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ASSESEMENT OF MEAN GLANDULAR DOSES IN SOME SELECTED HOSPITALS IN LAGOS STATE

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ABSTRACT

Mammography is the x-ray examination of the breast tissues and it's helpful in the early detection of breast diseases. The radiation dose absorbed during mammography is a risk factor since it can trigger carcinogenesis.

OBJECTIVES: To determine the mean glandular dose in the hospitals studied.

METHOD: This study was a prospective cross-sectional study. Sixty-seven Women who volunteered were involved in the study. 4 hospitals in Lagos State were selected. Thermoluminiscent dosimeter (TLD) chips were placed on the breast and exposed for both the Cranio-caudal (CC) and medio-lateral oblique views (MLO) of the breast. The TLD chips were then read with a TLD reader.

RESULT: The result showed an average mean glandular dose of 0.74mGy and the calculated mean glandular dose for CC and MLO views were 0.33-6.41mGy and 0.28-8.59mGy respectively.

CONCLUSION: The average mean glandular doses are below the recommended published guidance level of 3mGy for mammography.

Keywords: Mean glandular dose, Mammography, Thermoluminiscent dosimeters, Mediolateral oblique, Cranio-caudal

INTRODUCTION

Breast cancer is the most common cancer in women worldwide. It is also the leading cause of cancer death in less developed countries[1]. Globally, breast cancer represents one in four cancers in women since 2008. Worldwide breast cancer incidence has increased by more than 20%. Mortality has also increased by 14 %[2]. In Nigeria it is the commonest cancer and majority occurs in pre-menopausal women with the peak age in the 5th decade[3]. With the increasing use of diagnostic x-ray machines across Lagos, relevant international bodies have proposed the use of reference dose levels to help manage radiation dose[4,5]. Research has also shown that adherence to radiation protection practices among Radiographers in Lagos metropolis was poor and most x-ray machines in use are quite old with no evidence of quality assurance and quality control[6]. Mammography is the x-ray examination of the breast tissues using low energy x-rays for screening and diagnosis. We have two projections used in screening mammography: Medio-lateral and Cranio-caudal projections. We also have two types of mammography examination namely: Diagnostic mammography-this is carried out symptomatic women while Screening mammography is carried out on asymptomatic women[7]

The goal of mammography is the detection, characterization and evaluation of findings suggestive of breast cancer and other diseases[8]. In a study to determine entrance surface doses at the third quartile for adult radiographic Examinations and compare them with national and international established dose reference levels. The mean ESD for chest PA, Abdomen AP and AP lumbar spine were 0.603, 2.57, 2.58mGy respectively[9]. The value of PA chest was higher compared to other national and international reference dose levels. It is therefore pertinent to assess the mean glandular doses to the breast in Lagos state

The radiation dose absorbed by the breast is called Mean glandular dose (MGD) and it is suggested as a risk factor in mammography since it can trigger carcinogenesis[10], hence the need for optimization of doses in mammography and to also set a guidance level to help achieve that[11].

The purpose of this study thus, is to assess the mean glandular doses in the selected Hospitals.

MATERIALS& METHODS

This study was approved by the ethical committee of the Lagos State Government (General Hospital Lagos). Consent forms were also signed by the participant to indicate their consent.

This study was a prospective cross sectional study. A total of 67 women consented to the study.

Mammography machines used from the centres and their specifications.

Centre 1 – Alpha RT (mgf 101) serial no. 34163, permanent filtration 0.063Be.

Centre 2 – Alpha RT (Date of manufacture 1997) Permanent filtration 0.063Be

Centre 3 – Mammomat 3000 serial no. 012303811 DOM August 1999, Mo-Mo, Mo-Rh

Centre 4 – Allengens (venus) 2k1305018 Mo-Mo –Mo-Rh

-160 Thermo luminescent Dosimeter chips.

The chips used are made up of Lithium Fluoride material of size (3.2mm X 3.2mm) which is near tissue equivalence. TLD chips were annealed at a temperature of 300^{o}c this is to release trapped electron before use. 10% of the TLD chips were set aside as control to record the background radiation. The control TLD chips were kept away from every form of irradiation.

The TLD chips were positioned at the upper inner quadrant of the breast, then exposure is made. The following parameters were recorded; Age, Kvp, Anode/ filter combination and compressed breast thickness (CBT). The chips were then read with TLD reader (thermo electron madein USA model 4500 serial no: 0810238.

After the readings taken the value of the background readings by the exposed TLD chips and then multiplied by published conversion factor by Dance[12].

RESULTS

Table 1 shows the distribution of Age and mean glandular dose from the four centers and the average mean glandular Dose from the four Hospitals. A total of 160 TLD chips were used, two (2) chips each for a woman. A total of 67 women were involved.

The average mean glandular dose was 0.74mGy. The mean glandular dose from Centre 1-4 are: 0.85±0.52, 0.85± 0.51, 0.57± 0.61, 0.50± 0.40 respectively.

Table 2 shows the value of the Post hoc test Analysis between and within the various centres.

The P- value were not significant between Centre 1&2 and between Centre 3&4 at $p<0.05$. P values for Centre 1&2 = 0.812 for Centre 3&4 = 0.719.

Table 1: Summary of the age and mean glandular Dose from the various centres and the average mean glandular Dose.

	CENTRE 1	CENTRE 2	CENTRE 3	CENTRE 4	ALL CENTRES
AGE(**years**)	50.94±7.61	50.93±7.61	49±7.63	47±13v8.8	49.72±7.8
MGD (**mGy**)	0.85±0.52	0.84±0.52	0.57±0.61	0.50±0.40	0.74±0.58

TABLE2: Result of the Post Hoc Anova of the MGD within the centres.

	MGD	P value
Centre 1	Centre 2	0.812
	Centre 3	0.197
	Centre 4	0.058
Centre 3	Centre 1	0.197
	Centre2	0.205
	Centre 4	0.791

DISCUSSION

The findings of this study revealed an average mean glandular Dose of 0.74mGy. Though the mean value is lower than the published reference dose level for mammography which is 3mGy, a wide range in doses was still noted 0.03-3.19mGy. This can be due to different tube output, half value layer and Anode/filter combination.

Centre 1&2 showed no significant difference in their MGD distribution likewise Centre 3&4 this was discovered in the post hoc Anova done. This could be done to dose reduction between digital machines and film/screen conventional machine. The range calculated MGD for CC and MLO views were 0.33-6.41mGyg&0.28-8.59mGy respectively. This is lower than a dose gotten from a work done by[13] in Oyo State Nigeria which got 0.26-21.26 mGy& 0.2-0.98mGy for MLO and CC views respectively. This could be due to difference in tube output and technical parameters. The difference observed between the MGD from the CC and MLO can be due to the pectoralis major muscle in the MLO view this agrees with a work by[14].The result from this work had up to 90% of the MGD below 1.5mGy this agrees with the results from this work also this can probably be due to the same method of dose measurement that was used.

In a similar work carried out by[15] to determine dose reference levels for mammography in North Eastern Nigeria. Total MGD for the study was 0.31±0.05mGy and 0.69±0.11mGy for CC and MLO respectively this value is higher than then the result gotten from this work of which the value for CC and MLO calculated were 0.25±0.23mGy and 0.51±0.39mGy respectively this difference can probably be due to different tube output and the fact that most of the machines used for this work were Digital.

The value of MGD gotten from this work 0.74mGy was also lower than that gotten from a study done by[16] in Serbia to calculate MGD for both phantoms and patients.MGD gotten for phantoms was 1.19mGy when MGD was supplemented by a patient dose survey the average MGD per image was 2.8mGy for CC and 4.3mGy for MLO this differences can be due to tube output, difference glandularity.It is therefore important to standardize the method used for measurement of mean glandular dose in Nigeria to get more accurate and generalized dose reference levels

CONCLUSION

Though the MGD value gotten 0.74mGy was lower than the published dose reference, value of 3mGy. Because of the wide variation in the dose distribution, dose optimization is still necessary in the Centre.This work was unable to separate the mean glandular doses according to the various anode/filter combination hence further researches on that are recommended.

REFERENCES

1. Jemal A, Bray F, Center, M.M, FerlayJ, etal Global cancer statistics CA cancer J clin 2011 61(2):6690
2. World cancer Research fund. American Cancer society 2002.
3. Abdulkareem, F.B, Epidemiology and Incidence of common cancers in Nigeria. Presented at cancer regions Epid worship Anatomic pathology. College of medicine, University of Lagos 2009.
4. European Commission.European Guidelines on quality criteria for Diagnostic radiographic Imaages.Brussels,Luxemburg:EUR 16260 EN:1996.
5. Faulkner K,CorbettRH.Reference doses and quality in medical Imaging Br J Radiol.1998;71:1001-2

6 EzeCU,AbonyiLC,NjokuJ,IrurheNK,OlowuO.Assessement of radiation protection practices among Radiographers in Lagos Nigeria.Niger Med j 2013;54:386-91.

7 SuilemanME,BrennanPC,McEnteeMF.Diagnostic reference level in Digital mammography:A Systematic Review, Radiat.prot.Dosimetry 2015;167:608-19

8 Tabar, Vitk, B, Chenneth, Am, Y.Swedish two countries trial impact of mammography screening on breast cancer mortality during 3 decades. NCBI. 2011 1260(3): 658-663.

9 AkpochaforMO,OmojolaAK,AdeneyeSO.Determination of reference dose levels among selected xrayCentres in Lagos State.Journal of Clinical sciences:2016;13(4) :167-172.

10 Brenner D.J, Sawant S>g, Handle M.P, Millers R.C, etal. Routine screening mammography, Int Journal of Radiation Biology 2002. 78:1065-67

11 Olanrinoye, I.O &Sharifat I.A protocol for setting dose reference level formedical radiography in Nigeria. A Review Bayero Journal of Pure and applied science. 2010. 3(1): 138-141

12 Dance D.R, Skinner, C.L, Beckett .J.R., Kotre C>J., Additional factors for estimation of mean glandular dose using the UK mammography protocol Phys Med Biol. 2000; 45:3325-40
13 Ogundare, F.O., Odita A.N., Obed R.I., Balogun F. A. mean glandular dose for women undergoing mammography breast screening in Oyo State Nigeria Int. Journal of Diagnostic Imagery and Radiation therapy. 2009;15(4): 327-332.
14 Bor, d., Tukel, S, Olgar, T., tokel T. etal. Investigation of mean dose versus compressed breast thickness relationship in mammography. Radiation prof. Dosimetry 2008; 1(129)1:1-3.
15 Joseph DZ,NzottaCC,SkamJD,UmarMS,MusaDY.Diagnostic Reference level for mammography examinations in North Eastern Nigeria.Afri J Med Healthh science 2018;17(1):54-9.
16 Olivera,C.B,SnezonaB,DanijelaA,Dusko K and MilojkoK.Mammography radiation dose.Initial results from Serbia base on Mean glandular dose assesement for phantoms patients RPD Oxford Journal.doi 101093.