The prevalence of breast cancer in Iranian women: a systematic review and meta-analysis

Abstract

Background: Breast cancer is one of the main causes of women's death. Breast cancer is the most common cancer in women over the world. Various studies have reported different incidence of breast cancer in women. However, we found no comprehensive study that showed the results of these studies in general, so the present study was conducted aimed to determine the prevalence of breast cancer in Iranian women in a systematic review and meta-analysis study.

Methods: In this review study, with searching national and international databases of SID, MagIran, IranMedex, IranDoc, Google Scholar, Cochrane, Embase, ScienceDirect, Scopus, PubMed and Web of Science (WoS) the data were extracted between 1965 and September 2019. The random effects model was used for analysis and heterogeneity of studies was investigated using I^2 index. The data were analyzed using software Comprehensive Meta-Analysis (Version 2).

Results: The prevalence of breast cancer in Iranian women in 24 papers with a sample size of 39596 patients was 23.6% (95% CI: 15.3-34.7%). A significant difference was found in the prevalence of breast cancer in Iranian women regarding heterogeneity based on meta-regression, year of study and sample size (P < 0.005).

Conclusion: The study results show that the prevalence of breast cancer in Iranian women is high. Hence, appropriate solutions should be applied to improve the aforementioned situation, find causes and monitor by providing feedback to hospitals at all levels.

Keywords: Cancer, breast, prevalence, meta-analysis, Iran

Background

Breast cancer is one of the main causes of women's death [1]. Breast cancer is the most common cancer in women around the world, accounting for 30% of female cancers and 15% of cancer-related deaths among women [2]. According to the report of World Health Organization (WHO), in February 2009, breast cancer killed 519,000 patients worldwide annually [3].

In Iran, breast cancer accounts for 21.4% of all reported cases [4]. If we consider the life expectancy of an American woman to be 85 years, one in eight women (12.5%) will develop breast cancer during her lifetime [5]. The prevalence of breast cancer varies from country to country. The highest number has been reported in the US and northern Europe, and the lowest prevalence has been reported in Asia [2, 5, 6].

Breast cancer is rare in women younger than 20 years and uncommon in women younger than 30 years. The incidence increases rapidly with age up to age 50 [2]. In recent decades, changes in individuals' lifestyles have increased the incidence and prevalence of breast cancer and its risk factors worldwide [7]. In 2003, 658800 women were diagnosed with cancer, of which 270600 women died of the disease, and approximately 211300 of these women died of breast cancer [8].

Breast cancer is one of the most treatable cancers if diagnosed early. Recent studies show that breast cancer causes death and disability in developing countries [9]. The rate of death due to breast cancer is higher in poor countries [10]. Since determining the risk factors of this cancer can be very effective on early diagnosis and treatment, some results indicate that increasing age, number of births, socioeconomic status, age at first marriage, age of first pregnancy, marital status, and non-breastfeeding significantly increase the risk factors of breast cancer [11].

The factors such as individuals' older age are closely related to breast cancer, which increases in those over 55 years old [12]. Although the cause of breast cancer is unclear, various factors including individual and social characteristics (age, certain body sizes, menopausal age, and literacy) and lifestyle (diet, exercise, obesity, tobacco use, and etc.) increase susceptibility to breast cancer [13, 14].

It has been shown that the age of prevalence of breast cancer malignancy is 50-59 years older than other age groups [14, 15].

On the other hand, breast cancer with an incidence of 9.16 per 100,000 persons, constitutes 3.21% of all cancers in women and is the most common cancer among women, and its incidence has increased in recent years. Breast cancer is the most common cancer in women in most countries of the world, and is a major health problem in Iran, with the most common death age in Iran between 40 and 49 [17]. According to existing studies, early breast cancer diagnoses methods reduce death due to breast cancer [11].

According to studies, the prevalence of breast cancer in women in Kermanshah province is 14.2% [19], in Kerman province is 27.1% [20], in Tehran province is 20.9% [21] and in the northern provinces of Iran is 10% [22].

Regarding the effect of different factors on the prevalence of breast cancer and lack of general statistics about it throughout Iran, and given that the right policy can be done with accurate and reliable information, this reliable information can be obtained by collecting studies conducted at the population level and their overall outcome. we decided to reach general statistics on the prevalence of breast cancer in Iranian women by reviewing the studies conducted in this regard and the statistical analysis of the results of studies and open a window to more rigorous planning to reduce women's breast cancer complications, increase life expectancy, and improve individuals' health.

Methods

In this systematic review and meta-analysis study, the prevalence of breast cancer in Iranian women was studied based on studies conducted without time limit (until September 2019). For this purpose, we searched papers published in the databases of SID, MagIran, IranMedex and IranDoc and international databases of

Google scholar, Cochrane, Embase, ScienceDirect, Scopus, PubMed, and Web of Science (WoS) with Persian keywords of prevalence, cancer, breast, Brest and Breast and Latin keywords of Prevalence, Cancer, Breast and Iran.

The criteria for selecting the studies were observational (non-interventional studies) and full text availability. For more information, the references of the papers reviewed were also reviewed for access to other papers.

Selection of studies

First, all papers referring to the prevalence of breast cancer in Iranian women were collected by researchers and accepted based on the study inclusion and exclusion criteria. The study exclusion criteria included unrelated cases, case reports, interventional studies, repeated studies, unclear methodology, and inaccessibility of the full text of the study. In order to reduce bias, the papers were independently searched by two researchers, and in the case of disagreement, the paper was reviewed by the reviewer. Thirty studies entered the third stage i.e. qualitative evaluation.

Data extraction

All final papers entered the meta-analysis process were prepared using a pre-prepared checklist. The checklist included the paper title, first author's name, year of publication, study area, sample size of women, prevalence of breast cancer in women, and mean age.

Statistical analysis

Given that the prevalence has binomial distribution, prevalence variance was calculated using binomial distribution variance formula and weighted mean was used to combine prevalence rate of different studies. In order to evaluate the heterogeneity of the selected studies, I^2 test was used (heterogeneity was divided into three classes of less than 25% (low heterogeneity), 25-75% (mean heterogeneity) and more than 75% (high heterogeneity). Meta-regression analysis was used to investigate the relationship between the prevalence of breast cancer in women, the year of the study and sample size. Egger test at significance level 0.05 was used to investigate the propagation error and regarding the high sample size entered, Begg and Mazumdar test was used at significance level 0.1 and its corresponding Funnel plot. Sensitivity analysis was used to study the effect of each of studies on the final result. The data were analyzed using software Comprehensive Meta-Analysis (Version 2). The probability of bias in the results' propagation was evaluated by Funnel Plot and Egger test (Figure 1) which showed that the propagation bias was not statistically significant (P = 0.263). Also, the results of Begg and Mazumdar test at significance level 0.1 showed no propagation bias in the present study (P = 0.157).

(Figure 1 Here)

Results

Qualitative evaluation of studies

The quality of papers was evaluated based on the selected and related items of STROBE 22 checklist that could be evaluated in this study (study design, background, literature review, place and time of study, outcome, inclusion criteria, sample size, and statistical analysis) that previous studies have also referred to

them. The papers referring to 6 to 7 criteria were considered as high-quality papers, papers that did not mention 2 items and more than 2 items of the seven items were considered as mean and low methodological quality papers, respectively [18]. In the present study, 24 papers were systematically reviewed and meta-analysed as high and mean quality studies, and six papers were of poor quality and were excluded. Accordingly, out of 24 studies, 8 studies were of medium quality [22, 25, 30, 33, 36, 39. 40, 42] and 16 studies were of high quality (Table 1).

In this study, all conducted studies on the prevalence of breast cancer in Iranian women without time limitation were systematically reviewed according to PRISMA guidelines. In the initial search, 823 papers were identified that finally 24 studies published between 1965 and September 2019 were entered the final analysis (Figure 2) (Table 1).

(Figure 2 Here)

(Table 1 Here)

According to the test results (I^2: 99.7) and regarding the heterogeneity of the selected studies, a random effects model was used to combine the studies and estimate prevalence. The total sample size was n = 39596 with the mean age of sample in each study, which is presented in Table 1. The lowest and highest sample size were related to studies by Mahadavi et al. (2016) (n = 89) [25] and Taheri et al. (2012) (n = 11038) [16], respectively and the highest and lowest prevalence of breast cancer in Iranian women were related to studies by Roshani et al. (2016) [28] and Habibi et al. (1965) [35], respectively (Table 1).

Table 1. Characteristic of included studies prevalence Cancer Breast

According to the study results, the total prevalence of breast cancer in Iranian women was 23.6% (95% CI: 15.3-34.7%) (Figure 3).

(Figure 3 Here)

The relationship between year of study (P = 0.000), and prevalence of breast cancer in Iranian women was investigated using meta-regression. A significant relationship was observed between the prevalence of breast cancer in Iranian women and year of study, as the year of study increased the prevalence of breast cancer in Iranian women increased (Figures 5).

(Figure 4 Here)

Discussion
The present study was conducted aimed to determine the prevalence of breast cancer in Iranian women based on conducted studies. The prevalence of breast cancer among cancer patients in different regions of the world varies from 18 to 35% [43, 44]. According to studies conducted in Southwest Asian countries, the prevalence of breast cancer was 11.8% to 46.8% [45]. Regarding the prevalence rate of 23.6% in this study, it seems that our country is in the middle of the areas with maximum prevalence and minimum prevalence.
Breast cancer is the most common cancer in most Asian countries. Because of changes in lifestyle and diet, the prevalence rate is low, although at a faster rate than in Western countries. There are many differences between breast cancers in Asia compared to Western countries. The mean age at onset is lower than in

western countries and, unlike western countries, age-specific incidence reduces after age 50 years. Since there is no population-based breast cancer screening program in most Asian countries, most patients have advanced breast cancer. Most Asian countries are low- and middle-income countries with limited access to effective care. Survival of women with breast cancer in Asia is lower than in Western countries due to late diagnosis and inadequate access to care. Improving breast health in most Asian countries remains a challenge that will be addressed by cooperation of many sectors including public and private sectors [46].

According to a meta-analysis and systematic review by Momenimovahed et al., the incidence of breast cancer is very different by race and ethnicity and is higher in developed countries. The study results show that death due to breast cancer is higher in less developed regions. The study results showed that various risk factors, including demographic, reproductive, hormonal, hereditary, and lifestyle factors, are involved in breast cancer incidence [47].

The development of an international cancer registration system is needed to record the information and factors of cancer incidence, such as geographic, social, and occupational information of the patient. The information can be helpful in screening and preventing cancer [48, 49].

Cancer Registry Center collects and utilizes data for proper planning to determine the degree of susceptibility of populations in different regions, epidemiological studies, cancer control and support for health care [50, 51]. Advanced countries have an approved cancer program [52, 53], which require them to collect and report data on treated cancer patients, their disease type and treatment outcomes. Cancer registry software enables medical centers to better manage and analyze reports that have cancer recording capabilities, providing cancer diagnostic information, automated coding, statistics recording, reporting and follow-up [54, 55].

In the present study, the mean age of patients is presented in Table 1. Alavicheh et al. (2015) found that 49% of breast cancer cases in their study occurred in the age group of 41-60 years [56]. Molah Karim et al. (2015) reported a mean age of 49 years [57].

A 70-year-old woman's chances of developing breast cancer are 10 times higher than a 40-year-old woman's. About half of all breast cancer cases occur in American women over the age of 65 [58].

According to Dr. Sharon.H and Giordano at University of Texas in 2004, the mean age of breast cancer in women was 62 years and 67 years in men. According to classical statistics, the prevalence of breast cancer is 50 years or more [60, 61], but in our study the highest incidence of breast cancer was seen in those aged 35-49 years. The prevalent age of breast cancer in patients referred to our country is a decade older less than Western countries. One of the two possible reasons for the lower prevalence of breast cancer in this study is the younger population in the country, resulting in an increased number of younger patients, finally making up a greater percentage of the treated patients. The second reason is the presumption of old patients who tolerate breast cancer until death and refrain from referral for treatment and thus are not included in the referral patient statistics. The percentage of these patients cannot be mentioned, but if their percentage is high enough to cause the above conclusions, it alone indicates that women are unaware of the effect of breast cancer treatment.

Breast cancer is less prevalent in the age below 30 years, and some researchers believe that breast cancer lesions can only be monitored at this age due to the rarity of cancer in young people [62].

However, regarding the relatively low prevalence of breast cancer in the age below 30 years, this study recommends that any breast lesions at a younger age should be considered serious.

In a study by Bakhtiari et al., 49.9% of women and in a study by Zafarqandi et al. 70.2% of women had advanced cancer at the time of referring (stages 3 and 4) [35, 60]. In a study by Dr. Hill et al., the ratio was only 10% [63] and in E study (2005) it was 15% [64].

These differences clearly show the effect of non-implementation of screening programs and early diagnosis of breast cancer in Iran. Also, the high rate of delayed referral in these studies, the lack of awareness among women and sometimes the fear of being diagnosed due to false beliefs about not having cancer treatment are among the main causes of this difference. In a study by Dr. Ghaem Maghami et al. (2002), 68% of women referred with delay and 22.1% was lack of awareness, 18.4% was fear of diagnosis and 11.8% was

negligence. These individuals had higher mean age, lived in smaller cities, had less education, poorer economic state, and had less access to a physician [60].

Since in the studies reviewed in this study, these subjects were also less aware of the symptoms of breast cancer and breast self-examination, therefore, increased awareness may play an important role in early referral.

Regarding the effect of the year on the prevalence of breast cancer, it has been shown that the prevalence of breast cancer in Iranian women is increasing.

The factors such as older age of menopause, early menarche onset, obesity, and alcohol increase the risk of breast cancer and regular physical activity reduces the risk of breast cancer in women [66].

According to a meta-analysis study and systematic review by Larsson et al., it was found that diabetes significantly increases the risk of breast cancer in women by 20% [67].

According to a meta-analysis and systematic review by Sasco et al., in general, the analytical epidemiology of breast cancer in men is similar to the epidemiology of breast cancer in women. The factors related to hormone state and relative hypoestrogenesis in men are potentially associated with an increased risk of the disease [68]. According to a meta-analysis study and systematic review by Travis et al., it was found that a partial or no relationship was found between night shift and the incidence of breast cancer in women [69].

According to a meta-analysis and systematic review by DiSipio et al., up to 2 years after diagnosis or surgery of breast cancer, the incidence of arm lymphoma increases [70]. A meta-analysis and systematic review by Pilevarzadeh et al. showed that the prevalence of depression in patients with breast cancer was 32.2% [71].

Therefore, precautions should be taken to prevent complications of breast cancer.Since women are the center and guarantee of family health, and regarding the widespread role of women in the country's socio-economic cycle and the goal of a healthy human-sustainable development, the need for early diagnosis and prevention of breast cancer due to high prevalence around the world is important as one of the best approaches to control this disease; hence, we recommend primary prevention including changes in lifestyle, avoid risk factors, and provide mass education and information especially through mass media such as: radio, television and news to increase the level of awareness of breast cancer screening methods and secondary prevention, including: early diagnosis of cancer or precancerous lesions by screening methods as the most effective way of breast cancer diagnosis that can play an important role in reducing the incidence of breast cancer and death caused by it.

Conclusion

The study results show that the prevalence of breast cancer in Iranian women is high. Hence, appropriate solutions should be applied to improve the aforementioned situation, find causes and monitor by providing feedback to hospitals at all levels.

Abbreviations

WHO: World Health Organization

SID: Scientific Information Database

STROBE: The Strengthening the Reporting of Observational Studies in Epidemiology

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analysis.

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Table legend:

Table 1: Characteristic of included studies prevalence Cancer Breast

Figures Legend:

Figure 1. Funnel Plot: the results of the prevalence of breast cancer in women
Figure 2. Flow diagram of study selection.

Figure 3. Breast cancer prevalence and 95% confidence interval in Iran. The middle point of each line shows the prevalence of breast cancer in each study and the diamond shows the prevalence of breast cancer in Iranian women for all studies.

Figure 4. Meta-regression of the relationship between study year and prevalence of breast cancer in Iranian women