

Dedication

I dedicate the fruits of this thesis to my parents who have been encourage and fostering me throughout my child hood as well as my school hood so as to render me as an icon of steady and success. Also to my brothers and sisters who have been sincerely supporting me to so in the realm of education and research, to all those who helped in to layout this humble work with kind regards to them.

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List of abbreviations:

Ca: cancer

IMC: Internal mammary chain

CT: computed tomography

HU: Hounsfield unit

MRI: magnetic resonance imaging

NM: nuclear medicine

⁹⁹MO: Molybdenum

^{99m}Tc: Technetium

KeV: kilo electron volt

Ge: Germanium

Ga: Gallium

RICK: Radiation isotopes center of Khartoum

DCIS: ductal carcinoma insitu

LCIS: Lobular carcinoma insitu

Not: Not otherwise specified

IDC: Invasive ductal carcinoma

ILC: Invasive lobular carcinoma

HRT: Hormone replacement therapy

PHT: Postmenopausal hormone therapy

ERT: Estrogen replacement therapy

BRCA1: Breast cancer gene 1

BRCA2: Breast cancer gene 2

TNM: Tumor, Nodes and metastasis

SPECT: Single photon emission computed tomography

NaI: Sodium iodide

TL: Thallium

Sn²⁺: Stannous ion

SK: Skull

Rib: Ribs

Clavic: Clavicle

Humrs: Humerous

CV: cervical vertebrae

DV: Dorsal vertebrae

LV: Lumbar vertebrae

SV: Sacral vertebrae

Pelvic B: Pelvic Bone

ShJ: shoulder joint

HJ: Hip joint

KnJ: Knee joint

Rt breast: Right breast

Lt breast: Left breast

UNFPA: United Nations Population Fund

Abstract

Bone Scintigraphy is the one of the most significant study for detection of early occurrence of cancer as well as revealing of early metastasis; therefore it has been used to evaluate the metastasis from the breast cancer to the general skeletal system and the relative biography among breast cancer women.

The sample taken for this study consisted of one hundred and fifty (150) patients with age ranging between 25 to 90 years old, who were being scanned by gamma camera (Dual Head SPECT and whole body scanning, Manufactures:(Mediso Medical System) using ^{99m}Tc -MDP. The collected data from scanned patients and patient's biography were analyzed by Excel software.

The results showed that: the cancer incidence was so predominant at the left breast with a percentage of 50.7% relative to right breast while the incidence of bilateral breast cancer was very rare, and the common age of breast cancer incidence was between 40-55 years old which represent 33.3% and 24% in women with age range of 25-40 years old relative to rest ages groups.

Also the study reveal that: the common regions of skeletal system where the cancer cells could be seeded to establish secondary tumors from the right breast cancer were lumbar vertebrae with a percentage of 26.7%, the dorsal vertebrae with a percentage of 14, the pelvic bone with a percentage of 10%, the cervical vertebrae with a percentage of 8.7%, the skull with a percentage of 7.3% and femur bone with percentage of 6.7%. While the common regions of secondaries from left breast were Lumbar vertebrae with a percentage of 22%, the dorsal vertebrae with a percentage of 19.3%, the pelvic bone with a

percentage of 12.7%, the ribs with percentage of 11.3%, the cervical vertebrae with a percentage of 10.7% and the femur bone with a percentage of 10%.

The results from right and left breast could deduce that a 56% of bone metastasis was occurred in patients who had left breast cancer.

Also the study reveals that the most common regions targeted by migrated cancer cells were the vertebrae (Lumbar and dorsal vertebrae) then the pelvic bone and the ribs.

The study also showed that the metastasis from right breast cancer to lung was greater relative to left breast cancer with a percentage of 2% and 1.3% respectively, which were encountered with late stages only.

Regarding the cancer patients who were received external radiotherapy course, the study revealed that some of them who were categorized as stage II; in fact they have already circulatory system cancer spread which was not detected by bone scintigraphy during the clinical process, which in turn leading some patients to come back suffering of metastatic symptoms.

الخلاصة

تصوير العظام من أهم الدراسات ذات الدلالة للاكتشاف المبكر للسرطان والظهور المبكر لانتشاره، لذلك استخدم لتقييم انتشار سرطان الثدي إلى الهيكل العظمى وبعض الجوانب المتعلقة بالمرضى. والعينة التي أخذت لهذه الدراسة تتكون من مائة وخمسون مريضة وأعمارهن تتراوح بين 25-90 سنة واللاتي صورن بجهاز الـ قاما كاميرا ثنائي الرأس وبمادة صيدلانية إشعاعية (تكنشيوم - ميثالين - ثنائي الفوسفيت)

البيانات المجمعة من صور المرضى والسيرة الذاتية للمرضى حلت ببرنامج اكسل. أوضحت النتائج إن حدوث السرطان سائد في الثدي الأيسر بنسبة 50.7 % مقارنة بالثدي الأيمن بينما حدوثه في كل من الثديين مع بعضهما نادر جدا. وأكثر الأعمار لحدوث سرطان الثدي يتراوح بين 40-55 سنة بنسبة 33.3% و 24% من النساء يتراوح عمرهن بين 25-40 سنة منسوبة إلى بقية الأعمار. وأيضا أظهرت الدراسة إن أكثر المناطق في الهيكل العظمى التي تغرس فيها الخلايا السرطانية لتأسيس الورم الثانوي من الثدي الأيمن هي الفقرات البطنية بنسبة 26.7% والفقرات الظهرية بنسبة 14% وعظم الحوض بنسبة 10% والفقرات العذقية بنسبة 8.7% والجمجمة 7.3% وعظمة الفخذ بنسبة 6.7%. بينما أكثر المناطق شيوعا للثانويات السرطانية من الثدي الأيسر هي الفقرات البطنية بنسبة 22% والفقرات الظهرية بنسبة 19.3% وعظم الحوض بنسبة 12.7% والضلوع بنسبة 11.3% والفقرات العذقية بنسبة 10.7% وعظمة الفخذ بنسبة 10%.

النتائج من الثدي الأيمن والأيسر دلت على إن 56% من الورم الثانوي في العظام يحدث في المريضات اللاتي لديهن سرطان الثدي الأيسر. وأيضا الدراسة بينت إن أكثر المناطق استهدافا بواسطة الخلايا السرطانية المهاجرة هي الفقرات البطنية والظهرية وعظم الحوض والضلوع.

وضحت الدراسة إن انتشار الورم من الثدي الأيمن للرئة أكثر من الأيسر بنسبة 2% إلى 1.3% في المراحل المتأخرة للمرض فقط.

فيما يتعلق بمريضات سرطان الثدي اللاتي تلقين علاج إشعاع خارجي، أوضحت الدراسة عليهن إن اللاتي صنفن بمرحلة المرض الثانية (stage II) في الواقع هن بالفعل لديهن انتشار للثانويات السرطانية

في الجهاز العظمي الذي لم يتم اكتشافه بفحص العظام بالنظائر المشعة خلال الفحص السريري , مما أدى لعودة بعض المرضى يعانون من أعراض انتشار الورم.