

Frequency of Breast Cancer in Goa, India

Trivikram M. Deshpande^{1*}, A. K. Pandey² and S. K. Shyama¹

1. Department of Zoology, Goa University, Goa 403 206, India

*E-mail: tridesh@yahoo.com, skshyama@gmail.com

2. Department of Radiotherapy and Oncology, Government Medical College and Hospital, Chandigarh, Sector 32, 160030, India

ABSTRACT

As per the pathological labs in Goa, more number of breast cancer cases were reported. Hence, to find out the frequency of breast cancer in Goa, this retrospective study for the years 1994 to 1997 was done from the data of breast cancer patients reported to Goa Medical College (GMC). Aim was to study frequency of breast cancer in Goa for further research on etiology of breast cancer. Adhoc and mini surveys in different pathological labs and retrospective study of clinical records for years 1994 to 1997 from the Department of Pathology in GMC. Retrospective method and clinical records in percentages. High frequency of breast cancer in Goa (27%) for the period 1994-1997 and also high frequency of Christian breast cancer patients in Goa (65%) compared to Hindu (28%) and Muslim (7%) breast cancer patients as per female population in Goa in 1997 was observed. Increasing trend of breast cancer in Goa in accordance with national and international level in the study period was observed. High frequency of breast cancer (27%) in breast cancer patients reported to GMC, increasing trend of breast cancer and observation of higher no. (66 %) of breast cancer patients in Goan Christians may indicate that whether individual genome in interaction with environmental factors such as western lifestyle (comprising dietary habits and other habits) may contribute to breast carcinogenesis in Goan breast cancer patients. Retrospective study is useful and valuable for doing further research on breast cancer. With disease burden estimation, it is possible to devise diagnostic, prognostic and effective treatment measures to curb the disease for disease free longer survival of breast cancer patients and to develop preventive strategies against breast cancer occurrence.

KEYWORDS Breast cancer, Retrospective study, Frequency

INTRODUCTION

Initially, the private pathological labs in Goa were visited to get the data on breast cancer patients in Goa and they mentioned regarding more number of breast cancer patients and referred to GMC to get the further data on breast cancer patients in Goa. The objective of the study was to screen the pathological records for the years 1994 to 1997 of GMC, compare with the national and the international incidence of breast cancer, study the minimum and maximum and average age of onset of breast cancer and to find the histological commonest type of breast cancer in Goa.

SUBJECTS AND METHODS

Subjects were Breast cancer patients in Goa and the methods were Adhoc and Mini surveys in pathological laboratories and hospitals in Goa and screening of clinical records from the department of pathology in GMC for the retrospective study.

Describing the distribution of disease between different populations over time has been a highly successful way of devising hypotheses about causation and for quantifying the potential for preventive activities^[1]. Statistical data are also essential components of disease surveillance programs. These play a critical role in the development and implementation of health policy, through identification of health problems, decisions on priorities for preventive and curative

programmes and evaluation of outcomes of programs of prevention, early detection / screening and treatment in relation to resource inputs^[1].

Incidence, the number of new cases occurring, of diseases in any region can be expressed as the annual number of cases (the volume of new patients presenting for treatment) or as a rate per 100,000 persons per year. Incidence data are produced by population-based cancer registries. Registries may cover national populations or more often, certain regions. In developing countries in particular, coverage is often confined to the capital city and its environs. Frequency data, e.g., case series from hospitals and pathology laboratories, provide an indication of the relative importance of different cancers in a country or region in the absence of a population-based registry and mortality statistics. Prevalence is the proportion of a population that has the disease at a given point in time^[1].

Survey for Breast Cancer

Survey is an important method of investigation in the medical and health fields. It is defined as an investigation in which information is systematically collected without using any experimental method^[2]. Survey is thus, mainly an observation type of study. It usually involves collection of data on a large scale. A health survey is meant to describe the health status of a population. Field surveys involve collection of data in the field i.e. among the persons in the community. These provide first hand observations in contrast to surveys based on routine records which may be useful in special cases like study of rare diseases^[3].

Depending upon the frequency, White^[4] classified surveys as adhoc surveys, periodic surveys and continuing surveys. The special ad hoc surveys are one-time and useful for collecting base-line information needed to identify health problems and to plan health services. Periodic surveys may be seasonal and annual etc. In continuing surveys, field teams either move from place to place or repeat the surveys in different samples.

Nosseir et. al.^[5] advocate the concept of mini-surveys for providing rapid feed-back to administrators to enable them to take corrective actions quickly. A mini-survey is a truncated one, asking a limited number of questions to a relatively small number of individuals and providing the results within a short time frame, say, of two months^[3].

Thus, a preliminary ad-hoc and mini-survey in Goa Medical College (GMC), Bambolim, the only medical college in the state, Hospicio Hospital, Margao, Manipal Goa Cancer and General Hospital, Dona Paula and in various pathological labs in Margao, Panaji, Vasco was carried out to know the frequency of breast cancer in Goa.

Data Collection and Analysis

The definitive pathological diagnosis is done only in GMC and nowhere else in Goa. Hence, ultimately, most of the patients are referred for the definitive pathological diagnosis in GMC. The records of these patients from various other hospitals and other health centres in Goa were maintained under the heading "Private register" in Department of Pathology, GMC. Thus, the 'private register' gives an almost overall picture of the cases of a particular disease in Goa as such.

Registers containing the clinical records of patients with different types of cancer who reported to GMC and those from the 'private register' were screened for 4 years, viz. 1994, 1995, 1996 and 1997. Data for the retrospective study of Goan breast cancer patients was collected from these records using a format which included their name, age, sex, diagnosis, histopathology report and this data was analysed. In the private register similar format was there with the inclusion of one more column for the private hospitals or primary health centres across Goa.

RESULTS

The frequency of the ten most common cancer observed in Goa during 1994-1997 is listed in Table 1. Cancer of the oral cavity and pharynx, irrespective of sex, is the commonest cancer, whereas, breast cancer ranks second.

Table 1: Mean Annual Frequency of Ten Most Common Cancer in Patients Reported to Goa Medical College during 1994-1997.

| <i>Rank</i> | <i>Cancer</i> | <i>Total</i> | <i>%</i> |
|-------------|-------------------------|--------------|----------|
| 1 | Oral cavity and pharynx | 130 | 24.39 |
| 2 | Breast | 70 | 13.13 |
| 3 | Cervix | 38 | 07.13 |
| 4 | Stomach | 32 | 06.00 |
| 5 | Oesophagus | 25 | 05.00 |
| 5 | Rectum and colon | 24 | 05.00 |
| 6 | Leukemia and lymphoma | 23 | 04.00 |
| 6 | Lung | 21 | 04.00 |
| 7 | Bladder | 15 | 02.81 |
| 8 | Ovary | 14 | 02.63 |
| 9 | Thyroid | 13 | 02.44 |
| 10 | Others | 90 | 16.90 |

The mean annual frequency of the ten most common cancer observed in females admitted to GMC during 1994-1997 is listed in Table 2.

Table 2: Mean Annual Frequency of Ten Most Common Cancer in Female Patients Reported to Goa Medical College, Goa:

| <i>Rank</i> | <i>Cancer</i> | <i>Total</i> | <i>%</i> |
|-------------|-------------------------|--------------|----------|
| 1 | Breast | 67 | 27.00 |
| 2 | Cervix | 38 | 15.20 |
| 3 | Oral cavity and pharynx | 33 | 13.20 |
| 4 | Ovary | 14 | 05.60 |
| 5 | Rectum and colon | 11 | 04.40 |
| 6 | Thyroid | 10 | 04.00 |
| 7 | Stomach | 08 | 03.20 |
| 8 | Leukemia and lymphoma | 07 | 02.80 |
| 9 | Brain | 06 | 02.40 |
| 10 | Others | 31 | 12.40 |

In Goan females, Breast cancer is the commonest cancer and shows highest incidence with a frequency of 27% followed by cancer of cervix (15.2%), oral cavity and pharynx (13.2%), ovary (5.6%) and colo - rectum (4.4%) (Table 2).

Religion based distribution of breast cancer observed in females admitted to GMC during 1994-1997 is listed in table 3. Religion based distribution of breast cancer observed in females from the private register of GMC during 1994-1997 is listed in table 4. The combined no. of breast cancer cases reported to GMC and those from the private register of GMC during 1994-1997 is listed in table 5. The rising number of breast cancer cases in Goa during 1994 to 1997 is

represented in figure 1. Histopathology of breast cancer for the three years 1995-1997 is listed in table 6^[6]. In 1997, the incidence of breast cancer in females reported to GMC is 42 per 100,000 women^[7].

Table 3: Religion Based Distribution of Breast Cancer in females Reported to Goa Medical College during 1994-1997.

| <i>Religion</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> | <i>1997</i> | <i>Total</i> |
|-----------------|-------------|-------------|-------------|-------------|--------------|
| Hindu | 30 | 45 | 44 | 39 | 158 |
| Christian | 20 | 25 | 24 | 35 | 104 |
| Muslim | 3 | - | 3 | 1 | 07 |
| Total cancers | 211 | 251 | 271 | 267 | 1000 |

Table 4: Religion Based Distribution of Breast Cancer in females as observed from the-Private register of GMC during 1994-1997.

| <i>Religion</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> | <i>1997</i> | <i>Total</i> |
|-----------------|-------------|-------------|-------------|-------------|--------------|
| Hindu | 15 | 12 | 8 | 8 | 22 |
| Christian | 7 | 8 | 6 | 15 | 22 |
| Muslim | - | 2 | - | - | 2 |

Table 5: The combined no. of breast cancer (BC) cases reported to GMC and those from the Private register of GMC during 1994-1997

| <i>BC cases from</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> | <i>1997</i> |
|----------------------|-------------|-------------|-------------|-------------|
| GMC | 53 | 70 | 71 | 75 |
| Private register | 22 | 22 | 14 | 23 |
| Total | 75 | 92 | 85 | 98 |

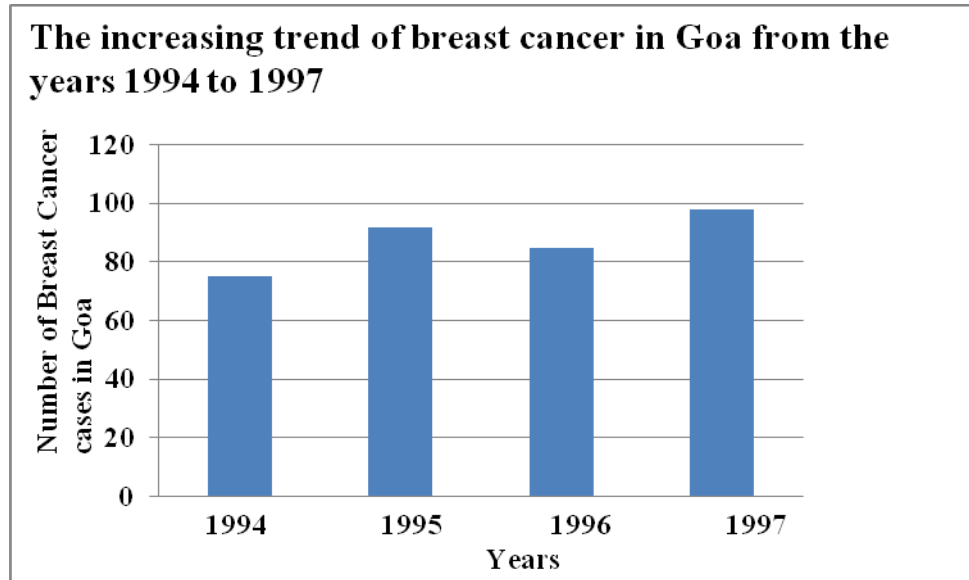


Figure 1: The increasing trend of breast cancer in Goa from the years 1994 to 1997.

Thus, from table 5 and figure 1, the increasing trend of breast cancer in Goa from the years 1994 to 1997 was observed.

Table 6: Histopathology of breast cancer for the years 1995-1997

| Histopathology | 1995 | 1996 | 1997 |
|----------------------------------|------|------|------|
| Infiltrating Duct Carcinoma | 66 | 69 | 68 |
| Lobular Carcinoma | 2 | 1 | 2 |
| Colloid Carcinoma | 1 | 1 | 1 |
| Medullary Carcinoma | 1 | | 1 |
| Cystosarcoma Phylloids | | | 1 |
| Non Hodgkin , Lymphoma of Breast | | | 1 |
| Serous Cyst Adenocarcinoma | | | 1 |

Breast cancer cases in females for the years 1994-1997 in different communities is represented in Figure 2. The frequency of breast cancer is higher in Hindu female patients than in Christian female patients and in Muslim female patients reported to GMC during 1994-1997

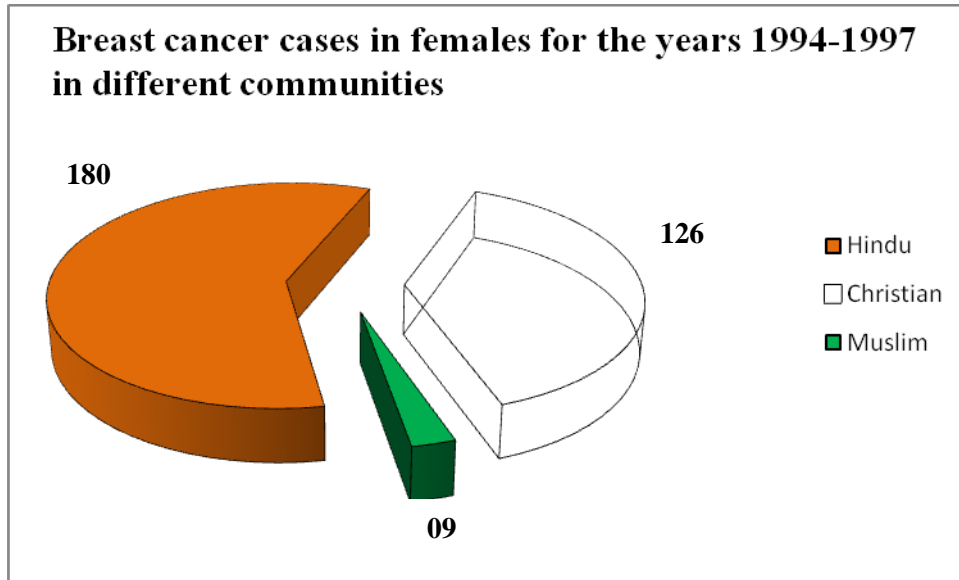


Figure 2: Breast cancer cases in females for the years 1994-1997 in different communities

The religion based distribution of breast cancer amongst the female population of each religion is represented in Figure 3.

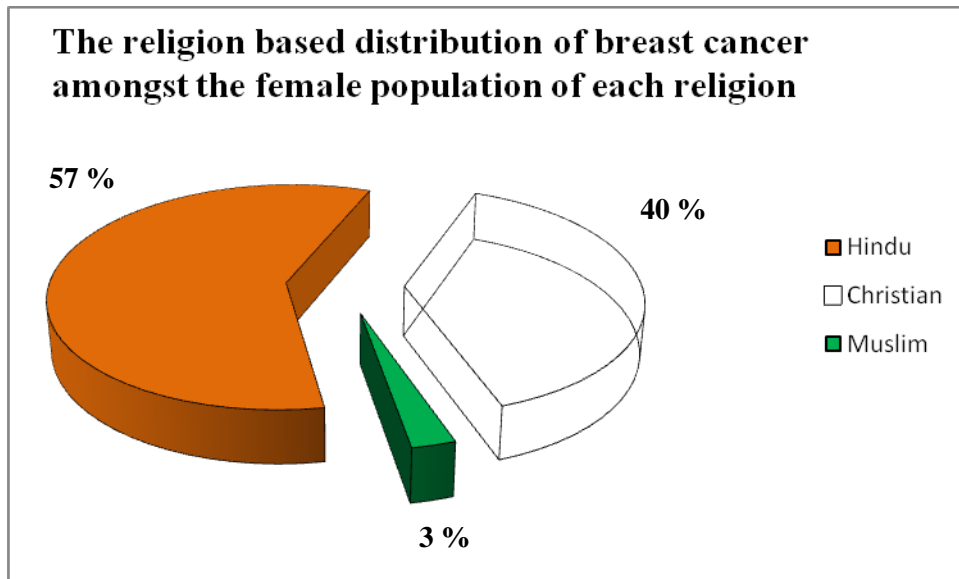


Figure 3: The religion based distribution of breast cancer amongst the female population of each religion

Total population of Goa as per census of India 2001 was 1,347,668 persons comprising 687,248 males and 660,420 females^[8]. Out of 660, 420 female population, Hindu community comprised 424365 (64.25%), Muslim community 42,819 (6.48 %), Christian community comprised 188,888 (28.60%), Sikh comprised 380 (0.057 %), Buddhist comprised 292 (0.044%), Jain comprised 385 (0.058) and other religious communities comprised 164 females^[9]. The religion based distribution of breast cancer as per 2001 census of Goan female population of each religion is represented for the years 1994 to 1997 in Figure 4. As per 2001 census in Goa, 0.011075 % of Hindu female population, 0.0264 % of Christian female population and 0.0023 % of Muslim female population was affected with breast cancer in these 4 years from 1994 to 1997.

Thus, frequency of breast cancer is higher in Christian female population compared to that of Hindu female population and Muslim female population.

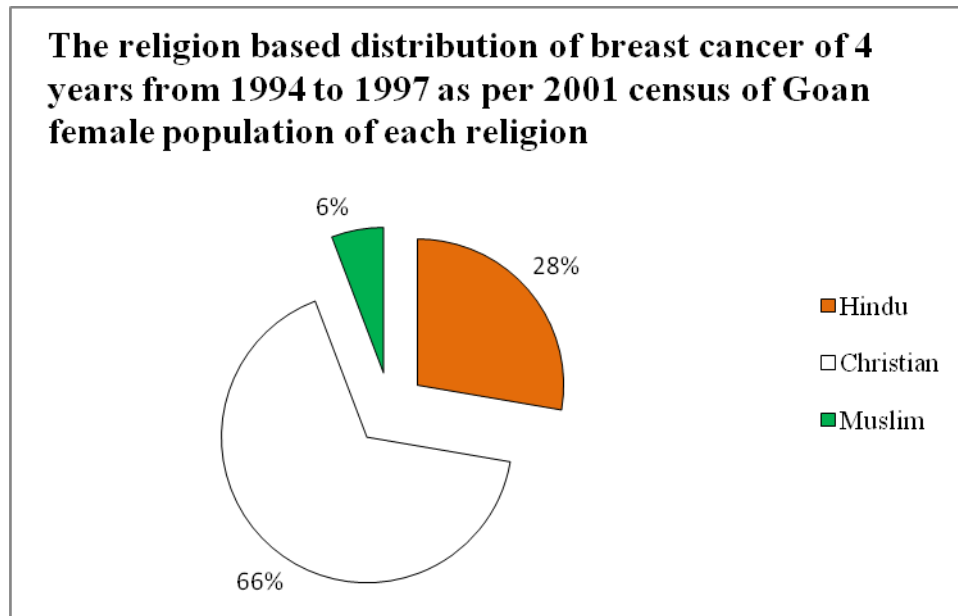


Figure 4: The religion based distribution of breast cancer of 4 years from 1994 to 1997 as per 2001 census of Goa female population of each religion

The annual number of cases of breast cancer reported to GMC, the average age and the minimum and maximum age of the patients is represented in table 7.

Table 7: The association Between Annual Distribution of Breast Cancer and Age

| Carcinoma of the Breast | 1994/473 | 1995/515 | 1996/568 | 1997/574 |
|-------------------------|----------|----------|----------|----------|
| No. of cases | 53 | 70 | 71 | 75 |
| Average age | 50 years | 51 years | 45 years | 48 years |
| Minimum age | 22 years | 20 years | 26 years | 13 years |
| Maximum age | 78 years | 93 years | 76 years | 81 years |

The annual number of cases of breast cancer as observed from the private register of GMC during 1994-1997, the average age and the minimum and maximum age of the breast cancer patients is represented in table 8.

Table 8 : The Association Between annual Distribution of Breast Cancer and Age

| Carcinoma of the Breast | 1994 | 1995 | 1996 | 1997 |
|-------------------------|----------|----------|----------|----------|
| No. of cases | 22 | 22 | 14 | 23 |
| Average age | 47 years | 46 years | 37 years | 53 years |
| Minimum age | 19 years | 25 years | 19 years | 25 years |
| Maximum age | 69 years | 93 years | 50 years | 71 years |

Table 9 : The Association Between annual Distribution of Breast Cancer and Age from both registers of department of pathology in GMC

| Carcinoma of the Breast | 1994 | 1995 | 1996 | 1997 | Average of 4 years |
|-------------------------|------------|------------|------------|------------|--------------------|
| No. of cases | 75 | 92 | 85 | 98 | 87.5 |
| Average age | 48.5 years | 48.5 years | 41 years | 50.5 years | 47.1 years |
| Minimum age | 20.5 years | 22.5years | 22.5 years | 19 years | 21.1 years |
| Maximum age | 73.5 years | 93years | 63 years | 76 years | 76 years |

Average age of onset of breast cancer in Goa was 47, average minimum age of onset of breast cancer was 21 and average maximum age of onset of breast cancer was 76 as per both registers combined for 4 years from 1994 to 1997 respectively.

Discussion:

Our present study is an attempt to find out the frequency of breast cancer in Goa. Frequency of breast cancer in Goa (27%) is increasing over a period of time and higher frequency in Christians (65%) than in Hindus (28%) and in Muslims (7%), was observed and hence etiology of breast cancer in Goa due to genetic factors and environmental factors was proposed for further research.

Globally, in women, the incidence of breast cancer is the highest followed by cancer of ovary, colo - rectum, stomach and lung (W.H.O., 1997)^[10]. Further, the incidence of breast cancer is on rise in the developed, as well as, developing countries and is responsible for a high degree of sufferings in humans.

Around 9, 00, 000 women, on average, were reported to suffer from breast cancer, every year, across the globe and among them around 3, 76, 000 patients die due to this disease in a year.^[9] As per Globocan 2000^[2], breast cancer is the second most common cancer overall with 10, 50, 000 new cases reported and 3,73,000 deaths.

As per the estimates based on weighted averages of data available from hospital registries in Bangalore, Bombay, Chandigarh, Dibrugarh, Madras and Trivandrum for 1986, breast cancer ranks as the second common cancer (17%) in females in India^[11]. Indian Council of Medical Research (ICMR) in their cancer research report for the period from 1982 to 1994^[12], reported that cancer of cervix followed by breast cancer are the commonest cancers among women in Barshi, Bangalore, Bhopal and Chennai, whereas in Delhi and in Mumbai, breast cancer is the commonest cancer followed by cancer of cervix. However, there has been a steady increase in the incidence of breast cancer in Bangalore, Mumbai, Chennai, Delhi and Bhopal during this period.

The commonest cancer in females reported to GMC, for the years 1994-1997, as per the present study, was breast cancer (27%). This is in agreement with the national level increase as per the recent annual report of ICMR for the year 1999-2000, cancer of the breast in women has shown an increase in all urban registry areas of the country^[13]. Thus, it was seen that there is an increasing trend towards the occurrence of breast cancer in Goan females.

Although Hindu breast cancer patients reported to GMC are more than Christians, it forms a small proportion of the actual Hindu female population in Goa. In contrast, although the number of Christian breast cancer patients reported to GMC is less in number than in Hindus, it forms a considerable population of the actual Christian female population in Goa. However, the Muslim patients are least in number. Our observation that Muslim patients are reported less in

number compared to Hindu and Christian patients is in agreement with the earlier studies^[14],^[15],^[16]. Thus, Christian females are at higher risk of breast cancer compared to other communities as observed from the hospital based data.

In 1997, the estimated incidence of breast cancer in females reported to GMC is 42 per 100,000 women^[7]. Populations at high risk of breast cancer are from countries of North America with incidence rates of US white going upto 103.7 per 100,000^[17]. High rates are also reported from Europe and Australia. In countries like India, Japan, China and those of Africa, the highest recorded incidence rates from various national registries for the year 1990 are 23.5, 33.4, 26.5 and 29.5 per 100,000 respectively^[17], which are more than 50% lower than the few ‘low’ rates of high risk populations^[17]. The age standardized rates for breast cancer for Bangalore is 21.4, Bhopal is 22.2, Chennai is 22.4 and Delhi is 29.0 and is different in these cities^[12]. However, Goa has a comparatively higher incidence of BC which may be partially due to westernized lifestyle. This agrees with the observation of Coleman et. al. (1983)^[18] that the incidence rate in Asian women is rising and is associated with a shift towards a more westernized lifestyle. Family history of breast cancer increases the risk 2 to 3 fold and the role of some genes viz. BRCA1 and BRCA2 in the predisposition to the disease has been identified^[19],^[20] but only 5% to 10% of breast cancer cases are due to inherited (germline) mutations^[17].

Similarly, whether lifestyle factor (westernized lifestyle) contributes as cause of development of breast cancer in Goan Christian breast cancer patients (as Goan Hindu breast cancer patients and Goan Muslim breast cancer patients don't exhibit western lifestyle compared to Goan Christian breast cancer patients), in addition to genetic factors was proposed for further research. Genetic predisposition to cancer may be caused by several mechanisms. One of the possibilities is genetic instability, which in some cases is expressed as chromosome instability. Chromosomal alterations play a key role in tumor initiation and progression. Thus, genetic studies of breast cancer in Goa were reported^[21].

Variation in incidence between different regions of the world in a particular type of cancer is much greater than all-sites cancer which has led to the view that much of human cancer is caused by environmental factors – human behavior, habits and lifestyle as well as external factors over which the individual has no control. On the basis of differences observed between the highest and the lowest incidence rates for various sites of cancer and the shift in incidence pattern of migrant populations towards the host country, it has been estimated that almost 80% of all human cancers have a large environment component and therefore preventable^[17].

This high risk may be attributed to either due to environmental factors and / or genetic factors or an integrated action of these factors. By knowing the exact cause, it is possible to have remedial measures such as gene therapy and other treatment methods through genetic counseling for genetic factors and with modifying lifestyle habits to prevent the risk of breast cancer occurrence for environmental factors.

Acknowledgements

I wish to thank Department of Pathology, Goa Medical College for accessing the registers containing clinical records during the research work.

References

- [1] Parkin DM, Bray F, Ferlay J, Pisani P. Mini review estimating the world cancer burden : Globocan 2000. *Int. J. Cancer* 2001; 94: 153-6.
- [2] Last JM (Ed), *A Dictionary of Epidemiology* 1st edition International Epidemiological Association New York: Oxford University Press, 1983.
- [3] Raghavprasad, K. *Health Surveys In: Verma BL, Shukla GD, Srivastava RN, editors. Biostatistics - Perspectives in Health Care Research and Practice* 1st edn. Delhi : CBS

- Publishers & Distributors; 1993. p. 1-9.
- [4] White KL. Health Surveys : who, why and what? World Health Stat Q 1985;38:2-14.
- [5] Nosseir NK, McCarthy J, Gillespie DG, Shah F. Using mini-surveys to evaluate community health programmes. Health Policy and Plan 1986;1: 67-74.
- [6] Deshpande TM, Shyama S.K, Pandey AK and Nadkarni N. High frequency of breast cancer in Goa and scope of genetic studies. 4th International Conference on Genetics, Health and Disease, Guru Nanak Dev University, Amritsar; 1998.
- [7] http://www.censusindia.gov.in/Census_Data_2001/Census_data_finder/A_Series/Total_population.htm
- [8] http://www.censusindia.gov.in/Census_Data_2001/Census_data_finder/C_Series/Population_by_religious_communities.htm
- [9] The World Health Report 1997, WHO, Geneva, 30.
- [10] Annual Report 1986: National Cancer Registry Programme, Indian Council of Medical Research, New Delhi, 1989.
- [11] Cancer Research in ICMR Achievements in Nineties: Network of National Cancer Registry Programme. [cited 2016 May 29]. Available from: <http://icmr.nic.in/cancer.pdf>
- [12] Non-Communicable Diseases, ONCOLOGY, National Cancer Registry Programme [cited 2016 June 19] Available from: <http://icmr.nic.in/annual/non.htm>
- [13] Bhandari NV. Study of breast cancer, M.D. thesis. Goa Medical College, Goa, India. May 1977. p. 1-63.
- [14] Rodrigues DAJ. Clinicopathological study of breast cancer, M.D. thesis. Goa Medical College, Goa, India July 1989. p. 1-178.
- [15] Kambli RA. Clinical study of cancer of female breast, M.D. thesis. Goa Medical College, Goa, India July 1995. p. 1-89.
- [16] Deshpande TM. Human Leucocyte Culture and Genetic studies of Human Breast Cancer. Ph.D. thesis. Department of Zoology, Goa University, Goa, India. June 2003, p. 1-143.
- [17] Notani P. Global variation in cancer incidence and mortality. Current Science 2001; 81: 465-74.
- [18] Coleman MP, Esteve J, Damiecki P, Arslan, A, Renard H, editors. Trends in Cancer Incidence and Mortality, No. 121, Lyon, France: IARC Scientific Publication; 1993. p.814
- [19] Miki Y, Swensen J, Shattuck-Eidens D, Futreal PA, Harshman K, Tavtigian S, *et al.* A strong candidate for the breast and ovarian cancer susceptibility gene BRCA1. Science 1994;266: 66-71.
- [20] Wooster R, Neuhausen SL, Mangion J, Quirk Y, Ford D, Collins N, *et al.* Localization of breast cancer susceptibility gene, BRCA2, to chromosomes 13q12-13, Science 1994;265:2088-90.
- [21] Deshpande TM, Shyama SK, Pandey AK Genetic Studies of Breast Cancer Patients in Goa, India, Int J Hum Genet 2008; 8: 263-8.