

## **Chapter one**

### **1.1 Introduction**

Mammography plays a central part in early detection of breast cancers because it can show changes in the breast up to two years before a patient or physician can feel them. Current guidelines from the U/S department of health and human services (HHS) and the American college of radiology (ACR) recommend screening mammography every year for women , beginning at age 40. Research has shown that annual mammograms lead to early detection of breast cancers, when they are most curable and breast –conservation therapies are available .The National Cancer Institute (NCI) adds that women who have had breast cancer, and those who area increased risk due to a family history of breast or ovarian cancer, should seek expert medical advice about whether they should begin screening before age 40 and the need for other types of screening. If you are at high risk for breast cancer, you may need to obtain a breast MRI in addition to your annual mammogram. (www.wikiradiograph).

### **1.2problem of study**

Unusing of mammography as basic protocol to early detection of any neoplastic breast pathology can be lead to increased death of female by cancer.

### **1.3 Objectives of study**

The main objective of this study wasstudy ofbreast disease using mammography.

**Specific objective:**

To assess the common features of breast cancer in Sudanese patient women using mammography.

To identify the site and location of breast lesion.

**1.4 Overview of study**

This study falls into five chapters, chapter one which is an introduction, deals with introduction, problem, objective. chapter two is theoretical background and literature review (previous study) chapter three about research methodology, which includes material and method chapter four deals with result (data presentation) chapter five includes discussion, conclusion and recommendation reference, s and., Appendix.

## **Chapter two**

### **Literature review**

#### **2.1 Theoretical background**

##### **2.1.1 Anatomy of the breast**

In order to understand the often bewildering textures and changes that the human breast undergoes in normal and especially abnormal situation, it is necessary to learn about what the breast is made of and what it is influenced. ([www.development human-breast](http://www.developmenthuman-breast))

Breast begins developing in embryo about 7 to 8 weeks after conception. There are unrecognizable at this stage consisting only of a thickening or ridge of tissue.

From weeks 12 to 16, the various sub- composes become more defined. Tiny groupings of cells begin to branch out laying the foundation for future ducts and milk producing glands. Other tissues develop in to muscle cells which will form the nipple (the protruding point of the breast). and areole (the darkened tissue surrounding the nipple). In the later stages of pregnancy, the mother's hormones, which cross the placenta in to fetus, causes breast cells to organize in to branching tube-like structures thus forming the milk ducts .in the final 8 weeks, lobules, (milk producing gland), mature and actually begin to secrete a liquid substance called colostrum's. In both female and male newborns, swelling underneath the nipples and areola can easily be felt and a clear liquid discharge, colostrum's or "witch, s milk", can be seen. These represent the effect of the mother's hormones and subside in the first few weeks of life. ([www.development human-breast](http://www.development human-breast))

From infancy to just before puberty, there is no difference between the female and male breast. With the beginning of female puberty, however, the release of estrogen, at first alone, and then in combination with progesterone when the ovaries functionally mature, cause the breast to undergo dramatic changes which culminate

in the fully mature. This process on average takes 3 to 4 years and is usually complete by age 16. Further maturation of the breast tissues occurs with lactation and is felt to be mildly protective against breast cancer. ([www.development human-breast](http://www.development-human-breast))

The mature female breast is composed of essentially four structures: lobules or gland; milkducts; fat and connective tissue. The lobule group together in to larger units called lobes. On average there are 15-20 lobes in each breast arranged roughly in wheel spoke pattern emanating from the nipple/ areola area. The distribution of the lobes is not even, however. There is preponderance of glandular tissue in the upper outer portion of the breast. This is responsible for the tenderness in this region that many women experience prior to their menstrual cycle. It is also the site of half of all breast cancer. The lobes empty in to the milk ducts which course through the breast towards the nipple/areola area. There, they converge in to 6-10 larger ducts called collecting ducts which enter the base of the nipple and connect with the outside. During lactation (breast feeding), the breast milk follows this course on its way to the feeding infant. ([www.development human-breast](http://www.development-human-breast))

The consistency of breast lobes varies from women to women and may even vary in an individual from one side to the other. However, in general, the glandular portion of the breast has affirmed, slightly no dollarfeels to it. Surrounding the lobe is breastfat unlike the lobes, the fat is almost always soft. The discrepancy in textures between these two components allows one to outline the lobes by carefully palpating (feeling) the breast .interestingly, the different in density between glandular breast tissue and breast fat is also the basis for mammographic imaging.in contrast, the ducts of the breast are usually not palpable unless they are engorged with milk, inflamed or contain tumor ([www.development human-breast](http://www.development-human-breast))

The breast of younger women is primarily composed of glandular tissue with only a small percentage being fat. Thus they are firmer than older counterparts as women age, especially with the loss of estrogen at menopause, the lobes involute (shrink) and are replaced by fat. The breasts become softer and lose their support. Physical examination and mammography are easier to interpret and may well be more accurate.

Whereas all components of the breast are influenced by female hormones, the glandular tissue is most sensitive. Very dramatic and totally normal changes can occur in the consistency of the breast during the menstrual cycle, these changes are most evident just prior to menstruation when levels of estrogen and progesterone are peaking right after menstruation, hormone levels are at their lowest and the breast becomes softer and less tender. This is the recommended time to perform breast self-examination, and to have a mammogram. ([www.development-human-breast.com](http://www.development-human-breast.com))

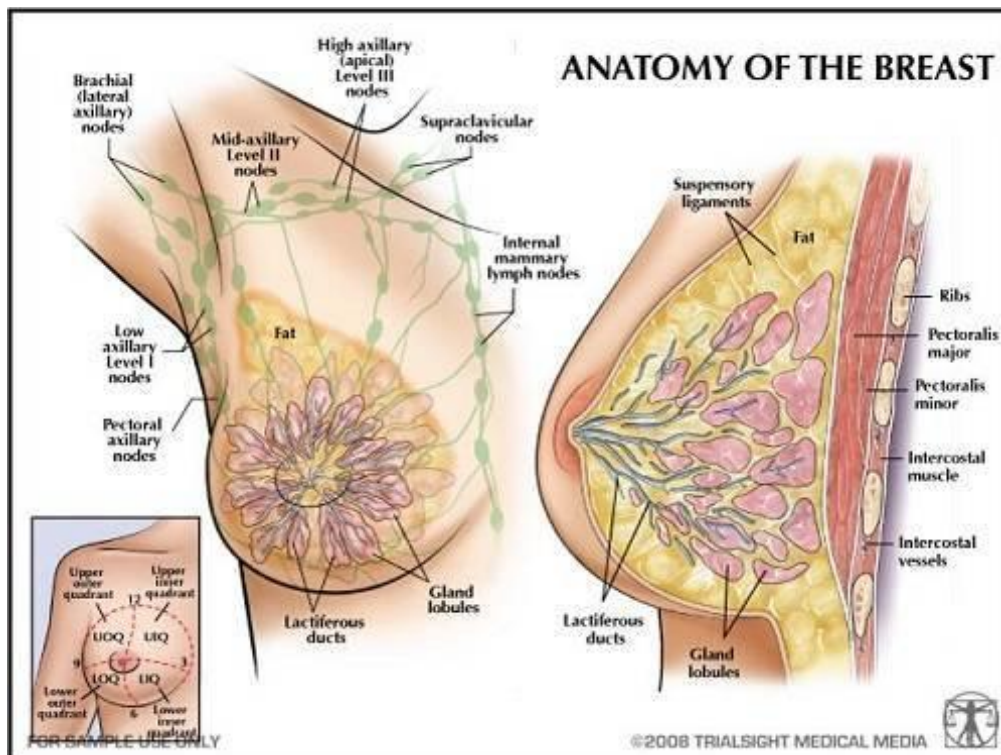


Figure (2.1) show the breast anatomy

([www.wikiradiograph.org](http://www.wikiradiograph.org))

### **2.1.1.1 Form of the breast**

The human breast has a distinctive and unique protuberant conical form.

This conical form is most marked in younger nulliparous women. With advantage age the breast usually become somewhat flattened and pendulous and less firm. Popular opinion has it that these change are aggravated by breast feeding obesity is the most important factor concerned with variation in size, shape, and density of the breast. As women gain weight their breast become more massive and pendulous. They become so firm and dense that it is much more difficult to detect disease in examination them. ([www.health.better medicine.com](http://www.health.bettermedicine.com))

### **2.1.1.2 Extent of the breast**

The upper edge of the protuberant breast is usually at the level of the second or third rib and its lower edge is at about the level of the sixth or seventh costal cartilage. Its medial border is at the edge of the sternum and its lateral border at the anterior axillary line. The actual extent of the mammary tissue is considerably greater; however it is spread out as a thin layer that often reaches the lower edge of the clavicle above, the midline of the sternum medially, and the anterior edge of the latissimus dorsi muscle laterally. This is a fact of importance to the surgeon attacking carcinoma of breast, who must carry his dissection widely enough to be certain of removing all breast tissue. This wide extent of the breast tissue is particularly evident in some cases of acute post-partum engorgement of the breast. We have also seen proof of it in studying microscopic sections of subcutaneous tissue from area beyond the protuberant breast. ([www.health.better medicine.com](http://www.health.bettermedicine.com))

### **2.1.1.3 Size of the breast**

Not infrequently there is some difference in the size of the two breasts if it is slight it may not have been noticed by the patient because she does not have as good a view of her breasts as a careful examiner. The breasts in these patients are usually otherwise normal. The clinician, for abnormalities in the breast produced by neoplasms, must not confuse these limited differences in size that are developmental in origin with those due to pathology. ([www.health.bettermedicine.com](http://www.health.bettermedicine.com))

### **2.1.1.4 Anomalies**

The question arises as to what breast structure, abnormal in form or number or position or the absence of normal breasts should be classified as anomalous. Differences in size of entirely normal breast tissue in the axilla are so frequent that they can hardly be classified as anomalies. True anomalies of the human breast include those in which a breast is absent, rudimentary, or accessory breast or nipples, the breast; its anomalies, its diseases, and their treatment. They point out the absence or incomplete development of breast is the result of complete or imperfect suppression of the breast anlagen in the embryo. Accessory breast or nipples, on the other hand, represent reversion to a more primitive type of mammary arrangement in which more than a single pair of anlagen persists. Darwin himself, in his descent of man, used polymastia as an example of atavism, or reversion to more primitive ancestral type. Amastia: complete absence of one or both breasts is one of the breast anomalies. Very small rudimentary breasts are less rare. ([www.health.bettermedicine.com](http://www.health.bettermedicine.com))

In a considerable proportion of cases of absent or rudimentary breast, shoulder girdle, chest, or arm, several instances of mother and daughter with amastia are recorded and in one family the anomaly transmitted through three generations.

Accessory breast tissue is an anomaly that is clearly hereditary, for there are many reports of familial transmission. Accessory breast tissue: accessory breast or nipples are much more common than amastia, it occurs in form 1 to 2 percent of white subjects. This anomaly is apparently more frequent in Orientals. Iwaki found it in 1.68percent oh Japanese males and 5.19 of femaletake found it in 3.6 percent of Chinese males.

It may occur as any combination of the three component of the breast\_ its glandular and ductal parenchyma, the areola, or the nipple or as single element. The most frequent combination is a small areola and nipple. Diminutive nipple is the most frequent accessory breast structure, their most frequently site, is just below the lower edge of the normal breast. The next most frequent site is the axilla. They are occasionally bilateral abnormal breast form: another anomaly, but very rare, is protrusion of the areola to form a dependent sessile tumor. When the breast begins to grow at puberty, the areolae sometimes appear to be disproportionately large and bulging. As the breast enlarges and mature this disproportion corrects itself.in patient, however, this protrusion of the areolae increased with advancing age.([www.health.better](http://www.health.better) medicine.com)

### **2.1.1.5The blood supply of the breast**

The main blood supply of the breast is from the perforating branches of the internal mammary artery. The first, second, third, and fourth perforating branches perforate the chest wall near the sternum edge in the corresponding interspaces, and traverse the pectoralis major muscle to reach the mammary gland along its medial edge.

In the upper interspace there is a series of much smaller perforating vessels which emerge from the intercostal muscle plane 2 to 3 cm. lateral to and parallel with main perforator. The several branches of the axillary artery also share in providing blood for the breast; the highest thoracic artery; pectoral branch of thoracic



acromial artery; the artery of the axillary artery ; lateral thoracic artery; the subscapular artery; and the thoracic dorsal artery. The venous route is important to student of breast carcinoma not only because veins are a key to the lymphatic path way, which in general follow the occursveins ([www.health.better medicine.com](http://www.health.bettermedicine.com)).

The superficial subcutaneous veins over the breast lie just below the superficial layer of the superficial

Fascia, and large enough and close enough to the skin surface to be shown well by photographs taken in infrared light.

There are three groups of deep veins carrying blood from breast and chest wall; the perforating branches of the internal mammary vein, and axially vein receives many tributaries from the chest wall and the third and most important routes through the intercostalveins

The vertebral system of veins provides an entirely different rout by which metises reach the bones directly, without going through the cavil veins and through the lungs ([www.health.better medicine.com](http://www.health.bettermedicine.com)).

### **2.1.1.6The nerves of breast**

The microscopic character of the inner rations of the skin over the breast unusually large number of by multi-branched free fiber endings in the dermis of the nipple, and Ruffian- like and Krause and bulbs dermis of the areola and peripheral breast skin, they suggest that this special innervations is associated with the process of erection of the nipple and milk flow, mediated through reflex stimulation of the pituitary.as flows; the skin over the upper part of the breast third and fourth branches of the cervical plexus .the skin over lower part of the breast ; thoracic intercostal. The thoracic dorsal or middle sub scapular nerves the long thoracic nerves.([www.health.better medicine.com](http://www.health.bettermedicine.com)).

### **. 2.1.1.7The lymphatic, s of the breast**

The axillary lymph nodes includes: the external mammary nodes, the scapular nodes, the central nodes, the axillary vein nodes, the sub clavicle nodes adventitious mammary lymph nodes these lymph nodes are situated beneath the breast slightly caudal to its center termination of the axillary lymphatic route in the jugular-subclavian venous confluence lymphatic route from breast to liver via the rectus abdominis muscle, lymphatic route to the supraclavicular lymph nodes, internal mammary lymphatic route, lymphatic drainage across the midline to the opposite breast and axilla, and lymphatic drainage of the chest wall underlying the breast. The great collecting trunks of the lymphatic system at the base of the neck (www.development human- breast.com).

### **2.1.2.1Physiology of the breast**

A Breast is an integral part of the reproductive system, and under the control of the same neuroendocrine system. This is to correlate the breast physiology and its aberrations with other hormonal phenomena.(www.epe.lac-bac.gc.ca.com)

### **2.1.2.2Origin and status in adolescence**

Apocrine epitheliumform which the axillary sweat glandeventuallydevelop.

Cords of these cells bud downward from ectoderm and by the time of birth constitute a branching system of ducts that empty in to well- developed nipples. This fetal breast development has been stimulated by the prolactin estrogen, and progesterone of placental origin. Shortly after birth there is temporary evidence of a slight degree of breast secretory function in most babies. The rudimentary breasts appear to enlarge and there is a slight secretion of milk material from the nipples. The breast then relapses in to an inactive phase that characterizes them during

childhood. The epithelial element consist merely for small ducts scattered throughout fibrous stoma there are no lobules.(www.epe.lac-bac.gc.ca.com).

### **2.1.2.3Changes associated with puberty**

Puberty begins with lengthening and branching of the ducts from which lobules bud out to form the normal breast structure, these changes produce rather rapid increase in the size and density of the breast, as the result of coordinating action by several hormones , prolactin ,estrogen, progesterone, adrenal. Steroids, insulin, growth hormone, and thyroid hormone. Franz states that estrogen promotes primarily duct growth, while prolactin and progesterone are responsible for lobular development , however, the exact role of these hormones in relation to the breasts is not yet precisely known because each hormone , besides having actions of its own, may also regulate the secretion and activity of other hormone .(Arthur c guyton 2011).

### **2.1.2.4The breasts in adult women**

In adult women, breast character that is, size, fullness, density, and nodularity depend chiefly upon two factors: corpulence and whether or not the breast has functioned. It is my impression that in women who have nursed the breast are softer and less nodular: that is more normal.

Increased density and nodularity are more characteristics of breast that have never functioned..(Arthur c guyton 2011)

### **2.1.2.5Menopausal change in the breasts**

The completion of the menopausal the breasts commonly decrease somewhat in size and be-come less dense. If they have been abnormally nodular, the nodularity usually diminishes

With these postmenopausal physical changes in the breasts there is frequently a decrease in the number and size of gland fields.(Arthur c guyton 2011)

#### **2.1.2.6 Breast changes associated with the menstrual cycle**

In the breast phenomenon of engorgement is normally closely correlated with the menstrual cycle. Engorgement has several components: Increase in the size, density, and nodularity of breasts as well as increase in sensitivity. Most women are conscious of some degree of breast engorgement during the three or four days preceding onset of menstruation and disappear with its completion.

The increase of size, density, and nodularity of the breast is usually not perceived in this term by the patient; she complains only that her breasts are fuller. The great difficulty of measuring lesser variations in breast size makes it virtually impossible to prove that there is a cyclical increase in breast volume.(Arthur c guyton 2011).

#### **2.1.2.7 Change in the breast during pregnancy and lactation**

Within a few weeks after conception the effects of pregnancy are evident in the breasts. They begin to enlarge rapidly, and become more firm. The areolar skin glands become more prominent and the areolar skin darkens. The nipples enlarge and become more erect. These changes are the result of high blood levels of estrogen and progesterone as well as concentration of prolactin originating in the pituitary that increases steadily throughout gestation. Both the duct and lobular element of the breast proliferate dramatically. During the last trimester of pregnancy it is often possible to express a few drops of this yellowish secretion from the nipples.(Arthur c guyton 2011).

Prolactin is one of two hormones of pituitary origin recently identified; it was first measured in human blood in 1970. Frantz considers it to be the breast after parturition there is an abrupt decline in circulating estrogen and progesterone

caused by expulsion of the placenta, while the prolactin level remains high. It is essential for lactation.

The other pituitary hormone concerned with lactation is oxytocin in has a specific effect upon the epithelial cells that constitute an outer layer surrounding the inner layer of milk secreting epithelial cells in the mammary acing.

These my epithelial cells are stimulated to contract by oxytocin thus forcing the milk in to collecting ducts and to the nipples, this hormone” lets down “the milk.

Sucking, as well as psychic factors such as the anticipation of nursing stimulates the production of both oxytocin and prolactin by pituitary (Arthur c guyton 2011).

### **2.1.3 Pathology of the breast**

Breast tissue is susceptible to a number of benign and malignant conditions and it is not to happen.

#### **2.1.3.1 Breast infection**

Breast infection is classified as breast abscesses and mastitis.

#### **2.1.3.2 Breast abscesses**

A breast abscesses is a pain full infection brought on by bacteria. The type of bacteria that most frequently produces breast infection is staphylococcus aureus bacteria can enter through a crack in the skin of the breast or on the nipple. The resulting infection, called mastitis, invades the fatty tissue of the breast leading to swelling and pressure on the milk ducts. An abscess is hollow space in the breast that becomes filled with pus from the infection milk ducts. An abscess can develop in the presence of severe mastitis. In women who are not breastfeeding, an abscess is generally considered a benign lesion of the breast. Mastitis without abscess can be treated with antibiotic, symptoms of breast abscess include pain and

swelling in breast, fever and nipple discharge. Breast abscess is caused by a bacterial infection. The most common type of bacteria involved in breast abscess is staphylococcus aureus. Bacteria enter through a scratch in the skin or atear in the nipple. The resulting infection, called mastitis, invades the fatty tissue of the breast and leadto swelling and pressure on the milk ducts. An abscess, or painful, pus-filled lump, can develop in the presence of severe mastitis.([www.wikipedia.org/breast](http://www.wikipedia.org/breast) cancer.com)

### **2.1.3.3 Mastitis**

Mastitis is an infection of the tissue of the breast that occurs most frequently during the time of breastfeeding. This infection causes pain,swelling, redness, and increased temperature of the breast. It can occur when bacteria, often from the baby'smouth. Enter a milk duct through a crack in the nipple. This causes an infection and painful inflammation of the breast, breast infection most commonly occur one to three months after the delivery of a baby, but they can occur in women who have not recently delivered as well as in women after menopause. Other causes of infection include chronic mastitis and a rare form of cancer called inflammatory carcinoma, if mastitis is left untreated, an abscess can develop in the breast tissue, and this type of infection may require surgical drainage.([www.wikipedia.org/breast](http://www.wikipedia.org/breast) cancer.com)

### **2.1.3.2Breast masses**

#### **2.1.3.2.1Benign masses**

Most breast masses are benign (not cancerous). Possible causes for a benign breast mass include, but are not limited to, fibrocystic breast disease, infection, a benign tumor, and a reaction to medicine. Although most breast masses are benign, you

should always contact your physician if you discover a lump in your breast, tests and procedures that can help detect whether a breast mass is benign include physician examination mammogram, ultrasound, and breast biopsy, a breast biopsy may be performed to determine if the mass is benign. During a breast biopsy, a part or entire mass may be removed and will be sent to pathology for testing ([www.wikipedia.org/breast](http://www.wikipedia.org/breast) cancer.com).

#### **2.1.3.2.2 Breast cancer**

Malignant breast neoplasm is cancer originating from breast tissue, most commonly from the inner lining of milk ducts or the lobules that supply the ducts with milk, cancer originating from ducts are known as ductal carcinoma; those originating from lobules are lobular carcinoma. Breast cancer is a disease of humans and other mammals; while the overwhelming majority of cases in humans are women, men can also develop breast cancer. The size, stage, rate of growth, and other characteristics of the tumor determine the kinds of treatment.

Treatment may include surgery, drug, (hormonal therapy and chemotherapy), radiation, and/ or immunotherapy. Surgical alone being capable of producing a cure in many cases to somewhat increase the likelihood of long-term disease-free survival, several chemotherapy are commonly given in addition to surgery. Most form of chemotherapy kill cells that are dividing rapidly anywhere in the body, and as a result causes temporary hair loss and digestive disturbances. Radiation is indicated especially after breast conserving surgery and substantially improves local relapse rates and in many circumstances also overall survival. Some breast cancers are sensitive to hormones such as estrogen and / or progesterone, which make it possible to treat them by blocking the effects of these hormones. Signs and symptoms first noticeable of breast cancer is typically a lump that feels different from the rest of the breast tissue more than 80% of breast cancer cases are

discovered when the women feels a lump, the earliest breast cancers are detected by mammogram, lumps found in lymph nodes located the armpits can also indicate breast cancer.

Indications of breast cancer other than a lump may include changes in breast size or shape, skin dimpling, nipple inversion, or spontaneous single-nipple discharge. Pain (“mastodynia”) is an unreliable tool in determining the presence absence of breast cancer, but may be indicative of other breast health tissues.

Inflammatory breast cancer is a particular type of breast cancer which can pose a substantial diagnostic challenge, symptoms may resemble breast inflammation and may include itching, pain, swelling, nipple inversion, warmth and redness the breast, as well as an orange-peel texture to the skin referred to as peau d’ orange; the absence of a discernible lump detection dangerously reported symptom complex of breast cancer is Paget’s disease of the breast. This syndrome presents as eczematous skin changes such as redness and mid flaking of the nipple skin .asPaget’s advances symptoms may include tingling, itching, increased sensitivity, burning, and pain. There may also is discharge from the nipple. Approximately half of women diagnosed with Paget’s also have a lump in the breast.

In rare cases, what initially appears as fibro adenoma (hard movable lump) could in fact be a phylloid tumor? Phyllodes tumors are formed within the stoma (connective tissue) of breast and contain glandular as well as stromal tissue.

Phyllodes tumors are not staged in the usual sense; they are classified on the basis of their appearance under microscope as benign border line, or malignant.

Occasionally, breast cancer presents as metastatic disease, that is , cancer that has spread beyond the original organist metastatic breast cancer will cause symptoms that depend on the location of metastasis. Common sites of metastasis include bone, liver, lung and brain; unexplained weight loss can occasionally herald a sometime be manifestations of metastatic breast cancer, as can jaundice or neurological



symptoms. These symptoms are called be manifestations of much other illness, most symptoms of breast disorders, including most lumps; do not turn to represent underlying breast cancer.

Type of breast cancer there are several different type of breast cancer, some types are more common than others commonly diagnosed non –invasive breast cancer, the cancer is confined to the ducts of the breast , thus of the being referred as non-invasive. Rarely does it spread outside the ducts. If it stays within the ducts, the five year survival rate is almost 100%. There are different forms of ductal carcinoma in situ.

Lobular carcinoma in situ is not usually classified as cancer. It is a condition indicating a sudden increase of cells in the lobules. This can indicate a higher chance of developing breast cancer, the good news is a great majority of lobular carcinoma in situ cases never develop cancer; patients are monitored closely and may be given hormone therapy to prevent cancer.

Infiltrating Ductal Carcinoma or Invasive Carcinoma this type of breast cancer accounts for 80% of all breast cancer diagnoses, infiltrating ductal carcinoma is indicative that cancer has broken through the ducts and has invaded neighboring fatty tissue.

Infiltrating lobular carcinoma or invasive lobular carcinoma this is a very difficult form of breast cancer. It initially develops in the lobules( milk ducts) but spreads to other parts of the body , infiltrating lobular carcinoma is responsible for 10-15% of breast cancer cases.

There are other types of breast cancer which are less commonly diagnosed, such as Mucinous Carcinoma (colloid carcinoma) this type of breast cancer is formed from mucus producing cancer cells. Although rare, it carries a better prognosis than many invasive breast cancer types:

Medullary carcinoma this type of breast cancer account for about 5% of breast cancer cases. It is invasive and form a distinct boundary between healthy and tumor tissue. It is often hard to tell the difference between type and invasive ductal carcinoma, tubular carcinoma: named after the shape of cell under a microscope, tubular carcinoma is a type of invasive breast cancer. It has a better prognosis than most common invasive breast cancers, inflammatory: this type of breast cancer is usually detected at advanced stages. It causes the skin to have an orange peel appearance and it may become reddened. It is mistaken for mastitis. Inflammatory breast cancer account for 1-4% of breast cancer cases,

Paget's disease of the nipple this type of breast cancer is extremely rare. It affects the nipple and areola of the breast. It can be mistaking for eczema because of the scaling and itchiness it produces, and phylloides tumor: these tumors develop in the connective tissue of the breast, making it a sarcoma, not a carcinoma. The tumor can grow to be very large, and it removed by surgery, it does not respond to treatments used for other type of breast cancer ([www.wikipedia.org/breastcancer.com](http://www.wikipedia.org/breastcancer.com))

#### **2.1.4 Mammography Equipment**

Mammography is special type of x-ray imaging used to create detailed images of the breast. Mammography plays a major role in early detection of breast cancer, about 75% of cancer are detected at least a year before they can be palpable. Mammography uses allow- dose ionizing radiation .which may be harmful to **the** patient nevertheless the benefits of mammography far out the risks and inconvenience.(Radial2001).

Mammography uses low KVp achieved by using targets made of low atomic weight alloys (e.g. molybdenum and rhodium). Filters made of aluminum, molybdenum. Beryllium, rhodium, or palladium is used. it uses high –contrast, high – resolution(with single – sided emulsion )film to demonstrate micro calcifications smaller than 1m . kvp techniques the focus to distance is 1 in range( 60-65) cm .(Radial 2001)

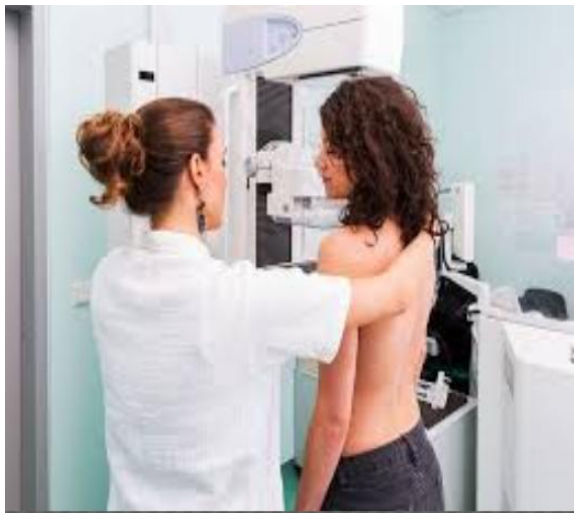
### **Automatic exposure control (ATC)**

This automatically control the exposure duration, so that optimum optical density of mammogram is maintained over a wide range of different breast size and densities.



### 2.1.5 Projections of mammography

For screening mammography, each breast is imaged separately, typically in both the crania-caudal (CC) and media-lateral- oblique (MLO) views. For diagnostic mammography, each breast is imaged separately in CC, MLO, and supplemental views tailored to specific problem. these supplemental views can include lateral-medial ( LM)and media- lateral (ML) views exaggerated views, magnification views spot compression views, and other . special skin markers are sometimes used to identify certain lesions, skin abnormalities, the nipple , and other areas (Roentgen 1986; 147;149).



**Fig 2.3 Craniocaudal (CC) projection**([www.wikiradiograph.org](http://www.wikiradiograph.org))



**Fig 2.4 Medio- lateral-oblique(MLO) projection.**([www.wikiradiograph.org](http://www.wikiradiograph.org))

### 2.1.6 Normal mammographic anatomy

The mammographic appearance of breast depends on the relative amounts of the glandular tissue which is present. The young woman contains a large proportion of glandular tissue which appears as soft density on the mammogram in older women , when involution of the glandular tissue has occurred most of the breast tissue

appears as fatty density . During involution; there is a mixture. of soft tissue and fatty density appearance.(Welling SR wolef radiographic appearance1990)

The junction between the subcutaneous, retro-mammary fat layer and the glandular tissue should consist of a series of curved margins. Straightening or distortion of these margins may indicate the presence of underlying pathology in the glandular tissue. Other normal structures visible on the mammogram include nipple skin, blood vessel, and ducts, cooper’s ligaments and axillary lymph nodes..(Welling SR wolef radiographic appearance1990)

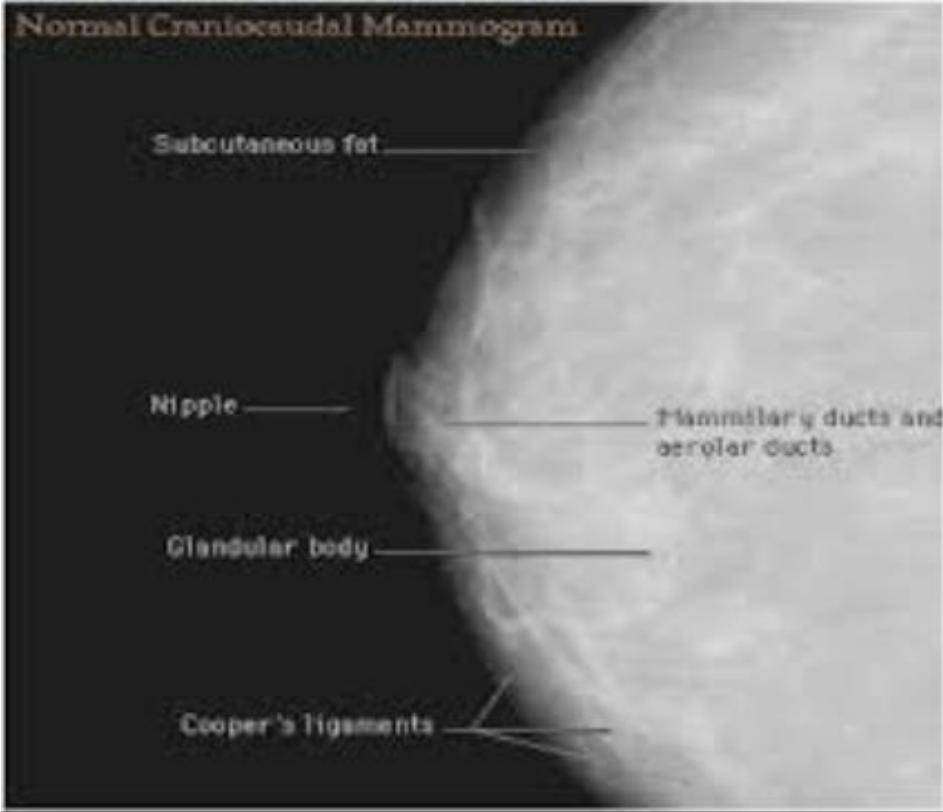


Fig 2.5 normal mammogram appearance of breast  
Crania-caudal view(www.wikiradiograph.org)

The nipple and areola The technically adequate mammogram will show the nipple as a soft tissue density in profile projecting from the breast. Potential pitfall in interpretation is a nipple that has placed in profile at it may be misdiagnosed as breast mass. The areola is a soft tissue density situated centrally and anteriorly on the normal study is difficult to see in most female..(Welling SR wolef radiographic appearance1990)

The skin the epidermis and dermis of the skin measure 0.5-2.0mm histological mammographic ally the skin image appear as a thin line of soft- tissue density surrounding the breast. Normal mammography skin thickness is 0.8-3.0mm with the thickest areas located medially and inferiorly..(Welling SR wolef radiographic appearance1990)

Subcutaneous fat the normal breast contains a layer of fat of varying thickness and distribution just beneath the skin and circumferentially surrounding parenchyma element. This fat should be uniform in density throughout without distortion. at irregular intervals throughout the lobules of fat are soft-tissue strands 1-2mm in thickness which take a curved course from the breast parenchyma to the inferior surface of the skin. These arecooper's ligaments, in the underlying adjutant parenchyma. Straightening or thickening of cooper'sligaments may indicate pathology.(Welling SR wolef radiographic appearance1990)

Breast parenchyma and stromal the majority of soft tissue density on mammogram is made of the breast parenchyma and its surrounding tissue. The stromal in the normal female are concentrated in the upper outer quadrant and sub areolar of the of breast and are usually symmetric Asymmetry however is not unusual and without other clinical or mammography abnormalities should not be considered suspicious .Some women however should be followed more closely because of this finding.

In the premenopausal nulliparous women these glandular elements are very dense and occupy most of the volume of the breast. In the lactating breast this tissue is more prominent and shows even more density because of enlarged milk producing structures in both of these instances soft-tissue masses may be obscured by these normal glandular elements. Other extreme is in the post- menopausal female after the glandular elements have involutedly histological glandular structures are still present but are too small to be imaged on the mammogram.(Welling SR wolef radiographic appearance1990).

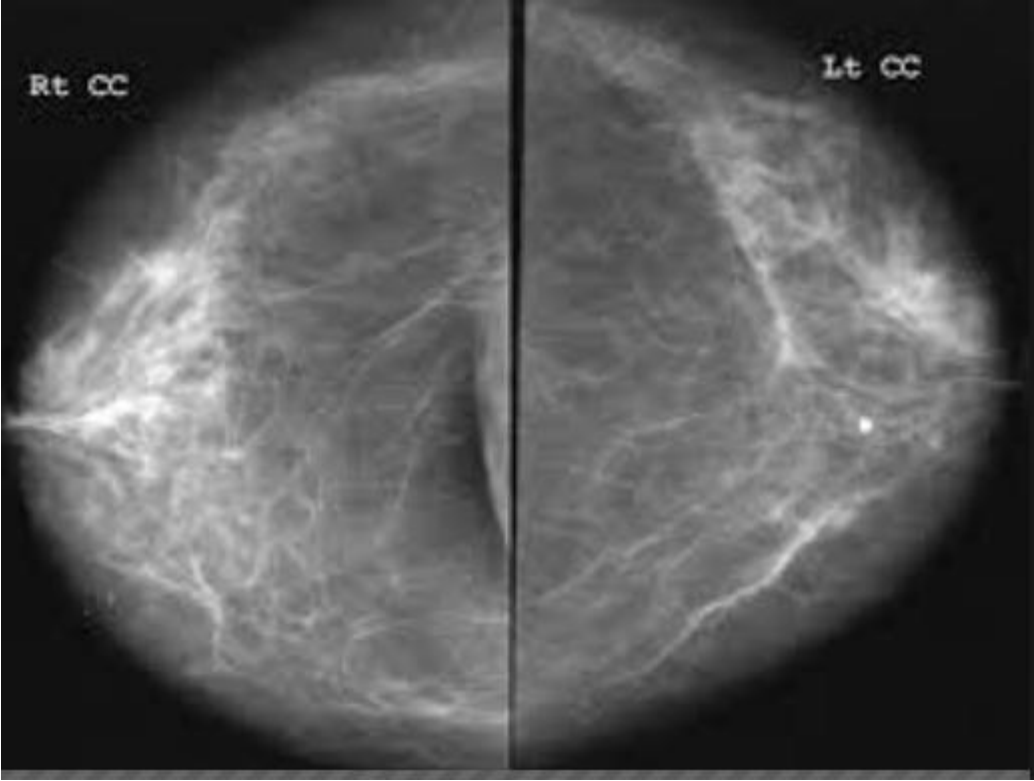


Fig 2.6 crania-caudal view shows blood vessel clear  
([www.wikiradiograph.org](http://www.wikiradiograph.org))

There are most commonly visualized in atrophic breast as linear undulating soft – tissue densities. Veins are usually larger than arteries and do not show atherosclerotic changes. Arteries are usually smaller and in older women may show typical linear calcifications. There are no documented relationship between arterial calcification to anything other than aging.(Welling SR wolef radiographic appearance1990).

Infra mammary lymph nodeThese are well-demarcated soft tissue densities range in size from 2mm to 3cm and generally located in the upper outer quadrants of the breast they should show central fatty helium to be definitely classified nodes.(Welling SR wolef radiographic appearance1990).

## **2.2 previous studies**

Relationship between calcification and breast cancer Dr. Smith 2011

Dr. Harness and Dr. Robert Smith of the American Cancer Society explain micro calcifications, which are often a concern for women as they show up as white spots on a mammogram. "Calcifications are normal in the breast," says Dr. Smith. "Generally most women will have at least some. They also tend to be associated with abnormalities and they tend to be associated with cancer.

Benign Breast Diseases: Classification, Diagnosis, and ManagementCatherine 2015Benign breast diseases constitute a heterogeneous group of lesions including developmental abnormalities, inflammatory lesions, epithelial and stromal proliferations, and neoplasms. In this review, common benign lesions aresummarized and their relationship to the development of subsequent breast cancer is emphasized.



## **Chapter three**

### **Material and method**

This study was done in university of Gezira (university Diagnostic centre) march 2016.

#### **3.1 Materials**

##### **3.1.1 Sample of study**

35 female patients their ages range from 42 to 75 years , with different symptoms which are pain, breast mass and nipple discharge. We are examined for breast mammography.

##### **3.1.2 Machine used**

Lilyum x-ray machine. Total filtration (compression plate included): 0.5 mm.

#### **3.2 Methods**

##### **3.2.1 Technique used**

###### **1-Cranio-Caudal View:**

The mammography equipment is positioned with the X-ray beam axis pointing vertically downwards.

The women faces the machine, with her arms by her sides .she is standing and is rotated 15-20 degrees to bring the side under examination close to the horizontal breast-support table. The table is at the level of the infra-mammary crease.

## **2- 45-degree medio-lateral oblique View:**

The mammographic equipment is routinely angled at 45 degree from the vertical, however, the precise angulation required will depend on the women.

The women faces the equipment , with the breast about to be examined closer to the breast –support table. She has her feet apart for stability ,in preparation for the leaning she will have to do later to achieve the correct position.

### **3.2.2 Data collection**

The data were collected by clinical data sheets and mammography image.

### **3.2.3Image Interpretation**

Mammogram results using a common language. The radiologist assigns a single digit BI-RADS score (ranging from 0 to 5) when the report of your mammogram is created.

Category 0 means: identifies a mammogram study that is not yet complete. You need to make sure that further evaluation is completed, perhaps extra mammography views or an ultrasound. Further information is needed to make a final assessment (codes 1 to 5).

Category 1 means: mammogram was negative (, no cancer) and that you should continue your routine screening.

Category 2 mean: mammogram was normal (no cancer), but other findings (eg, cysts) are described in the report. You should continue your routine screening.

Category3 means: mammogram is probably normal but a repeat mammogram should be completed in 6 months. The chance of breast cancer is approximately 2%

in this category. You should make sure that these follow-up mammograms are completed as requested.

Category 4 means that the findings mammogram are suspicious and that there is approximately a 23% to 34% chance that this is breast cancer. You will need a *biopsy* to get a small tissue sample to make a diagnosis.

Biopsy is done to obtain a piece of the breast tissue to determine whether there is cancer. The biopsy may be done using a needle technique (a “needle biopsy”) or may require a surgical operation (a “surgical biopsy”). When a needle biopsy is an option, it is usually preferred.

Category 5 means amammogram results are highly suspicious with a 95% chance of breast cancer. You will need to have a *biopsy* for diagnosis.(American College of Radiology).

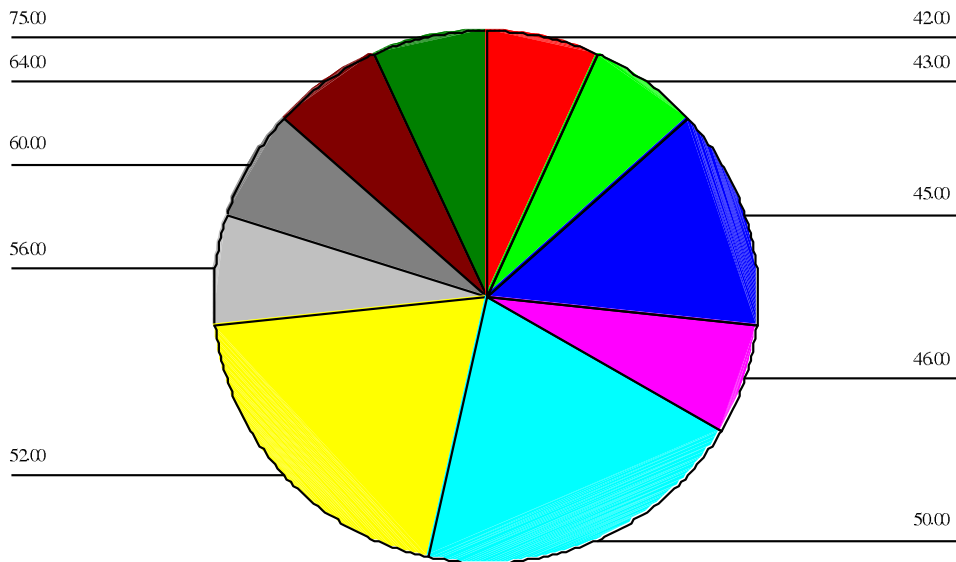
## Chapter four

### Results

This chapter aimed to description the statistical of the data among 35 patients between the age of ( 42-72) and all of them suffer from problems in the breast (such as breast tumors and infections to or discharge from the breast).

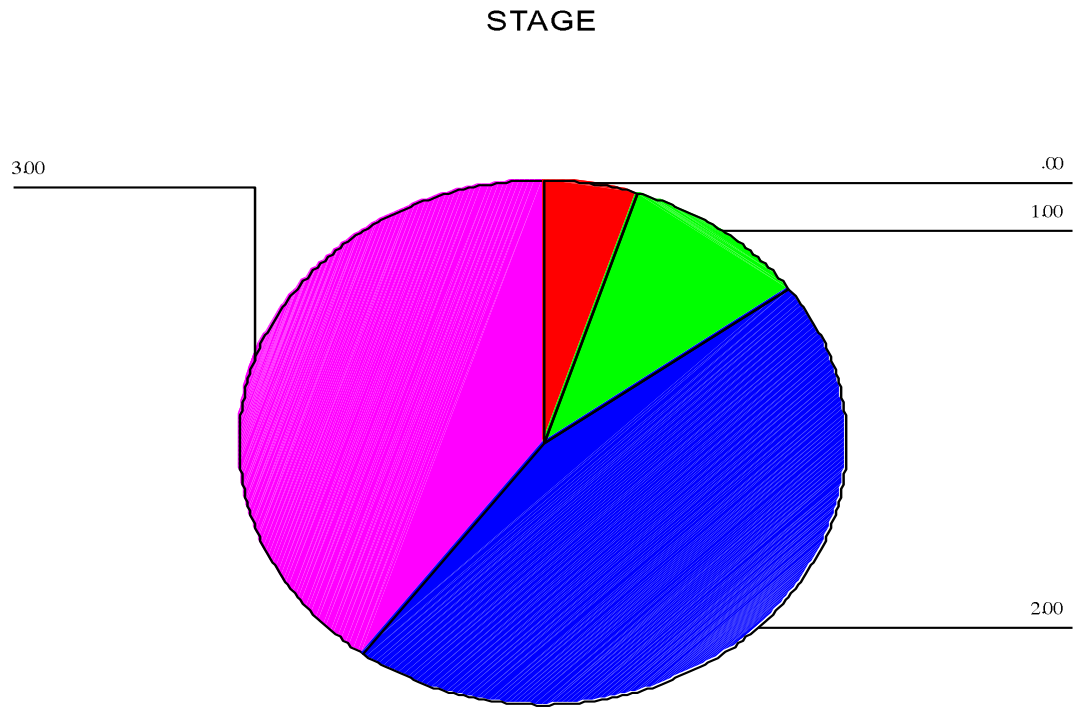
1.

AGE



:

Fig (4.1) shows for disturbance age in normal group



Fig(4.2)shows the stage in normal group

# LESION

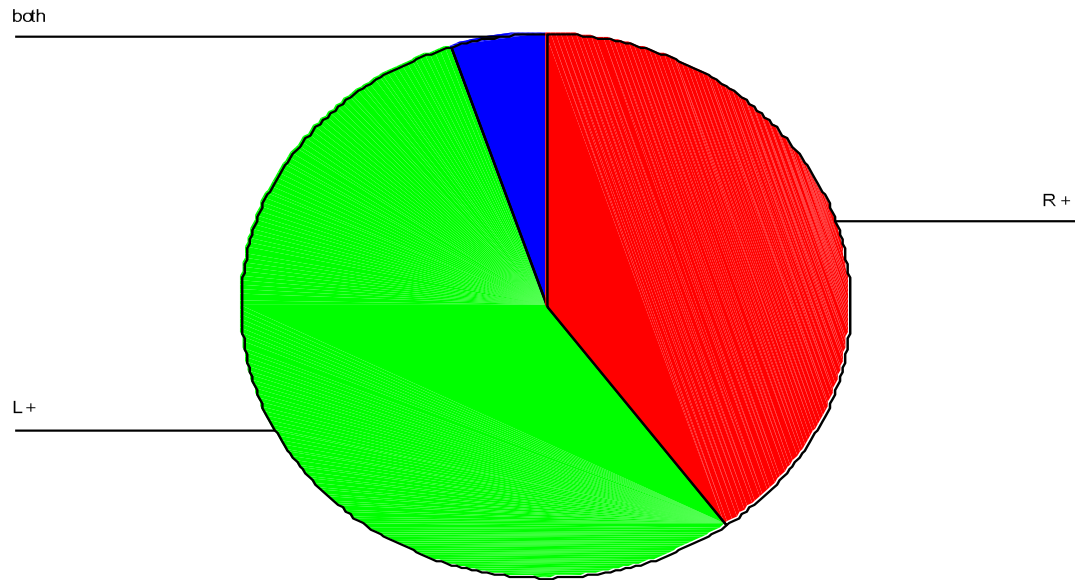


Fig (4.3) shows the site of lesion in normal group

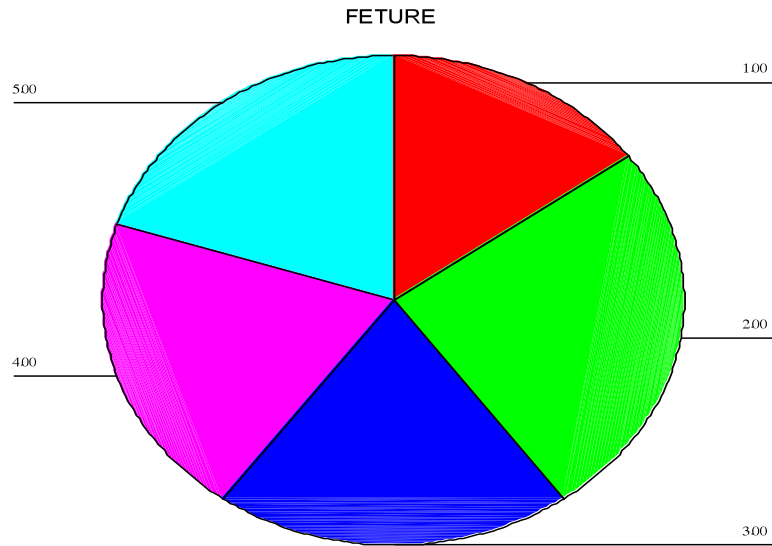


Fig (4.4) shows the radiographic feature in normal group

- Subcutaneous
- Well define
- Increase density
- Macrocaification
- Focal lesion

**Abnormal**

**AGE**

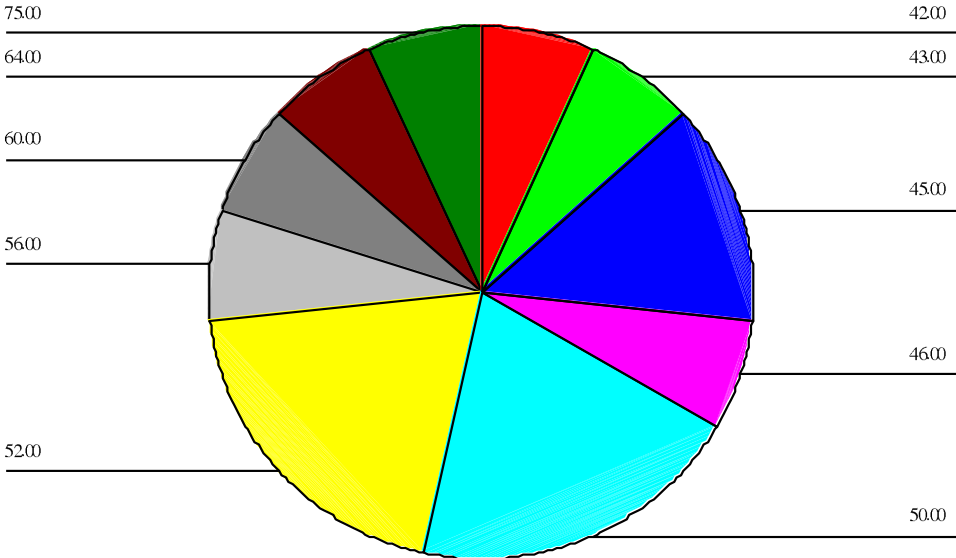


Fig (4.5) shows the disturbance age in abnormal group



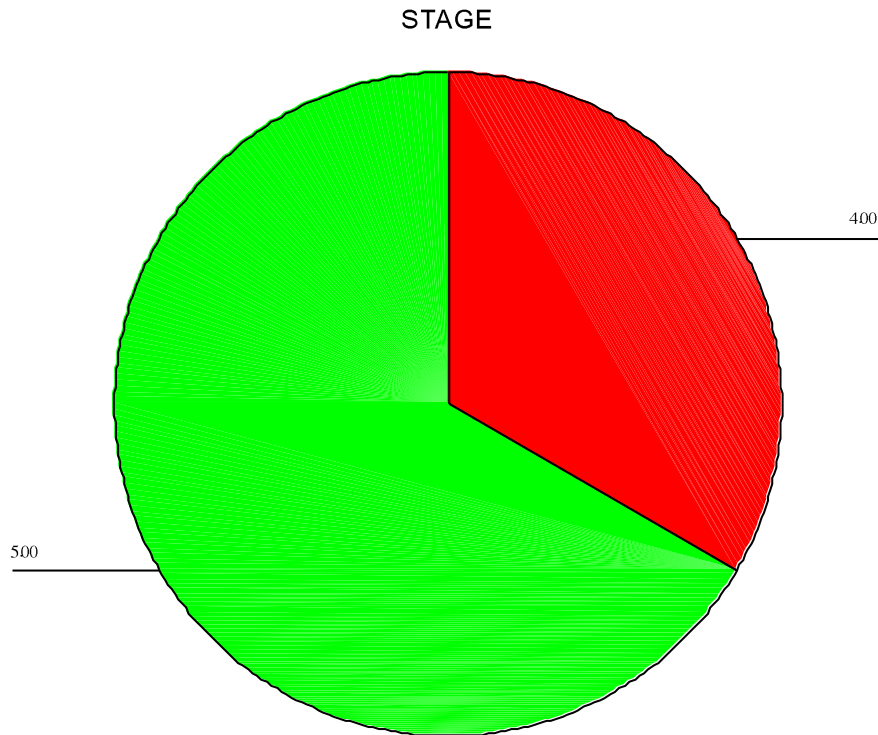


Fig (4.6) shows the stage in the abnormal group

LESION

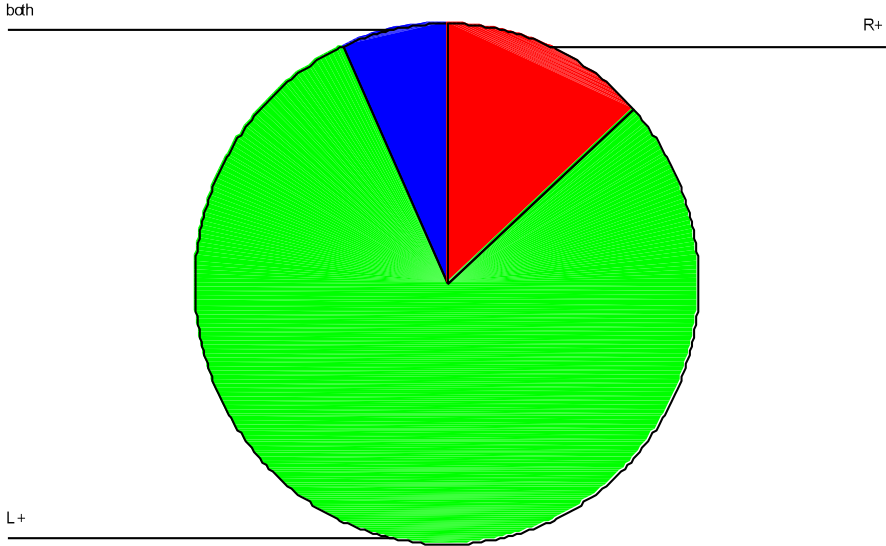


Fig (4.7) shows the site of lesion in abnormal group

# FETURE

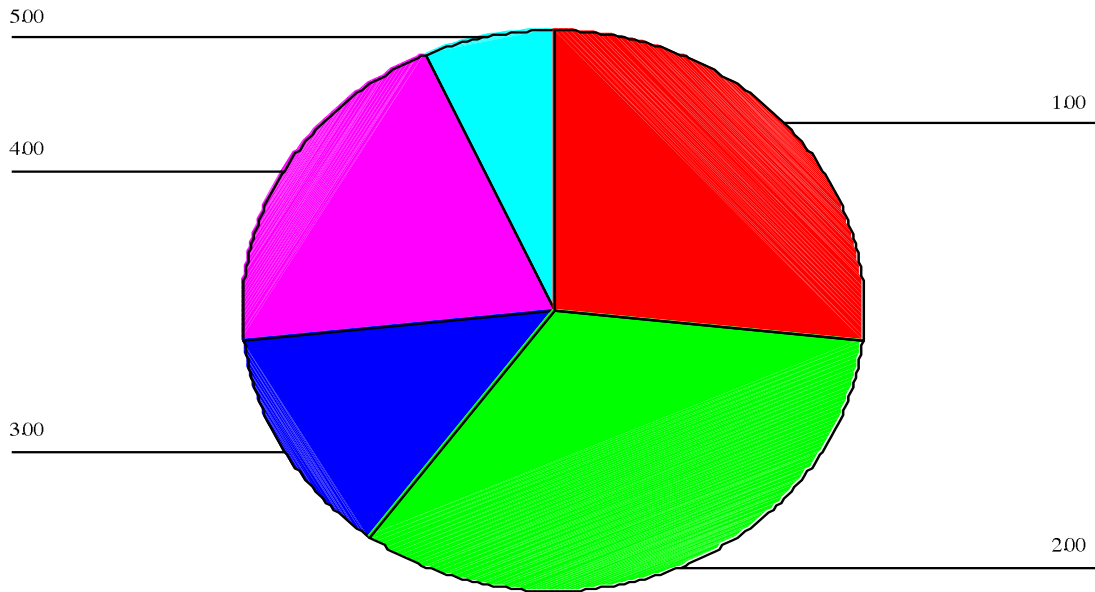


Fig (4.8) shows the radiographic feature in abnormal group

- Ill define
- Microcaification
- Homogenous
- Enlargement L-N
- Round mass

## Chapter five

### Discussion, conclusion, and recommendation

#### 5.1 Discussions:

The main finding of the study can be sum in the following:

The mean age in normal group 42-45 20% and in abnormal was 50-52 25%.

The site of lesion in normal group left 55%, right 40%, both 5% and in abnormal group the site of lesion in left 80% , right 13.3% , both 6.7% .

In normal group the stage 0 5%, stage 1 10%, stage 2 45%, stage 3 40%, and in abnormal the stage 4 33.3, and stage 5 66%.

The radiographic feature of normal group was subcutaneous 15% , well define 25% , increasing of density 20% , macrocification 20% focal lesion 20 % and in abnormal group was ill define 26% , microcaifiction 33% homogenous 13% , enlargement of L N 20% , and round mass6.7%.

I disagree with study relationship between calcification and breast cancer he say calcification are normal in the breast, in my study the microcalcification associated with cancer of breast and macrocaifiction indicated benign lesion.

I agree with study benign breast diseasesclassification, diagnosis, and management benign breast diseases constitute a heterogeneous group of lesions including developmental abnormalities inflammatory lesions, epithelial and stromal proliferation in my study malignant lesion are homogenous feature and benign lesiom are heterogeneous .

## **5.2 Conclusions:**

### Study of Breast Disease Using Mammography

The main finding of the study can be summed in the following:

- Mammogram is important for demonstrating stage of breast cancer.
- Mammogram is very informative in demonstrating the main objective of this study is to evaluate the site and shape of lesion.
- Mammogram is important in demonstrating the radiographic feature of lesion.

### **5.3Recommendations:**

Health education for breast self-examination (B.S.E) monthly (preferred to be after menses), and routine clinical examination by a trained staff , will help in early detection of any breast mass whatever the pathology is, and increase the chance for treatment and cure, also it reduces the mortality rate in female with breast cancer.

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## APPENDIX 1

| NO | STAGE | SITE OF LESION | AGE | RADIOGRAPHIC FEATURE |
|----|-------|----------------|-----|----------------------|
| 1  | 0     | 2              | 55  | 1                    |
| 2  | 1     | 2              | 53  | 1                    |
| 3  | 1     | 1              | 47  | 2                    |
| 4  | 1     | 1              | 45  | 3                    |
| 5  | 2     | 2              | 42  | 1                    |
| 6  | 2     | 3              | 42  | 1                    |
| 7  | 2     | 1              | 50  | 2                    |
| 8  | 2     | 2              | 65  | 3                    |
| 9  | 2     | 1              | 60  | 4                    |
| 10 | 2     | 1              | 60  | 5                    |
| 11 | 2     | 2              | 55  | 4                    |
| 12 | 2     | 1              | 42  | 2                    |
| 13 | 3     | 2              | 54  | 3                    |
| 14 | 3     | 2              | 53  | 4                    |
| 15 | 3     | 2              | 49  | 2                    |
| 16 | 3     | 1              | 52  | 5                    |
| 17 | 3     | 1              | 52  | 1                    |
| 18 | 3     | 2              | 50  | 2                    |
| 19 | 3     | 2              | 55  | 3                    |
| 20 | 3     | 1              | 42  | 3                    |
| 21 | 4     | 1              | 54  | 4                    |
| 22 | 4     | 2              | 56  | 5                    |
| 23 | 4     | 1              | 50  | 5                    |
| 24 | 4     | 2              | 42  | 4                    |
| 25 | 4     | 2              | 45  | 1                    |
| 26 | 5     | 2              | 46  | 2                    |
| 27 | 5     | 2              | 43  | 3                    |
| 28 | 5     | 2              | 50  | 4                    |
| 29 | 5     | 2              | 52  | 5                    |
| 30 | 5     | 2              | 75  | 1                    |
| 31 | 5     | 2              | 42  | 1                    |
| 32 | 5     | 2              | 50  | 2                    |
| 33 | 5     | 2              | 65  | 2                    |
| 34 | 5     | 2              | 52  | 1                    |
| 35 | 5     | 2              | 60  | 4                    |



## APPENDIX2

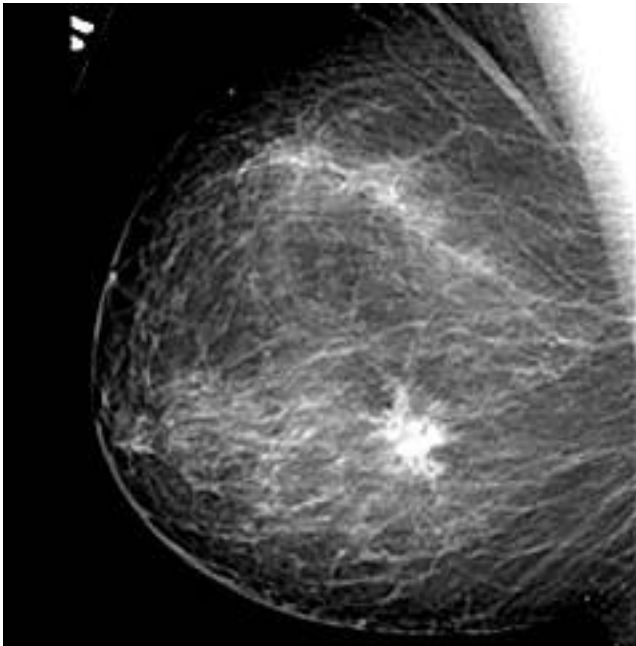


Image 1 female 72 years show microcalcification



Image2 female 55 years shows breast cancer stage 4

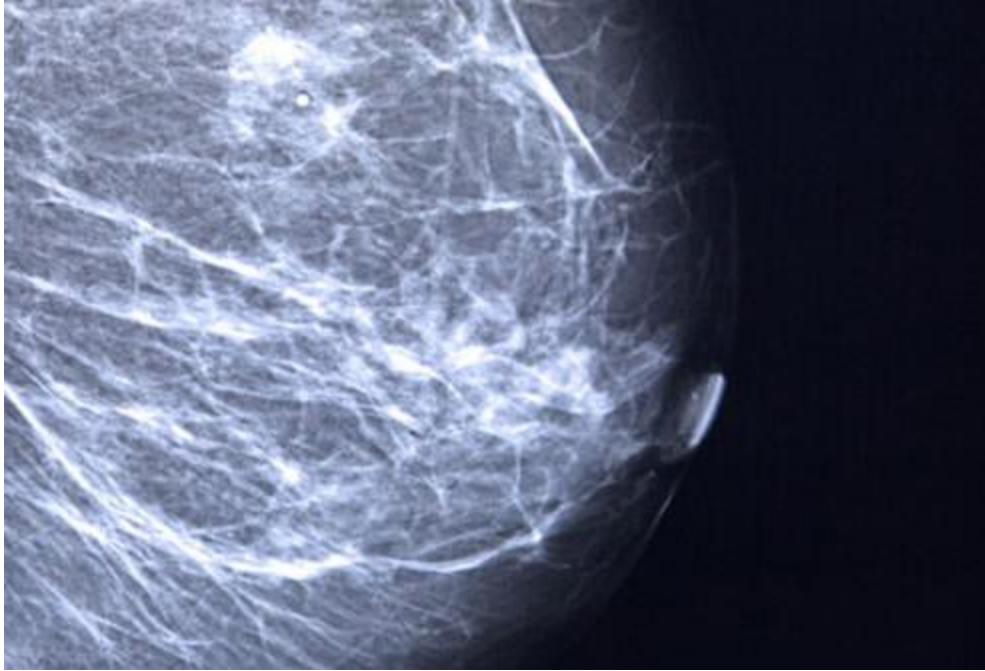


Image3 female 59 years shows breast cancer stage 5