment. While our results provide longitudinal evidence that radiographic progression of joint space narrowing is predictive of cartilage loss assessed on MRI, radiography is not a sensitive measure, and if used alone, will miss a substantial proportion of knees with cartilage loss. Knee osteoarthritis (OA) is one of the leading causes of chronic disability among older individuals. An accurate indicator of disease progression is critical for studies of this condition. Thinning, erosion, and loss of hyaline articular cartilage are considered the hallmark of OA. In clinical studies on the natural history of knee OA and in clinical trials assessing treatment efficacy for

knee OA, worsening of joint space narrowing seen on knee radiography, which is thought to reflect articular cartilage loss, has served as one indicator of structural disease progression. Although serial radiography is a noninvasive and inexpensive means to evaluate progression of joint space narrowing, it remains an indirect measure of cartilage loss.

There are several potential disadvantages of us-Supported by an Osteoarthritis Biomarkers. (Shreyasee Amin 2005(

Chapter Three

Materials and Methods

3.1 Materials:

MRI machine semenci 1.5T ,knee coil one phase and air plague .

3.2 Populations :

Including Male and female aged (18-100) with abnormal knee joint complain of pain and patient with abnormalities of knee joint (osteoarthritis, fracture, dislocation and knee with scow….etc), the data of this study collected from Alrebat hospital in 5 months.

3.3 Method of data collection (Technique):

The patient was either supine feet first on MRI table with both legs extended .The foot medially rotated to centralize the patella between the femoral condyles and sand bags are placed against the ankle to help maintain this position .The knee coil should be in close contact with joint .Centre 2.5 cm below the apex of patella through the joint apace.

3.4 Method of data acquisition:

The knee joint space were measured in four points , the distant between the tibia and femur, distance from medial femoral condyle to medial tibia condyle the distant from lateral femoral condyle to lateral tibia condyle, and central distance at the middle of the joint laterally to the inter condylar tibia eminence, The measurements were taken for all patients and the readings were correlated to patient's age and weight, the measurements were done by using computer software (senate editor), the data were analyzed by using excel and were presented in tables and figures.

3.5 Ethical clearance:

Ethical approval has been granted from the hospital as well as the radiology department; that this data will be used for research purpose only and the patient will not be subjected to any harm and his information will not be revealed as well as verbal consent from the patients were taken.

Chapter four

Results

This study includes 50 patients, the data were collected by selected 5variables(the distance laterally from lateral femoral condyle to lateral tibia condyle, and distance medially from medial femoral condyle to the medial tibia condyle in addition to central measurements including the distance laterally ,medially to the inter condylar eminence, gender, age, occupation, disease ,sign and BMI) using MRI coronal view.

The results include the mean and standard deviation of the variables as well as relationship between medial and lateral condyle and the 2 central measurements and the age, disease occupation, sign and weight of the patients.

Table (4-1): The mean and standard deviation of variables that collected from 50patient.

	Medial condyles	Lateral condyles	Medial central	Lateral central
Mean	14.8	15.5	10.6	11.6
STDEV	3.0	3.1	2.5	2.7

Table (4-2): The mean and standard deviation age and BMI of the patient

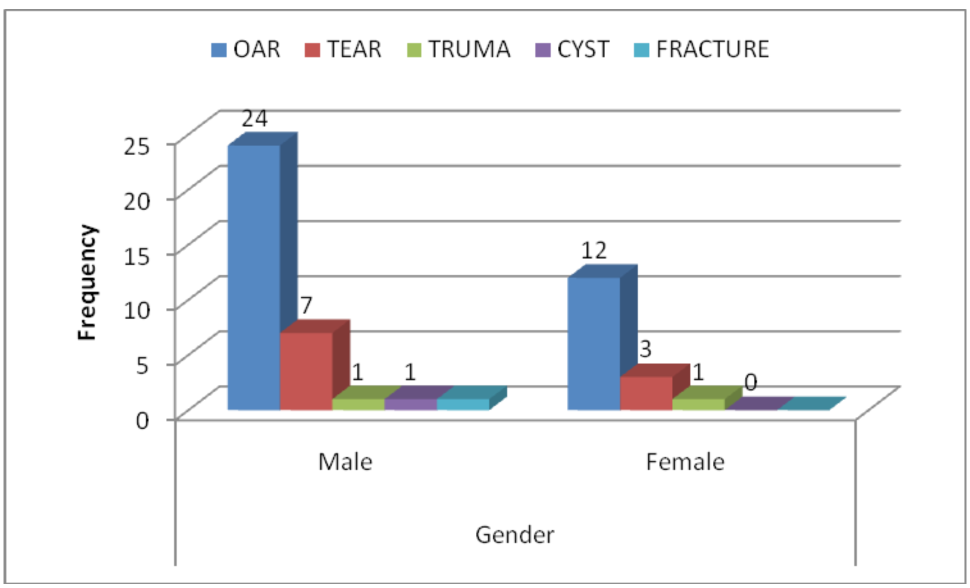
	Age	BMI
Mean	46.7	30.3
STDEV	20.3	4.3

Table (4-3): The frequencies of patients' signs.

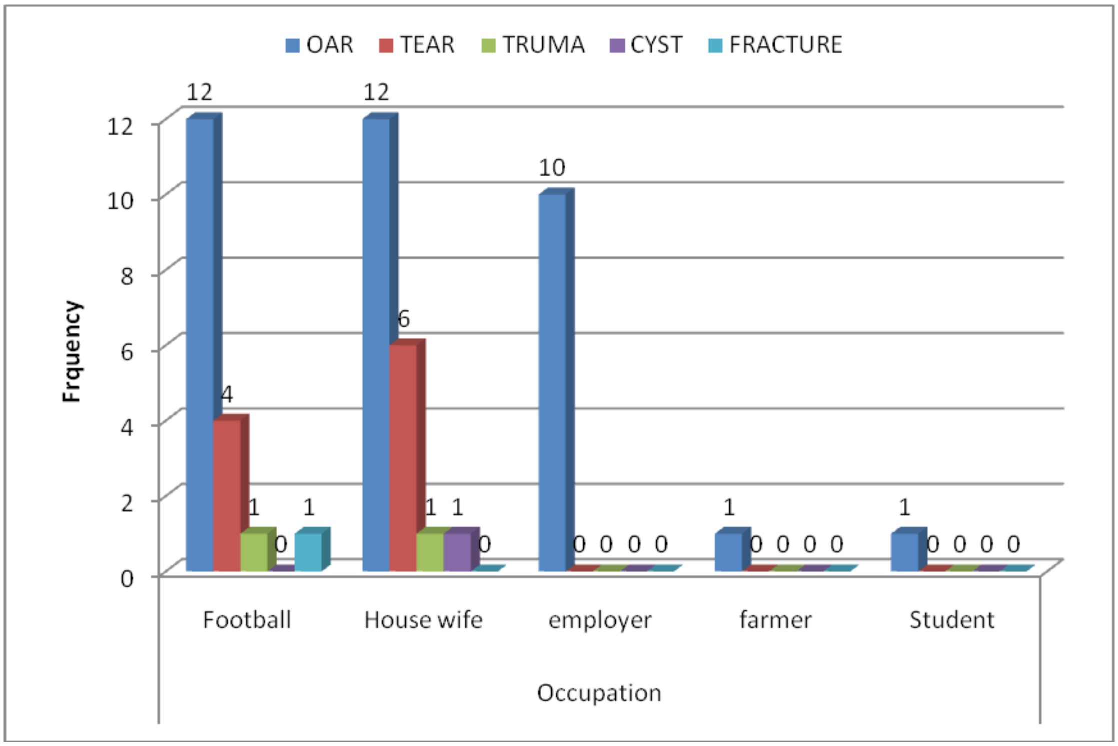
Sign	Frequency	Percent
Swelling	27	54.0
Gimp	23	46.0
Total	50	100.0

Table (4-4): The frequencies of patient disease types.

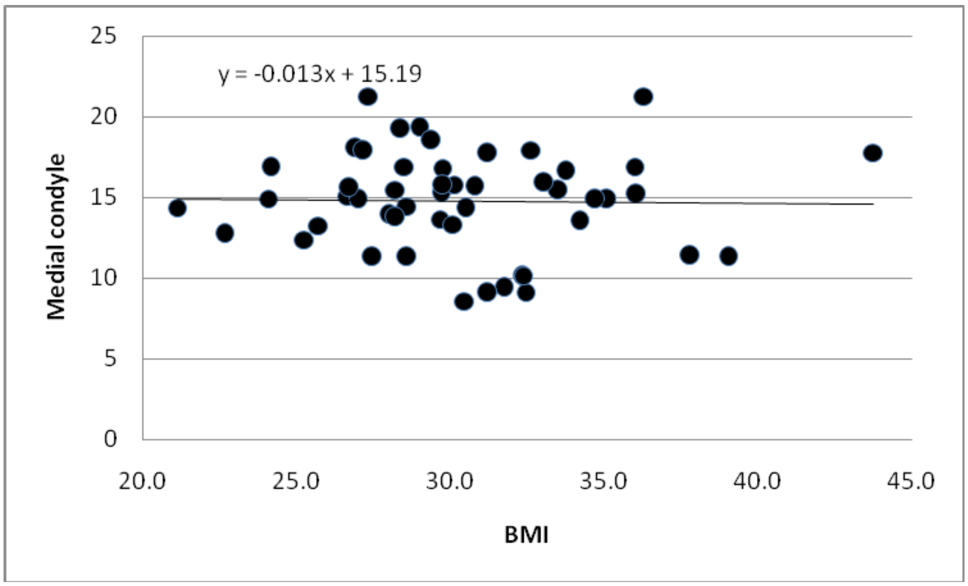
Disease	Frequency	Percent
OAR	36	72.0
TEAR	10	20.0
TRUMA	2	4.0
CYST	1	2.0
FRACTURE	1	2.0
Total	50	100.0



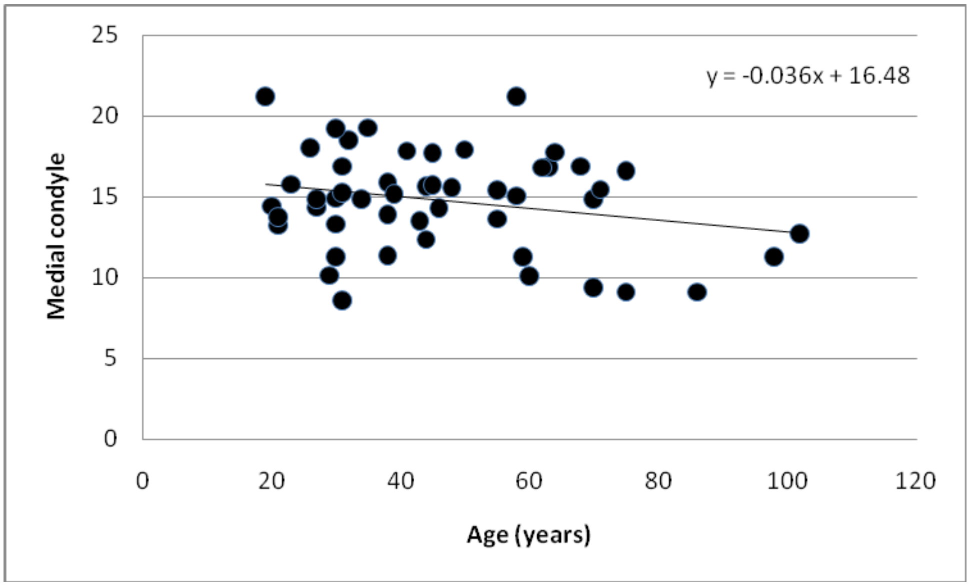
Graf (4-1): The frequencies of different types of knee joint diseases according to gender.



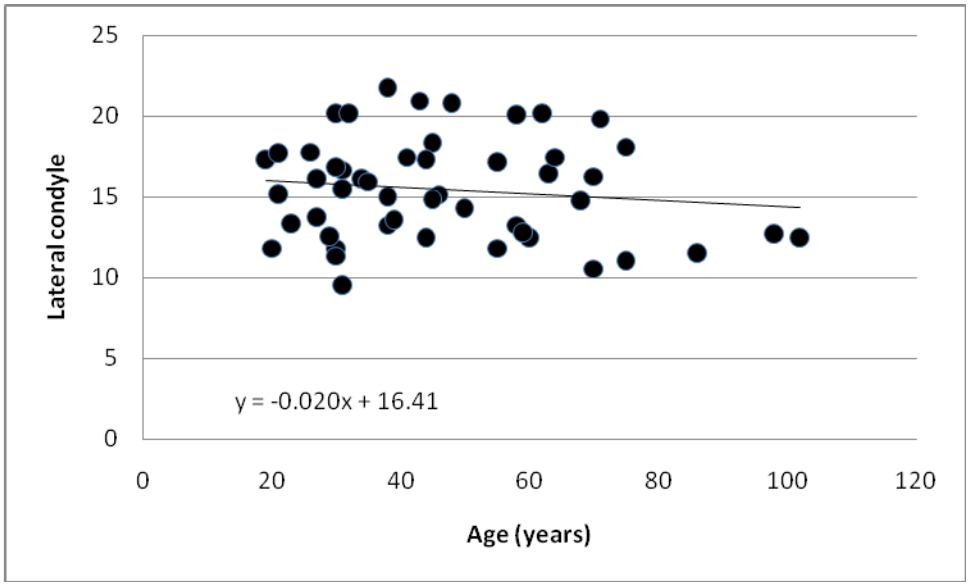
Graf (4-2): the frequencies of different types of knee joint diseases according to occupation.



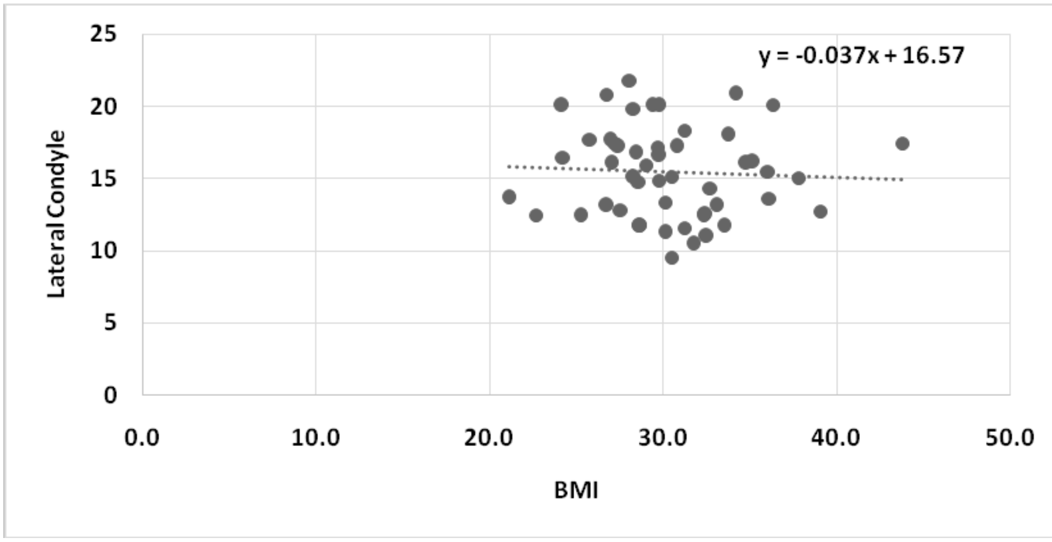
Graf (4-3): The relation between medial condyle measurements and Patients BMI



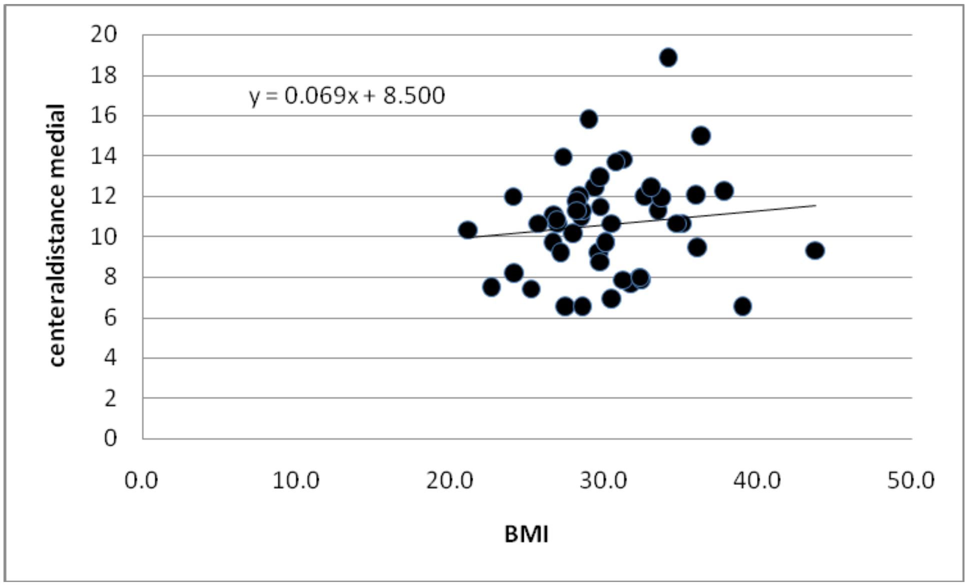
Graf (4-4): The relation between medial condyle measurements and Patients age.



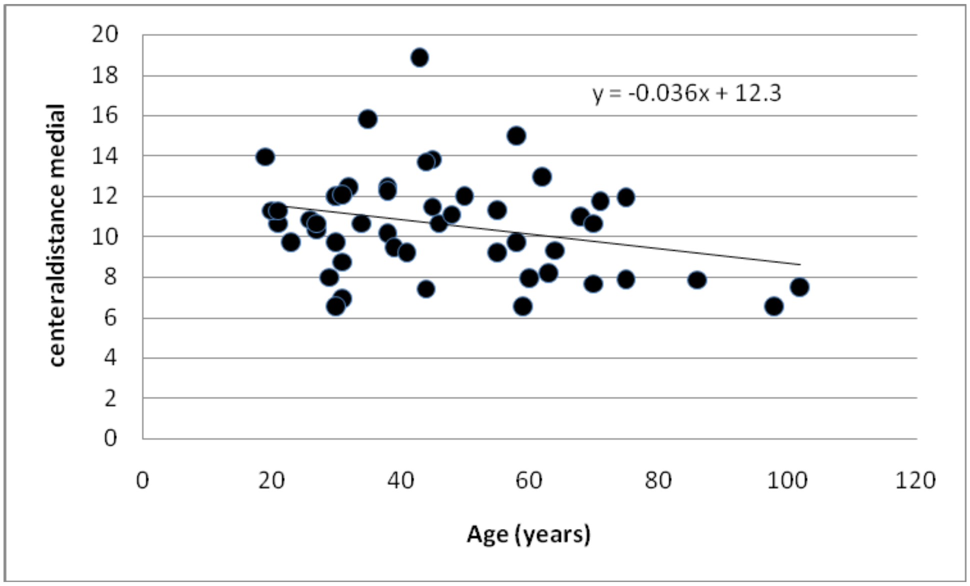
Graf (4-5): The relation between lateral condyle measurements and Patients age.



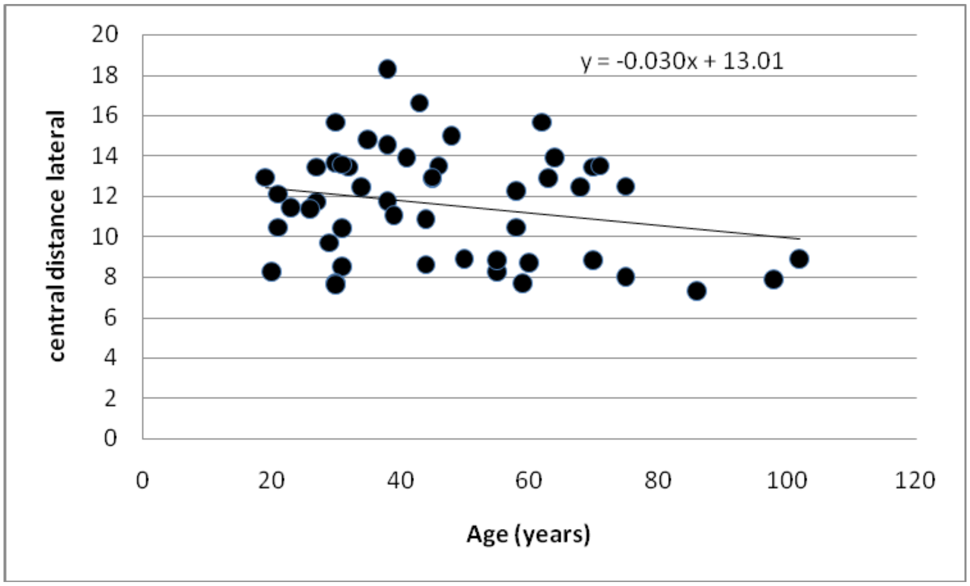
Graf (4-6): The relation between lateral condyle measurements and Patients BMI



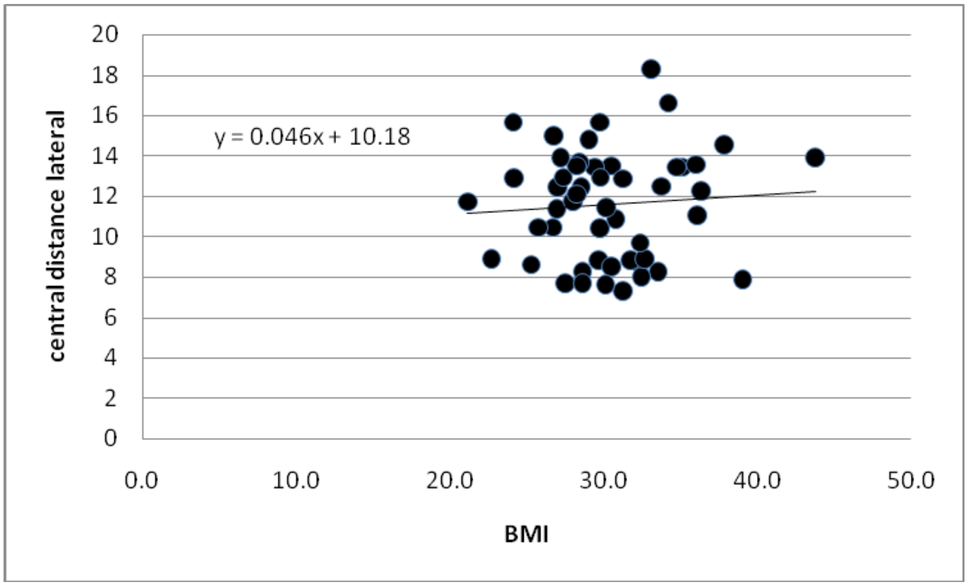
Graf (4-7): The relation between medial central measurements and Patients BMI.



Graf (4-8): The relation between medial central measurements and Patients age.



Graf (4-9): The relation between lateral central measurements and Patients age.



Graf (4-10): The relation between lateral central measurements and Patients BMI.

Chapter five

Discussion, Conclusion and Recommendation

5.1 Discussion:

This study includes 50 patients, the data were collected by selected 5variables (the distance laterally from lateral femoral condyle to lateral tibia condyle, and distance medially from medial femoral condyle to the medial tibia condyle in addition to central measurements including the distance laterally ,medially to the inter condylar eminence, gender, age, occupation, disease ,sign and BMI) using MRI coronal view.

The results include the mean and standard deviation of the variables as well as relationship between medial and lateral condyle and the 2 central measurements and the age, disease occupation, sign and weight of the patients. The relation between the patients BMI and distance between medial femoral condyle and tibial condyle were evaluated ; it was found that the medial condyle measurements decrease by 0.013mm/kg/m^2 this were shown in figure(4-3).

The relation between the patients age and distance (medial femoral condyle and medial tibial condyle) were evaluated ; it was found that the medial condyle measurements decreased by 0.036mm/year Figure(4-4).

The relation between the patients age and distance (lateral femoral condyle and lateral tibial condyle) were evaluated ; it was found that the lateral condyle measurements decreased by 0.020 mm/year Figure(4-5).

The relation between the patients BMI and distance between lateral femoral condyle and tibial condyle were evaluated ; it was found that the lateral condyle measurements decrease by 0.037mm/kg/m^2 this were described by Figure(4-6).

The medialcentral eminence measurements were found to be decrease by 0.046 in respectively with the relation to patient BMI it increased by10 kg/m^2 this were described by Figure (4-7).

The medialcentral eminence measurements were found to be decrease by 0.036 in respectively with the relation to patient age it increased by 20years this were described in figure (4-8).

The lateral central eminence measurements were found to be decrease by 0.030mm/year in respectively with the relation to patient age this were described in figure (4-9).

The lateral central eminence measurements were found to be decrease by 0.046 mm/kg/m2in respectively with the relation to patient BMI this were described in figure (4-10).

The study of D. J. Hunter etal.. (2006) had studied Change in Joint Space Width Hyaline Articular Cartilage Loss or Alteration in Meniscu has change in articular cartilagescore contributed substantially to narrowing of the joint space.Our final result show that affects some significant differences.

The study of Shreyasee Amin etal..(2005) had studied The Relationship betweencartilage loss on magnetic resonance imaging and radiographic progression inmen and women with knee osteoarthritis has Knee osteoarthritis (OA) is one of the leading causes of chronic disability among older individuals. Our final results show that significant effect.

5.2 Conclusion:

There are relation between patient’s age and BMI and the knee joint space. The measurements of the joint space decreased by increasing patient’s age and BMI.

Knee osteoarthritis (OAR) is one of the leading causes of chronic change in disk space.

No relation between male and female and the knee joint space .

5.3 Recommendation:

- All patients should reduce their weight to reduce the effect of joint space narrowing.
- The knee joint space should be evaluated using U/S.

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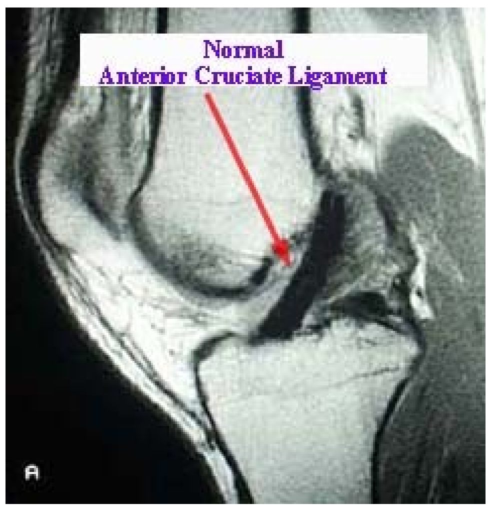
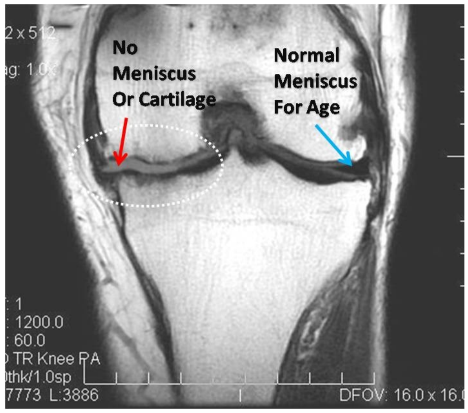
Appendix:

Normal left knee MRISaggitT1weightImage for female 36years

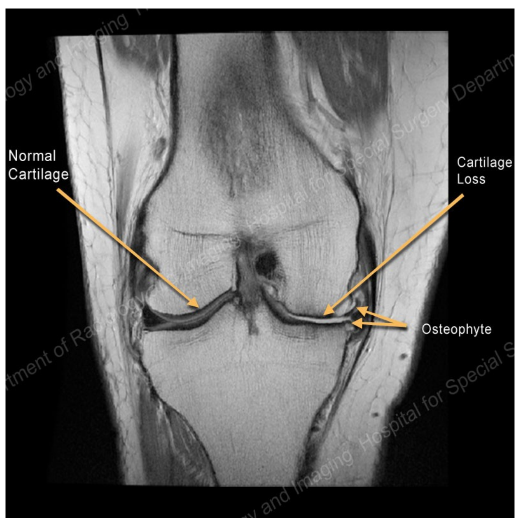
Normal left knee MRI axialT1 weight image for male 25 years



Normal right knee (ACL) MRI saggital T1weight Image for female 33years



Abnormal left knee MRI T1 weight image (meniscal injuries) for male 48 years



Abnormal right knee MRI coronal T1 weight image(Osteophyte) for male30 years