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EPIDEMIOLOGY OF BREAST CANCER IN INDIA

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Abstract– Breast cancer is one of the most common cancers in the world. It begins in the ducts and lobules of the breast and is characterized by uncontrolled growth of the breast tissue. There are many risk factors associated with this type of cancer like gender, age, inheritance of BRCA1/ BRCA2 genes, age of menarche and menopause, abortion, alcohol consumption. This disease is becoming increasingly prevalent in India, with India accounting for almost one-third of the world's breast cancer burden, with over 70,000 deaths annually. This is a survey-based study, which aims to understand the epidemiology of breast cancer in the Indian population. This online survey was answered by 297 Indian or Indian origin adults. Both females and males were the respondents. Results of the study indicated that breast cancer is moderately prevalent in Indian females with the mean age of diagnosis being 53.66 years. The correlation between the age of diagnosis of breast cancer with stage of detection, age of childbirth and the number of children the woman has given birth to was also determined, and the analyses demonstrated that there was a positive correlation between these factors. Increasing awareness about symptoms and seriousness of breast cancer is required to prevent high mortality from the disease.

INTRODUCTION

Breast cancer is the cancer in which there is uncontrolled growth of the breast tissue. It is one of the most common cancers. It occurs mostly in women and the number of cases is nearly 100 times more in women than in men (Sun *et al.,* 2017). Breast cancers generally begin in the ducts and lobules of the breast but spread outside the breast through blood and lymphatic vessels. Breast cancers can be invasive (cells split away from the ducts and lobules); or non-invasive (cancerous cells do not extend away from the lobule or ducts where it is situated). The less common forms of breast cancer include inflammatory breast cancer, Paget's disease, phyllodes tumor and Triple Negative Breast Cancer (TNBC) (Akram *et al.,* 2017). Breast cancer may occur due to a variety of factors like inheritance of mutated genes like BRCA1 (Breast Cancer Associated Gene-1), BRCA2 (Breast Cancer Associated Gene-2), HER-2 (Human Epidermal Growth Factor Receptor-2), EGFR (Epidermal Growth Factor Receptor), p53 and c-Myc(Sun *et al.,* 2017); age & early menarche and late menopause, as this exposes the body to more estrogen (Nkondjock and Ghadirian, 2004). BRCA1 and 2 genes encode tumor suppressor proteins, therefore a loss-of-function mutation in them causes breast cancer (Tutt and Ashworth, 2002), and these are inherited in an autosomal dominant manner (Hedau *et al.,* 2004).

The incidence of breast cancer in India has increased in the past two decades (Rangarajan *et al.,* 2016), with India accounting for about one-third of the world's breast cancer burden along with China and the USA. According to the data collected from the National Cancer Registry Program reports 2012–2014 and twenty-five population-based cancer registries (PBCRs) across India, the prevalence of breast cancer is most in the urban areas (Malvia *et al.,* 2017). Breast cancer occurs mostly at a pre-menopausal age in India, with many of these cancers being HER2 positive, ER/PR negative, or triple negative breast cancers. In India, 45.7% breast cancers are reported in advanced stages (Malvia *et al.,* 2017). Over 100,000 new cases of breast cancer are estimated to be diagnosed annually in India, with over 50% of the cases occurring in pre-menopausal women (Khokhar, 2012).

The aim of this study was to determine the epidemiology of breast cancer in the Indian

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population. The objective of this study is to understand the prevalence of breast cancer in India which will help raise awareness about the disease.

METHODS

The survey-based method was used to carry out study. A survey formulated on Google Forms was circulated through the messaging platform Whats App. The survey was answered by 297 adults. Majority were from the state of Maharashtra. The present study was conducted in accordance with the declaration of Helsinki. The consent was taken from all participants involved in the study.

Inclusion Criteria-In this survey, men and women in the age group of 18 years to 90 years were included. All participants were Indians or of Indian origin.

Exclusion Criteria-All persons below age of 18 years were excluded.

Statistical Analysis-The data obtained from the survey was analyzed by online statistical software MS Excel. The tools of analysis used were Student's t-test and Karl Pearson's Correlation Coefficient to determine the relationship between various factors in the survey.

RESULTS

Out of the 297 respondents, 12 female responders had been diagnosed with breast cancer. No case of male breast cancer was reported in this survey. Of the 12 responders, seven were from Maharashtra, two from Gujarat and one form Punjab, Karnataka & Telangana each.

All the responders had given birth to at least one child in their lifetimes, and had also breast fed their children for 6 months at least. The age at which most of the responders had given birth was 25-30 years as shown in Figure 1.

Only one responder had a history of a previously diagnosed cancer while four responders had a family history of cancer.

Three of the 12 respondents had a history of abortion.

The mean age of diagnosis of breast cancer was estimated as 53.66 years. Maximum number of

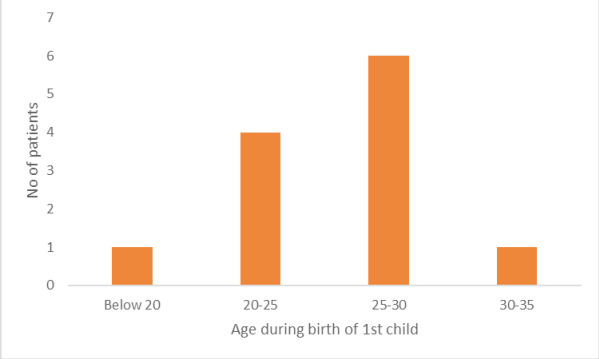

Fig. 1. The respondents ages during first childbirth

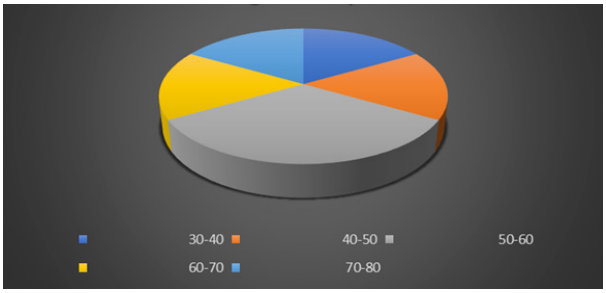

Fig. 2. The distribution of the Breast cancer diagnosis age in the survey responders

Table 1. Parameters for Statistical Analysis

Candidate	Age at diagnosis	Stage	Age at 1st childbirth	No of Children
1	60	1	19	3
2	62	1	24	2
3	42	1	22	2
4	47	3	27	2
5	50	1	25	2
6	50	1	26	2
7	59	2	27	2
8	77	1	21	1
9	31	2	25	1
10	70	1	22	3
11	37	1	31	1
12	59	0	27	2

respondents were diagnosed in the age group of 50-60 years as shown in Figure 2.

Student's t-test and Correlation analysis was performed to evaluate the relationship between patient's age at diagnosis of breast cancer and

1. Stage at which the cancer was diagnosed
2. Age of patient during first childbirth
3. Number of children

The results of the statistical analysis are enumerated in Tables 2 and 3.

The data shown in Tables 2 and 3 indicates that there is a relationship between the age at diagnosis and the 3 above mentioned parameters. The age of diagnosis and the stage of diagnosis are correlated such that earlier the age of diagnosis, higher is the stage of the breast cancer diagnosed. It can also be noted that earlier the age of 1st child birth, later is the age of diagnosis. The statistical analysis also demonstrated that more the number of children a woman gives birth to, later is the age of diagnosis of the cancer.The age distribution of menarche and menopause of the respondents are given in Figures 3 and 4. The figures show that the evidence obtained from ages of menarche and menopause is not conclusive for correlating to any factor determining breast cancer occurrence.

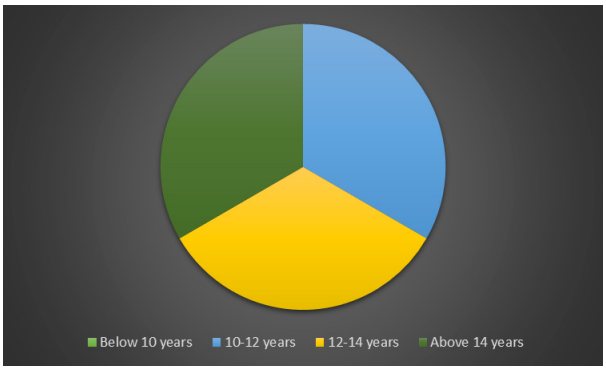

Fig. 3. Age distribution of Menarche of the respondents

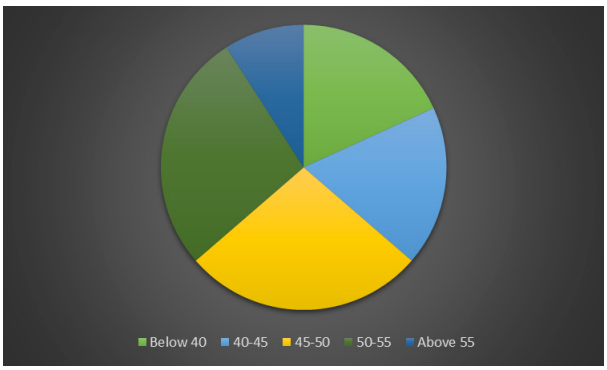

Fig. 4. Age distribution of Menopause of the respondents

DISCUSSION

The results of the study showed breast cancer to be moderately prevalent in India. No cases of male breast cancer were reported, even though male breast cancer forms around 3% of total breast cancer cases in India (Vanamail, 2019). This may be due to the fact that the sample size of the survey was small and the general hesitancy to answer a health-based survey. Though only 12 persons gave a positive response for this disease, there may have been more cases of breast cancer among the 297 respondents which may have gone unreported because some persons may not have been sure of their diagnosis and also the previously mentioned hesitancy factor has to be taken into account. Most of the women in this survey were diagnosed in the post-menopausal age group which is consistent with findings of other studies (Momenimovahed and Salehiniya, 2019), although a significant proportion of patients in India are younger than 35 years of age (Agarwal and

Table 2. Correlation Analysis

Parameter	Correlation Coefficient	Degree of Correlation
Age at diagnosis & Stage of detection	-0.32389	Low Negative correlation
Age of diagnosis & Age at 1st childbirth	-0.5148	Moderate Negative correlation
Age at diagnosis & Number of Children	0.3922	Moderate Positive correlation

Table 3. Student's t-test Analysis (at 5% level of significance)

Null hypothesis: There is no correlation between the parameters Parameter	t calculated	Degree of freedom df	t critical	Remarks
Age at diagnosis & Stage of detection	13.523	11	2.200	Reject null hypothesis
Age of diagnosis & Age at 1st childbirth	7.278	12	2.178	Reject null hypothesis
Age at diagnosis & Number of Children	13.366	11	2.200	Reject null hypothesis

Ramakant, 2008). All the patients in this survey had given birth at least once with 11 out of 12 patients having given birth before the age of 30, and all patients had breast fed their children for at least 6 months. This finding is contradictory to the previous studies where nulliparous women are at a greater risk of developing breast cancer (Key *et al.*, 2001). In this study, no concrete link between occurrence of breast cancer and consumption of contraceptive pills and abortion was established although studies have shown there is an correlation (Bhadoria *et al.*, 2013). The study also showed that earlier the age of diagnosis, higher is the stage of the breast cancer diagnosed which is consistent with the reported findings (Chen *et al.*, 2016).

CONCLUSION

Breast cancer is fairly prevalent in India with most of the cases occurring in women in the age group of 50-60 years. The correlation between age of diagnosis of breast cancer with stage, age of childbirth and the number of children was also determined, and the analyses demonstrated that there was a correlation between the aforementioned factors.Even though the prevalence of breast cancer in India is not as much as that seen in the Western populations, the social, economic and psychological burden of this disease is enormous. Early diagnosis of breast cancer can be effective in curing in the disease. The information obtained in the present survey can aid in the understanding of the occurrence and prevalence of breast cancer in India as well as increase the awareness of people for its signs and symptoms, and also aid health authorities in the country to deal with the disease burden more efficiently.

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