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Effectiveness and Results of Iraqi Breast Cancer Screening Program Applied at Primary Health Care Centers

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ABSTRACT

Background: *The most frequent malignancy among women worldwide is breast cancer, it accounts for 25% of all cancers. The aim of screening programs is to recognize individuals through the asymptomatic stages for possible recognition of cancer during preclinical phases of the disease.* ***Objectives:*** *To evaluate the breast cancer screening program result in Baghdad Al-Russafa Health sectors during 2015 and to estimate breast cancer screening program's effectiveness.* ***Methodology:*** *A cross-sectional study was conducted At Baghdad Al-Russafa Health districts, over the period from first January to December 2015. Data was collected from the database related to the program that was kept at Al-Russafa health sectors in a special form that was adopted by Iraqi ministry of health, true positive results of mammography was collected from the hospital* ***Results:*** *The total coverage rate of AlRussafa Health Directorate/ Baghdad was 71% and the number required to screen and to identify one case of breast cancer was 38. The percent of patients with positive screening test was11%. Detection ability of Baghdad Al Russafa Health Directorate was 3%. Percentage of positive predictive value of Baghdad alrussafa health directorate was 0.42%.* ***Conclusion:*** *The program had a high coverage rate in Al-russafa Health Directorate and the end results of diagnosed cases were low & it consisted of less than one-third of definitely screened cases. There was a high detection ability of the whole program. The number needed to screen to identify one case of breasts cancer was lower than those needed to be screened to identify one case in the screening program of other countries with low Positive predictive value.*

Keywords: Cancer of breast, Detection rate, Primary health care centers

INTRODUCTION

The most frequent malignancy among women worldwide is breast cancer, it accounts for 25% of all cancers, an anticipated 1.57 million new cases in 2012 [1]. It is also the foremost cause of female cancer-associated deaths. Although considerable progress in survival from this disease has been reported in high-reserve communities, still the risk continues to increase, leading to high mortality rates in middle and low-income countries [1,2]. In general, the usual percentage of this disease in developed countries is usually more than 80% while it is 40% in the developing world [3].

The survival rate of breast cancer differs globally starting from more than 80% in North America, Sweden, and Japan to about 60% in middle-income regions and to a less than 40% in low-income countries of the world [4,5]. In the less developed countries, low survival rates are mainly attributed due to the lack of program awareness, leading to a high percentage of late-stage diagnosis of the disease because of inadequate capacity for early diagnosis and inefficient multimodality management [6].

It has been reported by the WHO that the major increase in cancer deaths in the next 15 years is probably in the Eastern Mediterranean Region (EMR), where breast cancer is reported as the most common type of female malignancy in approximately all national cancer registries [4,7].

It has been acknowledged that breast cancer has a trend to be diagnosed at late stage, and with the frequency of poorly differentiated tumor presentations illustrated in significantly elevated rates of nuclear aneuploidy, thus leading to a mortality incidence of approximately 60% [1,4,8-10].

In Iraq, breast cancer had become a major risk to female health. It is the chief cause of death after cardiovascular diseases among women as the cancer-related mortality rate is 23% [1,5,9,10]. It is considered as the highest-ranked malignancy amongst the Iraqi population since 1986. The most recent Iraqi Cancer Registry showed that among an anticipated population size of 32500000, an overall of 21101 novel cases of cancer was registered in 2012 and out of that, 9268 were men and 11833 were women [9]. Throughout that year, 4115 cases of breast cancer were registered representing 19.5% of all newly diagnosed malignancies and 34% of the reported were female cancers, with incidence resembling 22 per 100000 female populations. The maximum occurrence was observed among middle-aged women (45-49years old), but the dip age-specific incidence was reported in women who were 50-54 years old [11]. In 2010, breast cancer was diagnosed in 19.8% of women as palpable breast lumps though 90.6% of those women had recognized the lumps by themselves and only 32% sought to medical advice in the first month. Rest 47% of these women were presented at a late stage of the disease, and 16% gave a positive family history [11].

Early Detection of Cancer

It is a component of a wider strategy that consists of diagnosis, treatment of the condition, and later follow-up. The objective is to identify cancer when it is contained before the invasion to surrounding tissues and remote organs. As the second major constituent of National Cancer Control Programs, the first is for the prevention of cancer globally. About one-third of all cancers are acquiescent to early detection and possible cure are possible with effective treatment [12-14]. Without early detection, treatment possessions are used incompetently and the need for palliative care services increases unreasonably. An early detection program is the structured and systematic performance of a process in distinct people of early diagnosis or screening (or both). Therefore, there are two main domains of Early Detection programs for Cancer: Early Diagnosis and Screening [14,15].

Early Diagnosis

It is the knowledge of the community and health professionals for the early signs and symptoms of cancer to assist identification and offer simpler effective treatment (Down Staging of Cancer) that could be promoted through promoting health education [16].

Screening: It is the systematic submission of a non-invasive simple screening test in a most likely asymptomatic target population to recognize individuals with an abnormality suggestive of specific cancer. Opportunistic Screening is the disorganized application of screening tests in health services [11]. The aim of screening is to proceed the time of diagnosis so that prognosis can be enhanced by earlier intervention [11]. An outcome of earlier diagnosis is that it increases the apparent incidence of breast cancer in a screened population and extends the mean time from diagnosis to death, even if screening did not give any benefit, the appropriate measure of benefit is a reduction in mortality from breast cancer in women who were accessible to screening as compared to women who were not offered screening [17].

Mammography has shown effectiveness in reducing deaths from breast cancer in randomized screening trials nevertheless, these trials were done before modern treatment was introduced for breast cancer, so their current relevance to determining policy is doubtful. Further, mammography requires expensive technology, well-trained radiologists and radiographers, and is impractical for population-wide implementation for many countries in the area [18,19].

Problems in Early Detection of Cancer in the Eastern Mediterranean Region

Disgrace and Myths pertaining to cancer that prevent symptomatic patients from looking for medical advice are as follows

1. Absence of comprehensive national public health educational programs
2. Fragile training/educational curriculum for Primary health care (PHC) providers
3. Weak Referral System insufficient number of well-equipped diagnostic services, referral centers and well-trained staff (pathologists and radiologists)
4. Absence of Evidence-Based Protocol, Guidelines for specialists
5. Inadequate financial resources and motivations

6. Absence of quality control measures
7. Inadequate information, Monitoring and Evaluation systems [20]

Screening Program of Breast Cancer at PHC Level

Clinical Breast Examination is an easy early revealing measure for breast cancer, applied by a trained healthcare provider that may be a physician or a nurse. It aims to identify breast abnormalities in their initial stage of presentation. The value of Clinical Breast Examination CBE depends on a number of factors that consist of proper positioning of the patient, meticulousness of the search, precise movement of the fingers and examination period of at least 5 minutes per breast [21].

The Guidelines of Breast Health Global Initiative Summit had recommended CBE as the best screening measure to be in use for early detection of breast cancer in countries with inadequate recourses [22].

Application of Breast Cancer Screening Program at PHC level in Iraq

CBE might be of meticulous significance in countries where breast cancer is often identified at advanced stages at the time of presentation and where there are inadequate resources to perform mammography screening [12,22,23]. These remarks lead to admitting the possible benefit of applying CBE to the Iraqi situation.

In Iraq, as a low-middle-income country, the capital for establishing a fully equipped national early detection system for the target population at risk is inadequate, at least in terms of the presence of adequate detection devices, i.e., mammography machines and ultrasounds. Other obstacles include the inadequate number of well-trained radiologists and radiographers and the insufficient standardized quality control procedures [24].

As a result, it is reasonable to search for other screening procedures that are both efficient and cost-effective. In the current situation, CBE is suggested as a suitable approach for detecting breast lumps particularly in premenopausal women where the highest frequency of breast cancer is confirmed [25] and where the mammograms are less sensitive and do not verify to be totally efficient [26].

Family physicians and those working in primary health care centers in Iraq should be directed to do CBE for women starting from 20 years of age, as a component of her routine health check every 2-3 years, rising to once a year from the age of 30 years and above. Once a deformity is detected, the patient should be referred for mammography and other applicable diagnostic tests [24].

The aim of BSE is to insist women learn the landscape of their breasts, in order to identify future abnormalities. BSE should be used in consistency with mammography and CBE, and not as an alternate for both methods. The National Breast Cancer Foundation, USA [27] listed that up to 70% of breast cancers are found by women applying on their own BSE, though there is no evidence-based data to sustain the efficacy of BSE as a screening method [21,28-30]. Yet, it is globally agreed that all women should be advised to learn how their breast normally look and feel in sequence to report any changes rapidly to their health care provider. It is indicated that BSE is a good alternative for women starting in their twenties [31].

Integrating CBE with Mammography

Apparently, when integrating these two procedures, the precision of diagnosing breast cancer would be elevated. Earlier surveys showed that the sensitivity and effectiveness of the two diagnostic methods, when combined together, were higher than when each was performed alone in women less than 40 years [32,33]. WHO [14,28] and the American cancer society [23] advices women that after the age of 40 years, they should perform both the examinations once a year. CBE should be performed before mammography to draw the attention of the radiologist to any abnormal finding identified by CBE.

Mammography is an X-ray reading of the breast used since 1940. Mammography is the only confirmed gold-standard procedure for identifying non-palpable (occult) cancers in addition to Minimal breast cancers (lobular carcinoma in situ, non-invasive intraductal carcinoma, minimal invasive carcinoma with a mass no greater than 0.5 cm in diameter).

Recent mammogram tools use very low levels of radiation, usually, a total dose of about 0.4 m Sv for a typical mammogram with 2 views of both breasts. Generally, it is assumed that ionizing radiation increases the risk of breast cancer progress after a latent period of 10 years with cumulative risk, being maximum in adolescent exposure and decreases with increasing age [14,27,33]. The technique demands compression of the breasts between 2 plates for a few seconds to flatten and spread the tissue. The characteristic picture of breast carcinoma is an irregular specular opacity and minute calcifications, with a retraction and thickening of the overlying skin.

False negative mammograms should be very low particularly if quality assurance programs are established. The frequent cause includes breast density, the fast growth rate of the tumors, inappropriate positioning of the breast or explanation errors. Mammograms have a relatively high sensitivity, yet the specificity of the examination may be insufficient, demanding additional special views, examination by US and tissue biopsies [35,36].

Primary Health Care Referral Guidelines for Breast Cancer

It is desirable to refer the following conditions to the Secondary or Tertiary Health Care Hospitals/Centers for advanced assessment.

1. Lump
2. Discharge from the Nipple
3. Changes of the Skin
4. Changes of the Nipple
5. Continuous pain not responding to analgesia [37]

The Objectives of This Study

1. To assess the results of the Breast cancer screening program applied at Alrusafa primary health care centers
2. To estimate Breast cancer screening Program effectiveness based on the number required to be screened to identify one case in the Program.

PATIENTS AND METHODS

This study was a cross-sectional study. The Duration of the study was one year starting from January to December 2016. The study was conducted at Baghdad /Al-Rusafa Health Sectors which includes the following districts.

1. Baghdad Al-Jadeda district
2. Al- Baladiyat district
3. Madenat al sader district
4. Al- Shaab district
5. Al- Rusafa district
6. Al- Aa'damia district
7. Al- Madain district

8. Al- BaladiyatAtthani district
9. Al-Isteqlal district

Data Source

Data were derived from Al-Rusafa Primary health directorate and from the 6 districts mentioned above by a special statistical form. The statistical form was approved by the Iraqi Ministry of Health which include data collected from a 2 step screening program applied for early detection and screening of breast cancer which is applied to all centers at primary health care level. All information was gathered, analyzed, and interpreted at the district into a further statistical form that was forwarded to the directorate from each district. And eventually, at the directorate, all the statistical forms of the districts will be gathered, analyzed and reserved in a final statistical form.

Women with more serious signs and symptoms of breast cancer (pain, lump, discharge of nipple) would be referred to an early detection center of breast cancer to perform mammography. For each district, there is an assigned hospital for a referral. Then the final results were gathered from the hospitals to Al-Russafa health directorate. Six hospitals at Al-Rusafa Health Directorate were assigned for early detection of breast cancer. Those were:

1. Al-Elwea hospital
2. Al-kindy hospital
3. Al-Nuaman hospital
4. Al-Shaheed Al-sader hospital
5. Ibn-Albalady hospital
6. Al-Shaheed Dary Al-Fayad hospital

The total number of positive diagnostic test and true positive mammography was collected from these specific centers for early detection in hospitals.

Inclusion Criteria

30% of all women who were of the age 20-45 years and attending primary health care center at Al Rusafa Health directorate were involved in the screening program.

Screening Method

The majority of the women that were involved in the screening program were attending the PHCCs for any complaint other than screening. The healthcare providers would then clarify the screening program and its significance to the women and encourage them to contribute in the program in the PHCC and to give the necessary information about the history regarding any complaint of pain or swelling, warmth, redness, lump, change in size, retraction or discharge of the nipple and examination of the breast were registered.

Parameters

The following equations were used for analysis:

$$\text{Coverage rate} = \frac{\text{Number screened}}{\text{Total number that should be screened}} \times 100$$

$$\text{Number should be screened to Diagnose one case} = \frac{\text{Number screened}}{\text{Total number of positive diagnostic tests}}$$

$$\text{Total number with positive Screening test} = \frac{\text{Number of positive screening test}}{\text{Total number screened}} \times 100$$

$$\text{Detection ability} = \frac{\text{Number of positive diagnostic tests}}{\text{Total number screened}} \times 100$$

$$\text{Positive Predictive Value} = \frac{\text{Number of true positive screening tests}}{\text{Total number screened}} \times 100$$

Descriptive data were submitted in the form of flow charts, number and percentages.

Ethical Review

Ethical approval of the research was obtained from:

1. Approval of the scientific committee of Alkindy college of medicine/University of Baghdad
2. Approval of the research and development center/Ministry of Health Iraq by Administrative order
3. Approval of Alrusafa Health directorate/to Al rusaffa Health district by administrative order directed to facilitate the task of obtaining the information from the assigned PHCCs.

RESULTS

The current study was conducted to assess the breast cancer screening program applied at primary health care centers in Al-Rusafa District. The details of the program are shown in Figures 1 and 2 (for Al rusafa/Baghdad districts, PHCCs). The coverage rate varied from 63% at Al-baladiyat and Al-baladiyat al-thani till 77% at Baghdad al-jadeda and Madenat al- saderthis as shown in Table 1. The total number of women needed to be screened to identify one case extends from 10 at Al-Aadamia till 81 at Al-Shaab and Al-Isteqlal District (Table 2). Percentage of women with positive screening test ranged from 2% at Albaladiyat, Al-baladiyatal-thani, Al-Shaab, Al-Isteqlal District till 25% at Madenat al sader District (Table 3).

Detection ability ranged from 1% at Baghdad al-jadeda and Al-Shaab+Al-Isteqlal district till 10% At Al-Aadamia (Table 4).

Positive Predictive value range from 0.12% at Al-rusafa till 2.01 at Al-Aadamia District (Table 5).

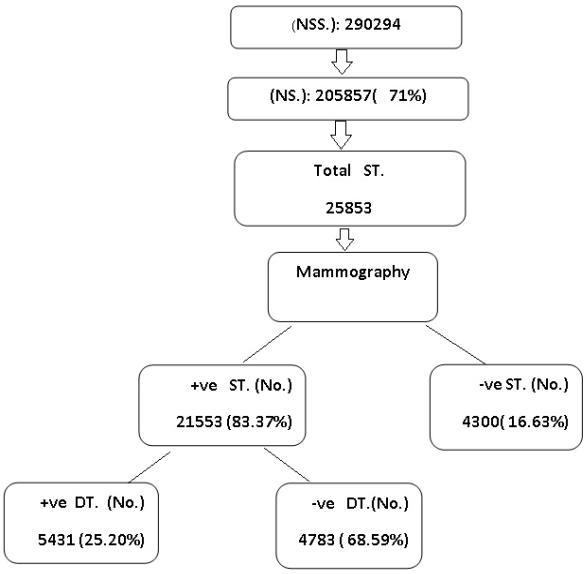

Figure 1 Flow chart to show data sets available for the program evaluation: NS: number screened, NSS: Number should be screened, +ve: positive, St: Screening tests, Dt: diagnostic test, No: Number

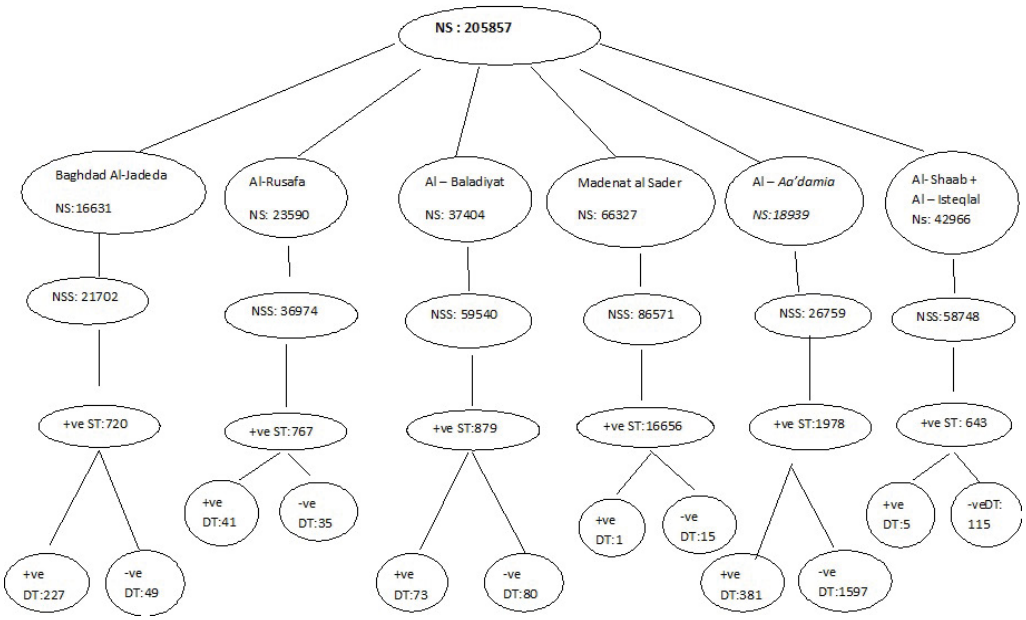

Figure 2 Distribution of Breast Cancer screening program results by Districts

Table 1 Coverage rate of breast cancer screening program/districts

District	NS number screened	Total number of women attending PHC	NSS	Coverage Rate =NS/ NSS%
Baghdad Al- Jadeda	16631	72339	21701.7	77
Al- Rusafa	23590	123246	36973.8	64
Al-Baladiyat	37404	198468	59540.4	63
Madenat al sader	66327	288570	86571	77
Al-Aa' damia	18939	89195	26758.5	71
Al-Shaab	42966	195828	58748.4	73
Total	205857	967646	290293.8	71

Table 2 No. needed to screen to diagnose one case in each district

District	NS number screened	No. of positive diagnostic tests	No. needed to screen to Diagnose one case
Baghdad Al- Jadeda	16631	227	73
Al- Rusafa	23590	411	57
Al-Baladiyat	37404	879	43
Madenat al sader	66327	1408	47
Al-Aa' damia	18939	1978	10
Al-Shaab	42966	528	81
Total	205857	5431	38

Table 3 Percent of clients with positive screening test %

District	No. of positive screening tests	No. Screened NS	Percent of clients with positive Screening test %
Baghdad Al- Jadeda	720	16631	4
Al- Rusafa	767	23590	3
Al-Baladiyat	879	37404	2
Madenat al sader	16656	66327	25
Al-Aa' damia	1978	18939	10
Al-Shaab	643	42966	2
Total	21553	205857	11

Table 4 Percentage of detection ability in each district

District	No. of positive diagnostic tests	NS number screened	Detection ability %
Baghdad Al- Jadeda	227	16631	1
Al- Rusafa	411	23590	2
Al-Baladiyat	879	37404	2
Madenat al sader	1408	66327	2
Al-Aa' damia	1978	18939	10
Al-Shaab	528	42966	1
Total	5431	205857	3

Table 5 Percentage of positive predictive value for each district

District	No. of True positive screening tests	NS number screened	Positive Predictive Value %
Baghdad Al- Jadeda	63	16631	0.38
Al- Rusafa	28	23590	0.12
Al-Baladiyat	73	37404	0.2
Madenat al sader	218	66327	0.33
Al-Aa' damia	381	18939	2.01
Al-Shaab	116	42966	0.27
Total	879	205857	0.42

DISCUSSION

Screening programs aimed to identify individuals during asymptomatic stages for possible detection of cancer during preclinical phases of the disease; they allow early diagnosis, more efficient treatment and increased odds of a successful result [38].

Screening programs should be evaluated continuously and systematically to ensure that they are meeting their targeted goals and objectives, that any areas for improvement are identified and managed in a timely and effective manner, and to be able to define interventions and continuation of the process [39].

Screening Coverage Rate

The coverage rate of a screening program is one of the fundamental indicators used to assess Breast cancer screening

program, and it is important for the forecast of future public health decisions on such programs. This is especially the case in developing countries with large populations, undeveloped economies, and uneven local development. One of the causes of missed cases is the lack of knowledge of the women about breast cancer screening. Though, the coverage rate was good at Baghdad Al-Russafa Directorate. In Bahrain During the year 2000, the coverage rate of breast cancer screening increased to 8%, in comparison to 6.2% in 1995.

It is presumed that underestimation is the reason for this trend in some of the health centers since breast examination is also performed during other preventive services, for example, antenatal and postnatal examination, and on patients demand during routine consultations without inclusion in the statistics [40].

It is presumed that relatively low coverage of periodic screening is due to unawareness of the services and absence of symptoms [40,41].

The coverage rate ranged from 50.9% in Italy to 115.2% in Poland, the latter exceeding 100% as more than 50% of the target population were invited in a single year (i.e. exceeding 100% coverage for a two-year program). The coverage in Poland was inflated in 2007 due to the initiation of personal invitation in the screening program in that year, the overall coverage rate in Europe was 70.9% [42].

Detection Rate

Low detection rate was noticed in the whole program in Baghdad Al Russafa District. In a similar study done in USA, the overall cancer detection rate was 1.7 cancers per 1000 mammograms (95% CI=1.4 to 1.9 cancers per 1000 mammograms). The cancer detection rate basically did not change with age and was not associated with family history, mainly in the age group of 35-39 years. African- American women had superior cancer detection rates than white women. The cancer detection rate was lower among women without a lump (1.2 cancers per 1000 mammograms, 95% CI=1.0 to 1.4) (P<.001) than that of women with a lump (11.4 cancers per 1000 mammograms, 95% CI=7.8 to 15.4) than among women [43].

Positive Predictive Value

The current study showed a much lower positive predictive value of Iraqi breast cancer screening than that of a study in USA that showed that the Age-Adjusted positive predictive value of screening was 1.3 % (95% CI=1.1% to 1.5%) with a slight variation with age. Positive predictive value of screening was 3.7% among women with a self-reported lump (95% CI=2.5% to 4.9%) as compared to 1.0 % among women without a lump ((95% CI=0.8% to 1.2% P<0.001).

On the other hand, a higher positive predictive value of screening was noticed among African- American women than among white women, and a statistically significantly higher positive predictive value was noticed among women with a positive family history (1.2 %, 95% CI=1.0% to 1.5%) than among women without such history (0.9%, 95% CI=0.4% to 1.5%) (P=0.032) [44].

For diagnostic mammography, the age-adjusted positive predictive value was 14.6% (95% CI=13.3% to 15.8%). This value increased with each age group from 2.3% for those aged 18–24 years (95% CI=0.5% to 4.5%) to 18.6% for those aged 35-39 years (95% CI=16.6% to 20.6%) and was statistically significantly higher among women with a lump 16.2% (95% CI=14.8% to 17.7%) than among women without a lump 8.3% (95% CI=6.0% to 10.6% ,P < 0.001). In addition, this value was lower (10.6%, 95% CI=8.1% to 13.3%) among women in the other racial group than among African American women (18.1%, 95% CI=14.0% to 22.4%) and among white women (15.2%, 95% CI=13.6% to 16.8%) [43].

Total Number of Women for Screening Test

The Total number of women who had screening test in Baghdad Al Russafa Directorate was higher than that of Number of breast cancer Screening First Visits in Bahrain which was 3086 in 1995, 4571 in 2000, 5521 in 2001, 7182 in 2006, 7886 in 2007 [45].

Number Needed To Screen To Diagnose One Case

The total number of women needed to screen to diagnose one case in Baghdad Al-Russafa directorate was 38 whereas, in a study done in the USA, the NNS to save one life with annual screening mammography in women between 40 and 49 years is 746. The NNS decreases to 351 for women aged 50-59 years, to 233 for women aged 60-69 years,

and increases to 377 for women aged 70-79 years. 84 women are needed to be screened annually from the age of 40 to 84 years (45 rounds) to save one life. These NNS results are smaller than those reported from screening trials because they assume a lifetime of screening after the age 40 years and they require complete follow-up rather than the restricted number of screening rounds and years of follow-up of RCTs [44].

CONCLUSION

The Iraqi national breast cancer screening program currently consists of clinical breast examination & mammography. The current study showed that there was a high coverage rate in Baghdad /Al-russafa Health Directorate compared to other countries and the highest coverage rate was in Baghdad al-jadeda and Madenat Al-sadee. Generally, the number of diagnosed cases were low and it encompasses less than one-third of the women with positively screened tests. The detection ability of the entire program was high as compared to other countries.

The number of women needed to be screened to diagnose one case through the entire program was lower than that of the program in other countries. The highest number was in Al-Shaab and Al-Isteqlal. The positive predictive value was low in Baghdad Al Russafa Health Directorate as compared to other countries and the highest Positive Predictive value was in Al-Aa'damia.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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