BREAST GLANDULARITY IN MALAYSIAN WOMEN FROM A FULL-FIELD DIGITAL MAMAMOGRAPHY SYSTEM

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ABSTRACT

This study is undertaken to estimate breast glandularity in Malaysian women from a Full-Field Digital mammography System. This study involved 223 women (Malay=100; Chinese=101 and Indian=22) underwent voluntary screening mammography at Breast Centre, International Islamic University Malaysia (IIUM Breast Centre) for the first quarter of year 2009. Those are women aged between 31 to 69 years old (median age, 49 years). Data on miliampre-seconds, kilovoltage, and compressed breast thickness for each craniocaudal view are used to estimate breast glandularity for an individual breast. Breast glandularity is calculated using the fitted equation reported earlier. The difference in breast glandularity among ethnic groups was tested for significance using the nonparametric Kruskal-Wallis test. The average breast glandularity estimated in our study, using FFDM system is 52.94± 27.03%. No significant difference was seen in breast glandularity among the ethnic groups (p>0.05, Kruskal-Wallis test). Breast glandularity decreases as age increases, up to 60 years old.

ABSTRAK

Kajian ini dijalankan untuk menilai glandulariti payudara wanita di Malaysia menggunakan satu System Digital Mamografi Berbidang Penuh. Kajian ini melibatkan 223 wanita (Melayu=100; China=101 dan India=22) yang telah menjalani ujian saringnpenyaringan mamografi sukarela di Pusat Payudara, Universiti Islam Antarabangsa Malaysia (Pusat Payudara IIUM) untuk suku pertama tahun 2009. Mereka adalah wanita yang berumur diantara 31 hingga 69 tahun (umur median, 49 tahun). Data miliampere-saat, kilovoltan dan ketebalan payudara tertekan untuk setiap prosedur craniocaudal telah diguna untuk menilai glandulariti setiap payudara. Perbezaan bermakna glandulariti payudara diantara kumpulan etnik diuji menggunakan ujian bukan-parametrik Kruskal-Wallis. Kajian menunjukkan purata glandulariti payudara menggunakan system digital mamografi berbidang penuh ialah 52.94±27.03%. Tiada perbezaan yang bermakna untuk glandulariti payudara diantara kumpulan etnik (p>0.05, ujian Kruskal-Wallis). Glandulariti payudara berkurangan dengan meningkatnya umur sehingga 60 tahun.

Keywords: Breast glandularity, Full Field Digital Mammography, Ethnic Groups

INTRODUCTION

At present, all mammography procedures in public hospitals in the country are carried out using Full-Field Digital Mammography (FFDM) systems. Ethnic differences in breast density are recognized. Asian women are

reported to be more likely to have dense breasts compared to white women (El-Bastawissi *et al* 2001). Malaysian women are of varied Asian ethnicities, and Chinese women in Malaysia have a higher incidence of breast cancer compared to Malay and Indian women (MOH 2008). As such, it would be of interest to compare mammographic breast density in these three ethnic groups using FFDM system, to see whether differences in their mammographic breast density. This may partially explain the difference in breast cancer incidence.

It is generally assumed that fibroglandular tissue, which is a common site for breast cancer, is the most vulnerable among the tissues making up the breast. Breast glandularity represents an average fraction of fibroglandular tissue in a breast (Zoetelief *et al*, 2006). There are many approaches to estimate breast galandurity. Subjective approaches include tracing the fibroglandular tissue of the breast and measuring their percentage of the whole breast area (Heggie 1996). In our previous study (Jamal *et al* 2004), we had estimated mammographic breast glandularity in Malaysian women from radiographic data using a Screen-Film Mammographic System. Those works extends the prior approach of Heggie (Heggie 1996) to include the 0.5-cm-thick adipose tissue as an outer layer, following a definition of breast glandularity by Dance (Dance *et al* 2000) and Beckett and Kotre (Beckett and Kotre 2000) and a model proposed by Stanton *et al* (1984).

The objective of this study is to estimate mammographic breast glandularity in Malaysian women from radiographic data using a FFDM system.

METHOD

A FFFDM system used in this study is Hologic LORAD Selenia. It operates using molybdenum (Mo) anode and filter. It is calibrated annually according to the American College of Radiology Standards. The Half value Layers at 26 and 28 kV potentials are 0.33 and 0.35 mm Al. All mammograms were taken using an 18 x 24 cm^2 image receptor.

This study does not require informed consent from subjects and was deemed to be exempted from institutional review board approval. This study involved 223 women (Malay=100; Chinese=101 and Indian=22) underwent voluntary screening mammography at Breast Centre, international Islamic University Malaysia (IIUM Breast Centre) for the first quarter of year 2009. Those are women aged between 29 to 76 years old (median age, 49 years).

The miliampre-seconds, kilovoltage, breast thickness for each craniocaudal view were used to estimate breast glandularity for an individual breast. Breast glandularity was calculated using the fitted equation reported earlier (Jamal *et al* 2004). The equation is as follows:

$$g = (10.19 = 272.1/t)\ln(mAs)\text{-}(208.6 + 121/t),$$

where g is the breast glandularity, mAs is the current and t is the breast thickness.

Descriptive statistics including mean, median are calculated for age, CBT and breast glandularity. The statistical significance of differences in breast glandularity among ethnic groups was tested using the nonparametric Kruskal-Wallis test of SPSS statistics 20.0. The relation of breast density with age was investigated. Results obtained were also compared with results with other recent studies.

RESULT AND DISCUSSIONS

This study is carried out based on the definition of breast density as percentage of fibroglandular tissue in the breast. Only craniocaudal images were included in this study because less muscle is included in the view.

Figure 1 shows variations of breast glandularity for the three different ethnic groups, using box-whisker plot. Median of breast glandularity for Malay, Chinese and Indian is 54.09, 57.69 and 44.48 respectively. No

significant difference is seen on breast glandularity among the three ethnic groups studied ($p>0.005$, Kruskal-Wallis test).

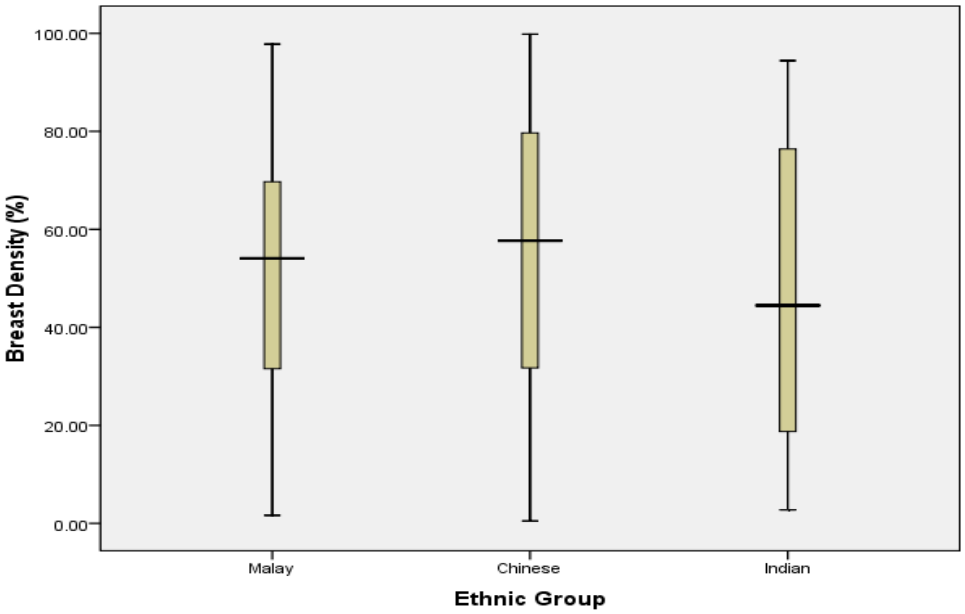

Figure 1. Box-whisker plot of breast glandularity for different ethnic groups; Malay (n=100), Chinese (n=101) and Indian (n=22). The 25^{th} and 75^{th} percentile marks the box and whisker extend to the range outliers excluded. The median is marked in the box. The median, which is not central, represents the study sample that is not normally distributed.

Table 1 shows distribution of age, compressed breast thickness and breast glandularity of the study sample. Average breast glandularity of the study sample is $52.94 \pm 27.03\%$.

Table 1: Distribution of age, compressed breast thickness and breast density of study sample

Ethnic Group	Age			Compressed Breast Thickness (mm)			Breast Glandularity (%)		
	Average	Median	(Upper , Lower Range)	Average	Median	(Upper , Lower Range)	Average	Median	(Upper , Lower Range)
Malay	47.5	47	(29,73)	49.8	50	(32,69)	55.51	54.09	(1.6,97.8)
Chinese	52.8	52	(40,76)	49.6	49	(31,62)	54.92	57.69	(0.5,99.8)
Indian	48.5	46	(39,67)	46.3	45	(30,68)	50.00	44.48	(2.8,94.4)
Total	51	49	(29,36)	51.9	51	(31,69)	52.94	54.24	(0.5,99.8)

Figure 2 shows relationship between breast glandularity and age group. It shows that breast glandularity decreases as age increases for the three ethnic groups studied, for the age between 31 to 60 years old. . This finding is similar to the results of our previous study on diagnostic mammographic screen-film system (Jamal *et al* 2004) and Dance *et al* (2000). This may be explained by an increase in the proportion of adipose tissues with increasing age (Soares *et al* 2002).

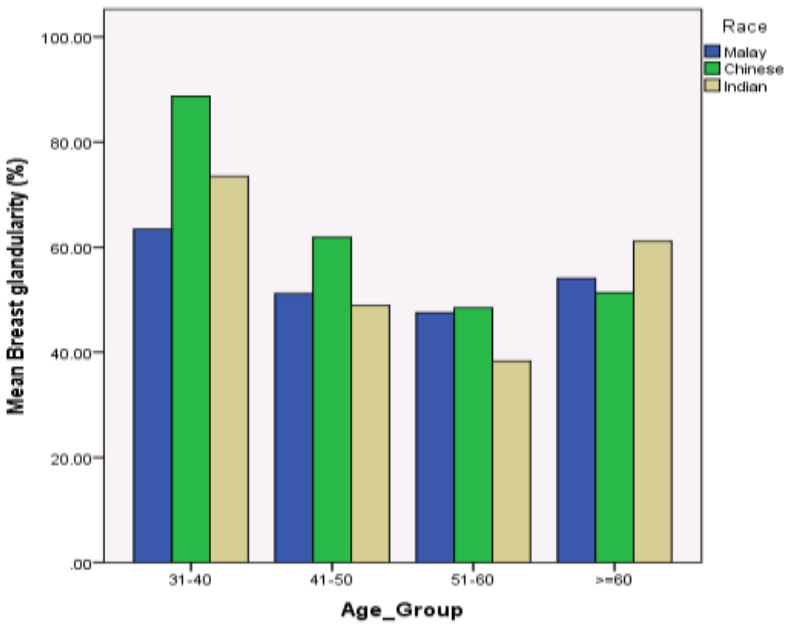

Figure 2: Relationship between breast glandularity and age group for different ethnic groups.

Table 2 shows that the average breast glandularity estimated in our study (52.94±27.03%) is slightly higher than those obtained in the previous study (48.9±18.7%) using screen-film mammography system (Jamal *et al* 2004). This may be explained by the fact that our present study samples are those form different geographical location, that mainly catered for women from the countryside. We also found that our result is higher than that reported by the United State's study (Geise& Palchevsky 1997) that may due to differences in categories of compressed breast thickness studies. As commonly observed (Dance *et al* 2000), it also shows the average breast glandularity decreases with compressed breast thickness for the interval of 30 mm to 70 mm.

Table 2: Comparison with other recent study

Study	Country	Average breast glandularity (%)	Average breast glandularity (%) according to compressed breast thickness interval			
			<30 mm	≥30 mm to < 50 mm	≥50 mm to < 70 mm	>70 mm
Geise & Palchevsky (1996)	United State	34	68±19	42±21	26±18	16±12
Jamal *et al* (2004)	Malaysia	48.9±18.7	79.1±18.0	54.5±20.4	43.2±20.4	30.8±40.0
Present Study	Malaysia	52.94±27.03	N/A	74.20±17.05	35.23±20.18	N/A

N/A: Not Available

CONCLUSION

The average breast glandularity estimated in our study, using FFDM system is 52.94± 27.03%. No significant difference was seen in breast glandularity among the ethnic groups ($p > 0.05$, Kruskal-Wallis test). Breast glandularity decreases as age increases.

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