Assessment of breast cancer risk and its role in screening among women attending maternal and child healthcare centers, Upper Egypt

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Background
Breast cancer (BC) is considered a huge health problem among women all over the world due to increased mortality rates. Breast cancer deaths are decreased by 28–34% due to improvement in breast cancer treatment and early detection. However, early detection and prevention are most effective for those most at risk. The Tyrer-Cuzick or Input Output Buffer Information System (IBIS) is a model viewed as the best accessible means to evaluate a woman's risk of developing BC and it is vital to give risk–benefit analysis before choosing interventions designed to decrease breast cancer risk.

Objectives
The objective of this study was to estimate the risk level by using the IBIS tool and the mean 10-year and lifetime risk of developing breast cancer and to perform screening for high-risk women by clinical breast examination (CBE) and mammogram.

Methods
The cross-sectional study included 600 women of maternal and child healthcare center (MCH) attendants. The tool utilized is based on the data required for analysis by IBIS. CBE and mammogram for the high-risk group was performed.

Results
The mean of age was 37.95 with range 30–85 years old. According to the IBIS tool, 76.7% were moderate/low risk for developing breast cancer, while 23.3% were high risk. Of those who were high risk, 18.6% had positive findings by CBE. A mammogram was done for 29 women of a high-risk group who agreed to do it, of them 69% had been suspected of breast cancer.

Conclusion
About one-fifth of women had a higher risk for developing BC. The IBIS tool is recommended for the detection of the high-risk group of women and to direct breast cancer screening services to those women.

Keywords:
breast cancer, screening, Tyrer-Cuzick model

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Introduction

Breast cancer (BC) remains the most widely and the second principal reason of cancer deaths in women worldwide, as suggested by World Health Organization [1]. In Egypt, BC accounts for 32% of all revealed malignancies; among females, the high rate of BC was in Upper Egypt, 38.7% [2]. Also, the median age at diagnosis is 49 years, one decade earlier than the corresponding age in Europe and North America [3]. Early detection of BC could improve BC survival and decrease the burden on the healthcare system. Recently, researches are directed mainly in trying to estimate individual BC risk women and follow-up screening for 'high-risk" individuals. This improves early discovery and prevents many unnecessary repetitions and decreases the burden on the economy [4].

BC is one of the ailments essentially influenced by risk factors, such as being a female, aging, race, ethnicity, earlier age at menarche before 12 years old, late age at menopause (55 years old), mutations in BC genes (BRCA1 or BRCA2), history of BC in first-degree relatives, having a history of past BC, some benign breast illness, exposure to radiation at a young age, hormone replacement therapy, smoking, overweight or obesity, did not breastfeed their babies, and being physically inactive [5].

Numerous models were developed to assess the impact of multiple risk factors for estimating the whole risk. Tyrer-Cuzick model is studied well, a broadly accessible model for predicting BC risk. It is a statistical risk assessment model used to estimate the the probability to develop BC within 10 years and lifetime risk among

healthy women. Presently, it has been validated in numerous researches [6,7].

Identifying the high-risk group could decrease the unnecessary investigations and reduce the cost and also reach the main goal of early detection and treatment of BC.

If every woman becomes more knowledgeable about her personal risk, she could make a decision to make a personalized plan for using the screening methods [8]. Among women aged ≥35 years with the lifetime risk of BC ≥20%–25%, it is suggested to accomplish clinical breast examination (CBE) twice per year and mammogram every year. The individuals who are at high lifetime risk of BC will profit more from invasive approaches, while low-risk women are followed up through the routine screening program for the avoidance of complications and high costs [9].

Although this tool was important in detecting the risk of BC to decrease the burden of screening, it was not adopted in Assiut city and no studies were carried out using this tool.

Subjects and methods

Study design

This is a cross-sectional study design.

Study site

Assiut city contains 10 MCH centers, four are located in the eastern part of Assiut city, and six are located in the western part of Assiut city. One and two MCH centers were selected randomly from the eastern and western parts, respectively. The selected centers were Al-Walideyah (eastern), Kolta and Gharb MCH Centers (western).

Sample size and study population

According to Epi-info program version 6, taking a design effect of 1.5 to compensate for missing data with 80% power of the test, 95% confidence interval, and prevalence of 50% of BC risk [10], 600 females attending the 3 MCH centers were randomly selected to participate in this study. The inclusion criteria included women can read and write, aged 30 years or older as IBIS provides the 10-year risk and lifetime up to age 85 years. The exclusion criteria included women <30 years, declined to participate, and those subjected to acute medical conditions. The women in the sample were chosen by systematic random sampling technique where every fourth attending woman was selected.

The tool for data collection

Data were collected using a structured interview questionnaire that was developed and designed by the researcher after an extensive review of related literature. The data were collected by the researcher. A head nurse in each MCH center under study assisted the researcher in collection of interviewed women and preparation of cases for CBE.

The questionnaire included the following data:-

(1) Sociodemographic characteristics: age, marital status,…. etc.
(2) The assessment made using a questionnaire that was fulfilled by the researcher; the instrument used for data collection is the BC risk assessment tool using the model developed by the IBIS tool. It is computer program software and was freely downloaded [11]. The data included in the questionnaire were age, age at menarche, null parity, age at first childbirth, having a family history of BC and its number, history of prior breast biopsy, the number of biopsies, and atypical hyperplasia in a biopsy specimen.

Absolute risk (lifetime risk) refers to an individual's probability or percentage to develop BC [12]. High risk is defined as having a lifetime risk 20% or more, while lower risk is defined as having less than 20% lifetime risk [13,14].

The 10-year risk is the probability of developing BC over the next 10 years, depending on age, as the older woman had higher absolute risk. Also, it depends on other risk factors such as family history and reproductive history [12]. It is classified as low risk (<3%), moderate risk (3–8%), and high risk (>8%). This classification was used to detect high- and low-risk women as a cutoff value [15].

Performing CBE and mammogram as a part of screening methods

The researcher practiced CBE among the high-risk group according to the 10-year risk classification and referred for suspected cases to do mammogram for free, and then they were referred by the researcher to a surgical specialist if mammography showed abnormal findings.

Statistical analysis

Data entry and analysis were carried out using Statistical Package for the Social Sciences (SPSS) version 16. Descriptive statistics were done in the form of frequencies, mean, and SD; then analytic statistics as Chi-square and Chi-square for linear trend was also

performed. Values were considered significant when *P* values were less than 0.05.

Nonparametric tests were performed in this study (Chi-square and logistic regression analysis), both of which do not need the data to be normally distributed because both of them are nonparametric tests.

A multivariable logistic regression analysis was conducted to predict risk factors for developing BC as women were divided into two groups, high and low risk, and the most important predictor variables for developing BC. The used variables were breast complaint, total duration of breastfeeding, age, physical inactivity, and body mass index.

Ethical considerations

The study was approved and monitored by the medical Ethical Committee, Assiut Faculty of Medicine. IRB# 17101102. Consent was obtained from participants.

Results

Sample characteristics

The total number of samples was 600 women, the ages of the women ranged from 30 to 85 years, with a mean 37.95 ± 7.46 years. Only 20.7% were illiterate or could just read and write, whereas 57.7% of women had secondary education. The majority of women were currently married (93.7%). Only 8.2% of the participants reported a family history of BC, 16.2% of women complained of previous breast illness. Exposure to x-rays was found in 7.2%. Only 3.7% of ever-married women have been subjected to a breast biopsy, of them 40.9% had negative results, 31.8% were malignant, and 27.3% were benign.

The median lifetime BC risk assessment up to age 85 years was 9.0 with range 6.5–59.0. The median 10-year risk of sampled women was 0.9 with range 0.3–19.4 [Table 1].

Among those with a high 10-year risk of BC, the percentage increased significantly with an increase in the age of the woman. The high-risk group was significantly lower among married women [Table 2].

A multivariable logistic regression analysis showed that the high-risk group of women was significantly associated with previous breast complaint (OR = 7.5), shorter duration of breast feeding (<2 years) (OR = 4.8), and older age of women (>40 years) (OR = 2.4). The model explained 27.2% variance (Negelkerke R^2) and was able to identify 83.7% cases accurately [Table 3].

About 29 women of the high-risk group agreed to do mammograms for BC screening. Of them, 20 women (69%) had suspected BIRADS classification [16] [Table 4].

About 76.4% were non-high 10-year risk for developing BC (moderate/low), while 23.3% were high 10-year risk for BC (Fig. 1).

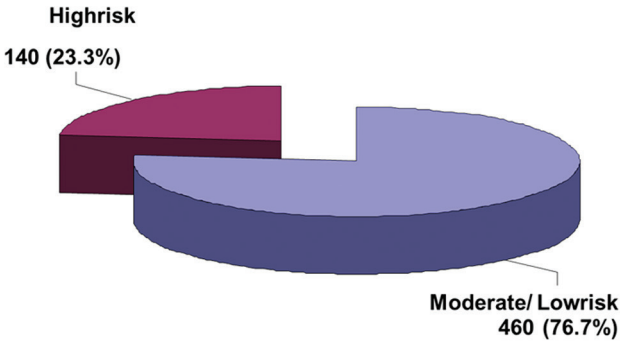
In comparison with women of the same age and average risk factors, 23.3% had a higher 10-year risk and 18.2% had higher lifetime risk (Fig. 2).

Among the high-risk group, 18.6% of them showed positive findings after performing CBE, while 81.4% of them showed negative findings (Fig. 3).

Discussion

BC is one of the diseases predominantly influenced by risk factors, according to American cancer society.

Figure 1



Level of 10-year risk by using a risk assessment tool (IBIS) among women attending MCH centers in Assiut city, 2017.

Table 1 Breast cancer 10-year risk and lifetime risk by the Tyrer-Cuzick model (IBIS) among women attending MCH centers in Assiut city, 2017

Risk	Median (range)	IQR
Lifetime risk (absolute risk)	9.0 (6.5-59.0)	10.7-14.1
Lifetime risk for women of the same age without risk factors	11.0 (1.8-13.3)	0.3-7.7
10-year risk of participants up to age 85 years	0.9 (0.3-19.4)	0.9-2.9
10-year risk up to age 85 years for women at the same age without risk factors	1.1 (0.3-4.0)	0.8-2.7

MCH, maternal and child healthcare center.

Table 2 The relationship between 10-year risk level and sociodemographic characteristics among women attending MCH centers in Assiut city, 2017

Variable	Moderate/low risk (*n*=460), *n* (%)	High risk (*n*=140), *n* (%)	*P*
Age:(years)			<0.001[a]
<35	175 (82.5%)	37 (17.5%)	
35-<40	159 (81.5%)	36 (18.5%)	
≥40	126 (65.3%)	67 (34.7%)	
Residence			0.747
Rural	64 (75.3%)	21 (24.7%)	
Urban	396 (76.9%)	119 (23.1%)	
Level of education			0.539*
Illiterate/read and write	96 (76.2%)	30 (23.8%)	
Basic education	52 (72.2%)	20 (27.8%)	
Secondary education	272 (78.6%)	74 (21.4%)	
Higher education (university or more)	40 (71.4%)	16 (28.6%)	
Occupation			0.367
Working	136 (74.3%)	47 (25.7%)	
Housewife	324 (77.7%)	93 (22.3%)	
Marital status			<0.001
Married	439 (78.1%)	123 (21.9%)	
Not married	21 (55.3%)	17 (44.7%)	

MCH, maternal and child healthcare center. [a]Chi-square for linear trend.

Table 3 Multivariable logistic regression analysis of factors related to the level of 10-year risk among women attending MCH centers in Assiut city, 2017

Variable	OR (95% C.I.)	*P*
Breast complaint	7.5 (4.45-12.77)	<0.001*
Total duration of breastfeeding (<2 years)	4.8 (2.4-9.77)	<0.001*
Age (>40 years)	2.4 (1.5-3.9)	<0.001*
Physically inactive	1.6 (0.9-2.8)	0.068*
BMI	1.0 (0.9-1.04)	0.900

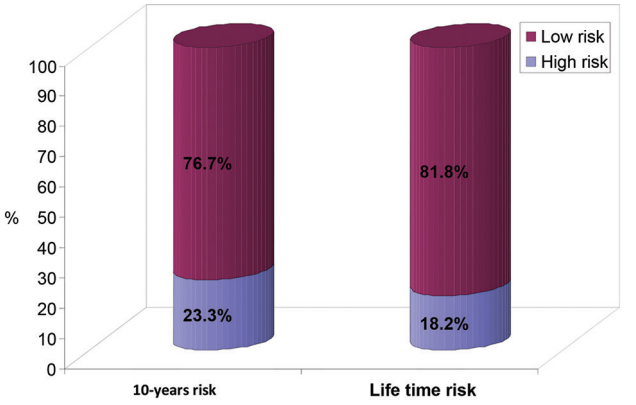
Overall percentage: 83.7%. R^2=0.272. C.I., confidence interval; MCH, maternal and child healthcare center.

Table 4 Results of mammogram screening among high-risk groups of women attending MCH centers in Assiut city, 2017

Breast composition by mammogram screening	No. (%)
Normal: BI-RADS (A)	9 (31.0)
Suspected breast cancer[a]	20 (69.0)
BI-RADS (B)	9 (45.0)
BI-RADS (C)	6 (30.0)
BI-RADS (D)	5 (25.0)
Total	29 (100.0)

MCH, maternal and child healthcare center. (A) The breasts are almost entirely fatty. (B) There are scattered areas of fibroglandular density. (C) The breasts are heterogeneously dense, which may obscure small masses. (D) The breasts are extremely dense, which lowers the sensitivity of mammography [16]. [a]BI-RADS B, C, D are considered suspected breast cancer and need further investigations.

Figure 2



Distribution of 10-year risk and lifetime risk among women attending MCH centers in Assiut city, 2017.

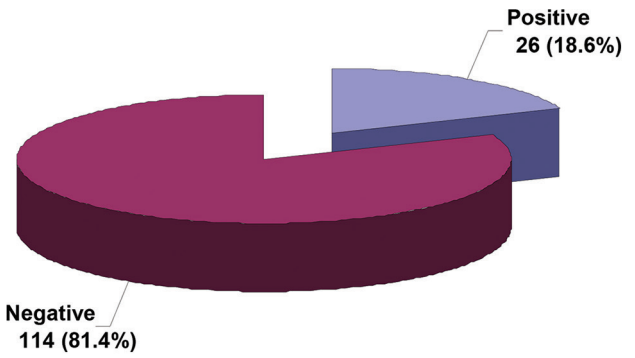
As many models were developed to assess the additive effect of multiple risk factors to estimate the overall risk, the health provider must collect extensive family history and so, it must determine who needs more intensive risk assessment. The annual examination can be a good time to do an initial risk assessment [6].

BC risk was determined utilizing the risk evaluation instrument; the findings demonstrated that 76.7% were moderate/low risk for developing BC, while 23.3% were high risk for BC.

These findings were lower than findings of a study conducted among 156 women attending family planning clinics at Zagazig University Hospital, Egypt [10], and higher than other studies conducted among Iranian women attending health centers (9.36%), and a study was done among 242 women in Nejran area, KSA (15.7%) [17,18]. The difference may be due to the use of different risk assessment tools (Gail model).

Of the 4266 women surveyed in British Columbia, 3.5% of women were seen to be at a high 10-year risk of utilizing BC using the Tyrer-Cuzick model [19], and about 1.07% of 10,000 women assessing BC risk within the UK National Health Service Breast Screening Program had higher 10-year risk [20].

Figure 3



Clinical breast examination among high-risk groups of women attending MCH centers in Assiut city, 2017.

This was lower than the finding of the present study, which might be because of different sample selection, a distinctive way of lifestyle, and different distribution to risk factors.

In this study, 18.2% had a higher lifetime risk; this result was nearly similar to Mortada study, 18.7% [10]. As the lifetime risk is consistent, whatever the instrument used to figure it, these investigations were comparable in the lifetime risk, regardless of various risk assessment tools.

The median 10-year risk for sampled women was 0.9; this was similar to the median 10-year risk for women in the study by Weisstock *et al.*[19] (2.63%), and was lower than a study conducted by Evans *et al.*[20] (2.65%).

The level of risk of BC increased with an increase in the age of the woman (*P* value<0.001), which agreed with a study done among 28,104 Singapore women, indicated that the highest occurrence of BC was shown among age group 45–50 years [21], and disagreed with Mortada's study as the majority of women aged from 36 to 45 years [10]. Additionally, low risk was significantly higher among married women (95.4%) (*P* value <0.001), in agreement with Mortada's study (80.1%) [10].

Previous breast complaint was identified as an important predictor for the high level of BC risk, OR = 7.5. The study by Barlow *et al.*[22] reported that having had an earlier breast procedure among 1 million women was related to about 50% increase in risk even without information on the type or result of the prior breast procedure. In this way, it floods the requirement for BC screening for early detection preceding the beginning of symptoms through different techniques [23].

The second predictor for a high level of risk of BC was a shorter duration of BF, OR = 4.8. This supported that long-term breastfeeding has a defensive impact on lower rate of BC, in agreement with previous study done among 400 female BC patients from two hospitals of Al-Azhar University in Cairo and Assiut, and also agreed with another study conducted in Urban China among 11,478 women [24,25]. Increasing the age of women more than 40 years old was an important predicting factor for increasing the risk of BC OR = 2.4, in agreement with other studies [22,26].

Being physically inactive was another important predictor of increased risk of BC, OR = 1.7. The study by EL-Moselhy *et al.*[24] revealed similar results, OR = 1.78. The risk of BC is lowered by about 12–21% among mostly active people, as reported in a meta-analysis study done on 38 cohort studies in 2016 [27].

After performing a CBE, the results of the current study were lower than a previous study conducted on 124 women in Saudi Arabia, as 34.9% of women who have been performing CBE have breast problems [28]. The study by Aboserera *et al.* [29], Sharqia governorate, Egypt, showed higher results (5.9%). In the present study, CBE was done only among high-risk groups of BC and only 29 of them had done mammogram.

In this study, by using the IBIS software program, high-risk women were identified easily for the first time in Assiut city, and so we could recommend early screening by CBE and mammogram for the high-risk group, and decrease the burden of screening. Although the cost of mammogram was expensive for the study participants (240 L.E) for two breasts, a mammogram was done by the researcher at the South Egypt Cancer Institute after getting approval and making a discount for study participants (120 L.E).

Conclusion and recommendations

About one-fifth of women had a higher 10-year risk and nearly one-fourth had higher lifetime risk by using Tyrer-Cuzick model. The most important significant predictors for the risk of BC were previous breast complaints, duration of BF <2 years, age of women >40 years, and being physically inactive. About one-fifth of high-risk women had positive findings by CBE.

The study recommends using the IBIS tool as a screening instrument for detection of a high-risk group of women before performing progressively costly screening methods by healthcare providers in clinical visits.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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