International Journal of Research in Medical Sciences
Mathew G et al. Int J Res Med Sci. 2020 Feb;8(2):681-685
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20200256

Original Research Article

Cancer burden and alarm signals: a community based study from Kerala, India

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Received: 11 December 2019
Revised: 17 December 2019
Accepted: 06 January 2020

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ABSTRACT

Background: Cancer is emerging as a major public health concern in many countries including India. Kerala state has the highest burden of cancer in the country. Objective of this study was to estimate the prevalence of diagnosed cancers, warning signs and selected risk factors of cancer in Kadapra Panchayath of Pathanamthitta district, Kerala.
Methods: A total of 16,391 population was covered by door to door survey using a structured questionnaire. The questionnaire collected information on the sociodemographic variables of the residents, source of water supply, warning signs of cancer and details of diagnosed cancer cases.
Results: The mean age of the population was 40.9+21 years. The prevalence of diagnosed cases of cancer in our study population was 776/100,000 population. Breast cancer was the most common cancer (43.5%) identified in the population. The prevalence of any warning sign among the study population was 220/100,000 population. Breast lump was the common warning sign identified. Increasing age and female gender were the factors found to be significantly associated with cancer.
Conclusions: As prevalence of cancer was found to be high in this population, an active community based screening along with teaching self-breast examination to the women in the community are required. Improving community awareness could help in early diagnosis, treatment and prevention. Soil and water testing for carcinogens is recommended.

Keywords: Alarm signals, Cancer burden, Community study, Risk factors

INTRODUCTION

Cancer is emerging as a major public health concern in many countries including India. The prevalence of cancer was conventionally much evident in developed nations, but in recent years, it has increased substantially in developing countries as well with the ongoing demographic and epidemiological transition. The estimates from Global Burden of Disease (GBD)suggest that about 70 percent of all cancer deaths are now concentrated among low- and middle-income countries.[1-5] The estimated number of incident cancer cases in India increased from 5,48, 000 in 1990 to 10,69, 000 in 2016. The crude cancer incidence rate in India increased by 28·2% from 63·4 per 100 000 in 1990 to 81·2 per 100 000 in 2016.[4] Among all the states in India, Kerala

reports to have the highest burden of cancer according to GBD report published in 2016. The state shows an alarming rise of incidence of cancer cases from 74.1 per 100,000 population in 1990 to 135.3 per 100,000 in 2016. In general, there is a consensus that about 60 percent of cancer deaths can be prevented with improved preventive and screening facilities.[2] Early detection remains an important strategy in low and middle-income countries (LMICs) for improved survival and simple cost-effective treatment.[3] However in low-income countries cancer prevention, education, and access to cancer screening tests as well as cancer treatment are inadequate.[5] This has led to worse cancer outcomes and higher incidence rates of cancer. The burden of Cancer on the economy for providing health care will be substantial. In addition to the direct medical costs, indirect costs such as loss due to premature deaths, loss due to hindrance of productivity, economic dependence, etc. cannot be quantified. One of the important factors in the success of any cancer programme is to apply the concept of prevention.[5,6] Studies have stressed the importance of screening for early warning signs of cancer so that we can detect early. Early detection of cancer significantly reduces the risk of treatments and the impact of the disease. Community based data is essential to plan preventive strategies tailored to the needs of that particular community. The main source of information about the burden of cancer is through the population based cancer registries in Kerala, India. However, even these registries cover only 5% of the population.[6] There is dearth of knowledge regarding the community based prevalence, warning signs and risk factors of cancer in Kerala. A meeting was called by the district administration to discuss this perceived problem of increasing number of cancer cases in some areas of Pathanamthitta district as reported by lay leaders in the community. It was decided to verify this public concern and perception regarding the increasing prevalence of cancer cases in this area. In this scenario, the present study was conducted by Department of Community Medicine in collaboration with the District Administration and the District Health Services, with the following objectives:

Objectives of this study was to:

- To assess the burden of diagnosed cancer among residents in Kadapra panchayath of Pathanamthitta district, Kerala
- To find out the prevalence of self-reported warning signs of cancer among the residents in Kadapara Panchayath
- To find out the association between cancer and selected risk factors (age, gender, source of drinking water and occupation).

METHODS

The study was conducted in Kadapra Panchayath in Pathanamthitta district. There are about 6000 families living in this Panchayath area. All residents in Kadapra Panchayath were included in the study. All houses which were found to be locked even after 3 visits were excluded.

Data regarding cancer was collected using a structured questionnaire which collected information on the sociodemographic variables of the residents, source of water supply, warning signs of cancer and details of diagnosed cancer cases. The data was collected by trained field workers through door to door survey in 3 months (August – October 2019). Ethics Approval was obtained for the study from the Institutional Ethics Committee and written informed consent was taken from the participants.

The data was entered in Microsoft Excel and analyzed using Epi Info software. Sample characteristics were described by mean (standard deviation [SD]) and percentage (%) for continuous and categorical variables, respectively. Suitable statistical tests like Pearson chi-square test and Fishers exact test were used, as appropriate. A p-value < 0.05 was considered to be statistically significant.

RESULTS

Section 1: Sociodemographic details of the study population

A total of 5848 houses constituting a population of 16,617 were included in the study. The mean age of the population was 40.9±21 years. Sociodemographic details of the population are shown in Table 1. (Authors have mentioned the data available for each variable (n) as there was missing data)

Table 1: Distribution of study population based on sociodemographic details.

Variables	Categories	Number (Percentage)
Gender (n=14,609)	Male	7062 (48.3%)
	Female	7547 (51.7%)
Age group (n=14,506)	≤ 5 years	649 (4.5%)
	5 - 18 years	1884 (13.0%)
	18 to 40 years	4266 (29.4%)
	40 to 60 years	4351 (30.0%)
	≥ 60 years	3356 (23.0%)
Source of drinking water (n=15,079)	Common well	410 (2.7%)
	Own well	13,959 (92.6%)
	Pipe	459 (3.0%)
	Water tanker	16 (0.1%)
	Others	235(1.6%)
Occupation (n=11,863)	Under-five/students	3152 (26.6%)
	Office job	464 (3.9%)
	Currently not working	4250 (35.8%)
	Agriculture/livestock	185 (1.6%)
	Daily wage labourer	1443 (12.2%)
	Others	2369 (20.0%)

Majority of the population belonged to the middle age category of 40 to 59 years. The proportion of elderly population was 23%. Gender distribution in the population was almost equal, with 51.7% females and 48.3% males.

Major drinking water source among the population was own well (92.6%) followed by pipe water (3%). Majority of the population were not working (unemployed/retired /housewife /students). Major occupation in the population was daily wage labor.

Section 2: Details regarding cancer among the study population

The prevalence of individuals with diagnosed cancer among the study population was 0.77% or 776/100,000 population (104 cases/13,407 population for which cancer data was available). The prevalence of cancer among females was 1.1% or 1,100/100,000 population. The cancer prevalence was found to be highest (1.7 % or 1700/100,000 population) in the age group ≥60 years. Details in Table 2.

Table 2: Age and gender wise prevalence of cancer in the study population.

Variables	Categories	Prevalence
Gender	Males	500/100,000
	Females	1100/100,000
Age group	≤ 5 years	0
	6-18 years	0
	19-39 years	100/100,000
	40-59 years	1100/100,000
	≥60 years	1700/100,000

Majority of the cases had breast cancer (43.5%) followed by upper GIT (14.1%) and Genitourinary (9.4%) (Figure 1). The prevalence of any warning signs of cancer was 0.22% or 220/100,000 population in those who were not diagnosed with cancer.

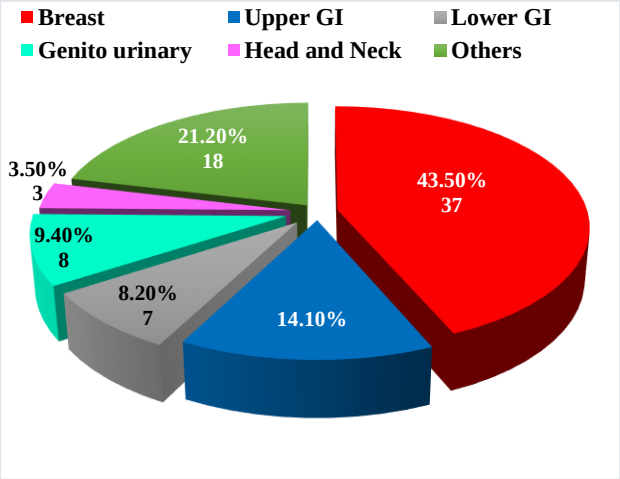

Figure 1: Distribution of population based on cancer site mentioned (n=85).

Breast lump was the most common warning sign among the population who did not have diagnosed cancers (14 people). Other warning signs identified were Dysfunctional uterine bleeding (4 people), Dysphagia (5 people),non-healing oral ulcers (2 people), post-menopausal bleeding (2 people) and nipple discharge (3 people).

Section 3: Factors associated with cancer

The association of cancer with selected risk factors like age, gender, source of drinking water source and occupational status was studied. Increasing age, female gender and occupational status were observed to be significant risk factors for cancer in this population. No significant association was found between cancer and source of drinking water Table 3.

DISCUSSION

The present study was conducted in Kadapra Panchayath of Pathanamthitta district to assess the prevalence of diagnosed cancer, warning signs and selected risk factors in the community. A total of 5848 houses with 16,391 population was covered by door to door survey. Majority of the population belonged to the age group of 40 to 60 years with a mean age of 40.9±21 years. The gender distribution was almost equal in the population with 48.3% males and 51.7% of females. The source of drinking water supply for the majority of the population (92.6%) was own well followed by piped water supply. The most common occupation observed in that population were daily wage labor followed by office job. However, majority of the population were unemployed probably due to the high proportion of elderly and non-working women in the study population. The prevalence of diagnosed cases of cancer in our study population was 776/100,000 population. Breast cancer was the most common cancer (43.5%) identified in the population. The prevalence of any warning sign among the study population was 220/100,000 population. Breast lump was the common warning sign identified. Increasing age, female gender were the factors found to be significantly associated with cancer.

The proportion of elderly population in this area was high compared to the national average. But among all the states, Kerala has the highest proportion of elderly in the country and Pathanamthitta district has the maximum proportion in Kerala which explains the high proportion in the study population.[7] Authors compared the data with the nearby panchayaths, and the sociodemographic variables are comparable with higher proportion of elderly and equal gender distribution. The prevalence of diagnosed cancer cases in the population was 776/ 100,000 which is higher compared to the National average. According to the data published in PLOS ONE in 2014, the overall prevalence of diagnosed cancer was estimated to be 83/100,000 population in India.

Table 3: Factors associated with cancer.

Variables		Cancer		Total	Chi-square, p value
		No	Yes		
Gender n=13,262	Male	6363 (99.5%)	29 (0.5%)	6392	Chi-square= 17.3 p = 0.001
	Female	6795 (98.9%)	75 (1.1%)	6870	
Age group n=13,166	≤ 5 years	581 (100%)	0	581	Fishers exact=89.7 p<0.0001
	6-18 years	1700 (100%)	0	1700	
	19-39 years	3837 (99.9%)	5 (0.1%)	3842	
	40-59 years	3951 (98.9%)	24 (1.1%)	3993	
	≥60 years	2997 (98.3%)	53 (1.7%)	3050	
Occupation n=10,659	Under-five/student	2838 (100%)	0	2838	Fishers exact=76 p<0.0001
	Office job	424 (99.8%)	1 (0.2%)	425	
	Not working	3709 (98.4%)	60 (1.6%)	3769	
	Agriculture/Livestock	176 (99.4%)	1 (0.6%)	177	
	Daily wage laborer	1252 (99.7%)	4 (0.3%)	1256	
	Others	2187 (99.7%)	7 (0.3%)	2194	
Water source n=12,467	Common well	347 (98.9%)	4 (1.1%)	351	Fishers exact=6 p=0.167
	Own well	11,426 (99.4%)	90 (0.8%)	11,516	
	Pipe	403 (99.3%)	3 (0.7%)	406	
	Water tanker	15 (93.8%)	1 (6.3%)	16	
	Others	176 (98.9%)	2 (0.9%)	178	

Higher prevalence was observed in urban areas (110/100,000 population). Even the age standardized prevalence rates are only 97/100,000 (All India), 83/100,000 (Rural India) and 130/100,000 (Urban India).[2] But Kerala state shows a higher burden of cancer among all the states. The incidence of cancer in Kerala was 135/100,000 in 2016 which is higher than the national burden. This was published in a recent lancet article comparing the variations across the states in India. The common cancer observed in the community was breast followed by uterus and lung. This shows a similar pattern as breast cancer and lung are the most common cancers observed in the World and in India.[4,5] Increasing incidence of breast cancer is becoming a world phenomenon. The most common cancer reported in Kerala is also breast cancer.

Reports from regional cancer center Trivandrum also show similar findings with around 1700 new cases of breast cancer getting detected every year. Another hospital based study done in central Kerala in 2015 showed that the most common cancer identified was breast cancer (21%).[8] The most common warning sign identified in our study population was breast lump. As it was a questionnaire based study based on self-reports, an active screening in this area could bring more cases of breast lump. Most probably women in the community would have picked up the breast lumps more than 2 cm in size.[9] If detected early, the prognosis of breast cancer is very good and the mortality can be reduced.[10] Another community based study done in Kannur district, Kerala showed 23 cases of breast cancer. This underlines the need for a community based screening for the early diagnosis of preventable cancer like breast cancer in this population.(3)Age wise prevalence showed higher rates among elderly people. The prevalence of cancer among people above 60 years and in the age category of 40 -59 years was 1700/100,000 and 1100/100,000 respectively. Whereas, the prevalence is only 321/ 100,000 among those who are above 60 years in India. Increasing age is a well-known risk factor for cancer and similar results were observed in this study too.[3,4] Another risk factor identified in our study was female gender. The prevalence of cancer among females was 1100/100,000 population compared to 500/100,000 population among males.

According to the data published in PLOS One the prevalence of cancer among females is 96/100,000 compared to 71/100,000 among males in India.(2, 6)Another factor which was found to be significant in our study was the occupation of the participants. However, the elderly population in the non-working category and very small number of people working the agriculture sector makes the association inconclusive. Many studies done in developed countries have looked into the association between agriculture occupation and cancer which could be due to the exposure to harmful chemicals including pesticides. Organochlorine pesticides have received the most attention because of so many reasons. Persistence in the environment, ability to concentrate up the food chain, continued detection in breast milk, and ability to be stored in the adipose tissue of animals and humans are some of the reasons stated.[11,12] More studies need to be done in developing country setting for building evidence regarding this association. No

significant association was observed between cancer and source of drinking water supply among residents.

Strengths and limitations of this study was one among the few community based studies done in Kerala that looked into the prevalence, warning signs and risk factors of cancer covering large population of 16,000 through door to door survey. The study was planned and executed in public private partnership model. Screening for warning signs in this population will help to plan community based interventions in this area. As we had to cover a large population, only selected risk factors were studied. The data lacked specificity as the data was not collected by medical professionals but by trained ASHA workers/field workers. Data on period prevalence and mortality were not assessed as only point prevalence was taken. The data on warning signs was based on self-report and not by clinical examination. Even though the prevalence of cancer was high, the number of cancer cases were small to study statistical significance in sub-analysis. Data on exposure to pesticides of other family members were not studied.

CONCLUSION

The prevalence of diagnosed cancer in this community was high at 776/100,000 population. The common cancer identified was breast and common warning sign identified in the population was breast lump. Increasing age, female gender and occupational status were found to be associated with cancer.

Recommendations

As the most common warning sign identified was breast lump, an active community based screening along with teaching self-breast examination to the women in the community should be planned. Risk factors could be studied using a case control design and soil and water samples can be tested for presence of carcinogens.

ACKNOWLEDGEMENTS

Authors would like to thank District Administration, Pathanamthitta, Kerala for the financial support for the study. Also, would like to acknowledge Honourable M.L.A. Shri Mathew, T. Thomas, Faculty of Community Medicine Department and Management of Believers Church Medical College, Medical officers (District Health services) field volunteers (ASHA workers) and Data entry operators for their contribution for the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Mathew G, Sebastian SR, Benjamin AI, Goyal V, Sushan A, Joseph J, et al. Cancer burden and alarm signals: a community based study from Kerala, India. Int J Res Med Sci 2020;8:681-5.