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Epidemiology and trends of patients with breast cancer referred to Tehran Cancer Diagnosis Centers during 1997 to 2016

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Abstract: Cancer is considered as one of the leading causes of mortality in the world and breast cancer is one of the most common types of cancers among women in the world. The number of cancerous cases in the world is gradually increasing. The present study aimed to describe the characteristics of women with breast cancer referred to cancer diagnosis centers in Tehran, and predict the frequency of patients by 2022 with respect to the frequency of data during 1997-2016. In this cross-sectional study, the population included 3753 patients, who were admitted to five independent cancer centers in Tehran, Iran during 1997-2016. All of the collected data were extracted to describe the characteristics of patients, as well as forecasting the frequency of this cancer by 2022 in Tehran. The data were analyzed by STATA 12 and MINITAB version 17 software. The results indicated that the highest occurrence occur between the 40s and 50s of women's life. In addition, these patients were overweight, used oral contraceptive pills (OCP), and experienced life-threatening events. Further, the prediction models demonstrated an upward trend in the prevalence of the disease by 2022. It seems that there is an increasing trend in the number of breast cancer in patients referred to cancer diagnosis centers in Tehran by considering the changes in women's lifestyle, increasing awareness about screening this cancer, as well as developing diagnostic techniques.

Keyword: Breast cancer, Trend, Forecasting, Epidemiology

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1. Introduction

Cancer is regarded as one of the major causes of heath around the world. In this regard, breast cancer is recognized as the most common type of cancer among women in the world. In addition, there is a gradual increase in the number of cancerous cases in the world (1). Cancer causes death in all countries with all socioeconomic status. Further growth rate of the elderly population and lifestyle changes have increased the occurrence of cancer (2).

Annually, 1.5 million women in the world are diagnosed with breast cancer, among whom 502,000 people die, and the incidence varies from 19.3 per 100 000 of women in West Africa to 89.9 per 100 000 in Europe (3). Approximately, 6.6% of all cancer patients are under the age of 40 years, among whom 2.4% are women under 35 and less than 1% are women under the age of 30 (4).

Breast cancer accounts for more than 27% of all cancers and 19% of deaths occur due to cancer in Asia. According to the Ministry of Health reports in 2000-2006, breast cancer has

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been growing among Iranian women during 1965-2000. Further, the occurrence of cancer ranged 21.4-24.6 in 100, which is the second most common cancer among Iranian women (5). The occurrence of this cancer is expected to increase in the future by increasing life expectancy in Iran and aging the population (6). The present study aimed to describe the characteristics of women with breast cancer referred to cancer diagnosis centers in Tehran, and predict the frequency of patients by 2022 with respect to the frequency of data during 1997-2016.

2. Method

This cross-sectional study was conducted based on the recorded data of three general cancer registry centers in Tehran including Cancer Institute of Tehran University of Medical Sciences, Motamed cancer Institute, Milad Hospital of Tehran and two private clinics volunteered to participate in the study.

First, all of the duplicated data and those related to men were removed. In order to ensure the accuracy of the results, records with more than 15% of missing data were excluded, and other patient records were double-checked individually for validation purposes. Finally, only 3753 complete records were obtained during 1997-2016. Variables such as the age related to the first diagnosis of the disease, the first menstruation, and the first menopause, marital status, education, body mass index, fertility status, history of contraceptive pills, smoking, having an unfortunate incidence in their life, and a family history of cancer were considered for the purpose of this study.

Then, the prevalence of breast cancer by 2022 was predicted by extracting the frequency of breast cancer patients by year by using predictive models of Trend Analysis. Finally, the data were analyzed by STATA 12 and MINITAB version 17 software.

The predictive model of Trend Analysis was used to investigate the frequency of referrals to Cancer Diagnosis Centers in Tehran and then it was fitted using Mean Absolute Deviation (MAPE), Mean Absolute Deviation (MAD) and Mean Squared Deviation (MSD) indices.

Ethical approval: This article does not contain any studies with human participants performed by any of the authors. We just aggregate their data from some centers in which informed

consent had been obtained from all individual participants. The study has the ethical approval from Motamed Cancer Institute ethical committee (ID: ir.acecr.ibcrc.1394.73).

3. Results

In this study, 3753 women with breast cancer selected although the information about all these people was not available and missing data were observed in some variables. According to the age of patients, the mean age of menarche, first childbirth and menopause were 13.4 ± 1.6, 21.8 ± 5.3 and 47.6 ± 5.3, respectively.

The highest occurrence of this type of cancer was related to the age group of 40-50 years (35.2%). among whom 11.4% lost their husbands, or were divorced from their husbands. Further, the results showed that those who had elementary education were the most frequent (30.7%) (Table 1).

Another factor was related to the use of contraceptive pills, and 56.9% subjects had a history of consumption. Furthermore, about 71% had a history of unpleasant events in their lives, among whom 22.3% were directly or indirectly exposed to cigarette smoke. As shown in Table 1, only 23.4% had normal BMI based on the result of body mass index (Table 1).

Regarding the review of the diagnosis trend of cancer during 1997-2016, the frequency of this type of cancer increased in all age groups in all these years. In addition, the most frequent diagnosis occurred during 40s and 50s of women's lives. Additionally, the trend seems the same in other ages (Figure 1).

Accordingly, modeling was used to forecast the frequency of cancer by 2022, and the best fit was related to the Exponential Growth model after examining the various models (Exponential Growth, Linear, S-Curve, and Quadratic).

The Mean absolute percentage error (MAPE) indicator showed that this model could predict the data by 2022 by 18% of error. Further, the Mean Absolute Deviation (MAD) and Mean squared deviation (MSD) indicated the deviations of means, which was related to the fact that the frequency of data was high in some years, which could be affected by these two indicators. Based on the results of this model, an increase may occur in the incidence of cancer by 2022 in Tehran, which could gradually increase by 2012 with a slight slope. However, a large peak, followed by a declining trend towards 2013, although it was not less than that of the previous years, and maintained its uptrend. The model prediction by 2022 demonstrated that the frequency would increase by about 9% with a slight slope although we may observe an approximately 24% increase at the end of 2017 until 2022 (Figure 2).

4. Discussion

The results of this study indicated that the mean age of the first menstruation, the first delivery and menopause among these individuals occurred during their normal time. In addition, there was no premature menstruation or late

menopause although the results of other studies indicated that the age of menstruation and menopause can be considered as risk factors for the disease (7-9).

The cancer was mostly diagnosed during the 40s and 50s

Table 1: Frequency of women with breast cancer detected in Tehran between 1997 and 2016

Characters	Category	Frequency	Percent
Age	20-30 years	123	3.3
	30-40 years	804	21.4
	40-50 years	1320	35.2
	50-60 years	906	24.2
	60-70 years	396	10.50
	70< years	168	4.50
	Missing	36	0.9
BMI	Under weight	21	0.6
	Normal	879	23.4
	Overweight	1383	36.8
	Obesity grade1	799	21.3
	Obesity grade2	240	6.4
	Obesity grade3	67	1.8
	Missing	364	9.7
Education Status	Illiterate	404	10.7
	Primary	1151	30.7
	High School	1072	28.6
	University	699	18.6
	Missing	427	11.4
Marital Status	Single	255	6.7
	Married	2940	78.3
	Divorce	410	11
	Widow	15	0.4
	Missing	133	3.6
Family History	Yes	838	77.7
	No	2915	22.3
	Missing	0	0
OCP use	Yes	2135	56.9
	No	1618	43.1
	Missing	0	0
Fertility Status	Fertile	3063	81.6
	Infertile	118	3.2
	Missing	572	15.2
Passive Smoking	Yes	522	13.9
	No	2992	79.7
	Missing	239	6.4
Life Event	Yes	2658	70.8
	No	169	4.5
	Missing	926	24.7

OCP: Oral contraceptive pill

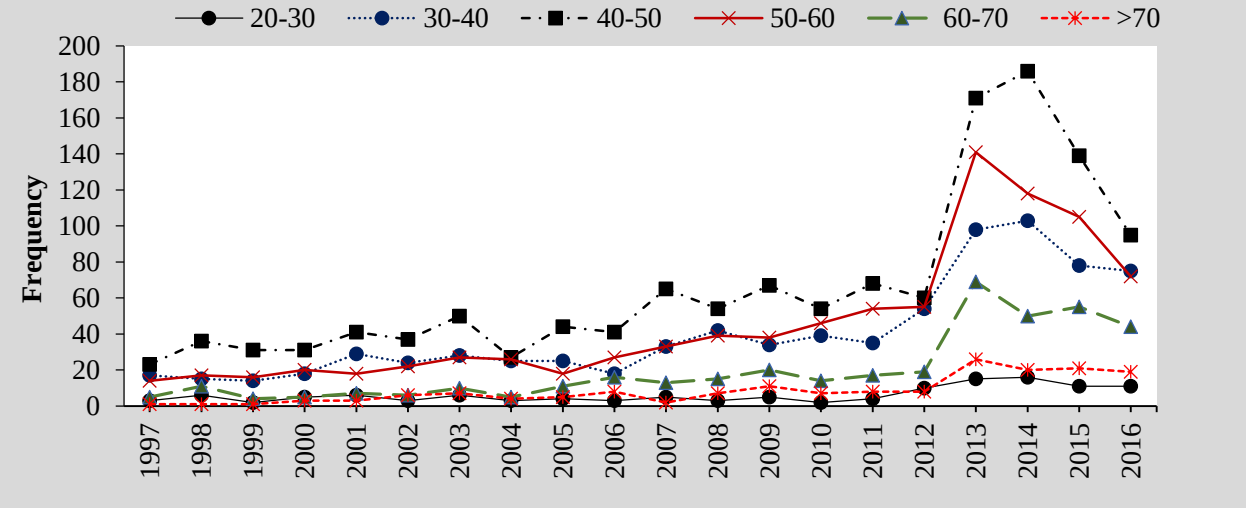

Figure 1: The frequency trend of diagnosis of women with cancer, by age group over the years 1997 to 2016

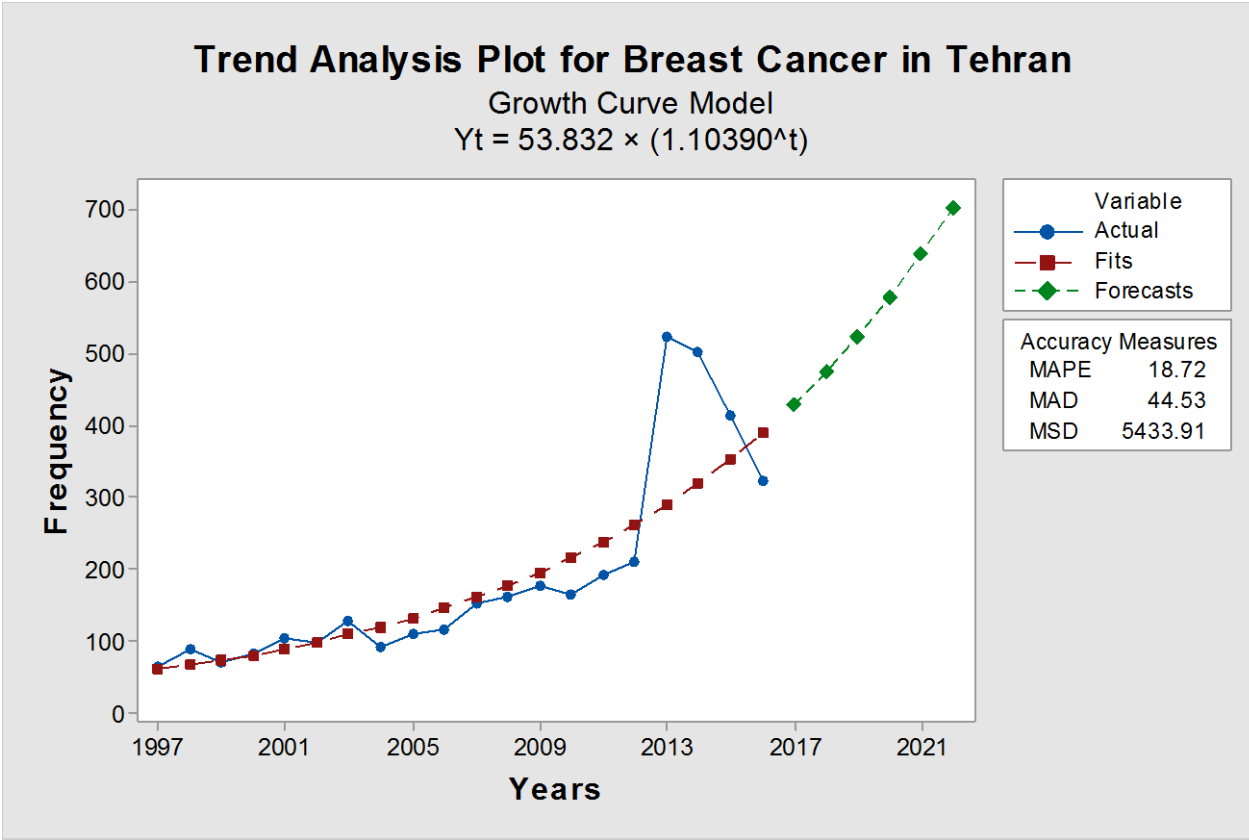

Figure 2: Forecasted frequency of breast cancer in women by 2022 in Tehran Cancer Diagnosis Centers

among the subjects, which is consistent with the results of other studies conducted in the world (10-14). It seems that the results can be justified through the chronic process of this disease, as well as the physiological changes of individuals at this age.

Low level of education was reported to be another reason found in the present study, which is in line with the result of another study which was regarded as a risk factor for breast cancer (7).

Further, the use of contraceptive pills has always been considered as one of the risk factors for developing breast cancer (7). In this study, more than half of the women reported using oral contraceptive pills (OCP). It seems that the hormonal changes caused by using these types of pills among women can be a risk factor for breast cancer.

Additionally, the occurrence of bad events such as the death of family members, separation from the spouse and losing

a job can result in increasing acute or long-term stress in people. In this study, more than 70% of women had a history of an unpleasant event in their life, which is regarded as a risk factor for diseases such as cancer among humans. In another study, the effect of each life-threatening event on breast cancer among Iranian women was demonstrated (15).

Exposure to cigarette smoke and abnormal BMI among individuals have been always been considered as two risk factors for developing non-communicable diseases, especially cancer (7). In this study, about 13% of women were exposed to cigarette smoke, and most of the patients with breast cancer were overweight.

An increasing trend separated by different age groups observed in the frequency of breast cancer occurrence in this study was reported in other countries (3, 16, and 17). In addition, it seems that the occurrence of cancer increased in all age groups, although it was more prevalent among the patients during the 40s and 50s, compared to other age groups. Regarding the reasons, we can refer to the changes in the women's lifestyle and an improvement in diagnostic techniques, which have occurred over time.

An overview of the overall incidence of breast cancer during 1997-2016 indicated an upward trend in diagnosing this cancer, although a transitory downturn was observed during 2014-2016, which may lead to a modeling error in this type of predicting model. However, this kind of modeling will demonstrate a growing trend in the frequency of breast cancer referred to cancer diagnosis centers in Tehran by the year 2022 with 18% prediction error. The result of another study conducted in 2011 in order to predict the incidence of breast cancer by 2016 indicated that the occurrence of this cancer followed an upward trend (18). Further, an increase in occurrence of this type of cancer in the coming years can be related to the changes in the women's lifestyle, raising awareness about screening techniques and their referring to periodic screening of breast cancer, as well as improving diagnostic techniques in these individuals.

Since the individuals' frequency was only considered in the present study, it is suggested that the standardized age rates should be used in future studies for more precise evaluation.

5. Conclusion

based on the results, it seems that an increasing trend may happen in the frequency of breast cancer in referred to cancer diagnosis centers in Tehran by considering the changes in women's lifestyle, increasing awareness about the screening of breast cancer, as well as the growth of diagnostic techniques.

6. Acknowledgment

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7. Conflict of interest

All authors declare that they have no conflict of interest.

8. Funding source

This study had no specific funding and was done with the authors' interest.

9. Ethical approval

This article does not contain any studies with human participants performed by any of the authors. We just aggregate their data from some centers in which informed consent had been obtained from all individual participants. The study has the ethical approval from Motamed Cancer Institute ethical committee (ID: ir.acecr.ibcrc.1394.73).

10. Data Availability

Access to the data which we used in this research is restricted because of ethical and regional issues.

11. Author contribution

All authors provided critical feedback and helped shape the research, analysis and manuscript.

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