Original Article

Cancer Awareness and its Predictors among the Rural Population of Eastern India: A Cross-sectional Study

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Abstract

Background: The global burden of cancer is increasing rapidly. In India, particularly, there is a low level of health awareness and significant information asymmetry. Improving awareness among the general population will bring about better health-seeking behavior and acceptance of screening methods. The study aims to assess the different aspects of cancer awareness and its determinants among the rural population. **Methods:** A cross-sectional study was conducted between August 2017 to August 2018. Data was collected from 1116 participants using a semistructured questionnaire. Information was collected on awareness about different cancers, sources of information, treatability, preventability, and risk factors of cancer. Data collected were analyzed using Statistical Package for Social Sciences (SPSS) version 22 (Armonk, NY, IBM Corp.). The level of awareness was presented as a percentage and the Odds ratio was calculated to find out the association between level of awareness and different sociodemographic characteristics. **Results:** 73.5% of the study participants had heard of cancer. Oral cancer was the most common cancer known to the study participants. Television was the most common source of cancer information. Knowledge about the preventability, treatability, and risk factors of cancer was very low. Tobacco was the most common risk factor identified. Awareness of cancer was found to be significantly associated with educational status. **Conclusion:** Awareness about general cancers was high, but awareness about specific cancers was low. There is a need to re-look at the health education campaigns about cancer to improve awareness of the rural population. Television and the Internet should be used as an effective medium to generate awareness about cancer.

Keywords: Awareness, cancer, knowledge, preventability, treatability

Introduction

Cancer is a global disease and is spreading rapidly. Now it is the second leading cause of death globally after cardiovascular disease.[1] In recent times, the epidemic of cancer has transited beyond the geographical boundaries of developed countries and has made deep forays in developing countries like India. Healthcare systems across the world are facing stiff challenges to tackle this issue. Globally, there were 20 million new cases of cancers and 9.7 million deaths in 2022.[2] In India, over 1.4 million new cancer patients were registered and 0.91 million people died due to cancer.[3]

Cancer of the oral cavity and lungs in males, and breast and cervix in females accounted for over 39.4% of all cancer deaths in India. The crude cancer death rate in India in 2016 was 61.8 (95% CI: 58.3-64.6) per 100000 population as compared to 44.2 (40.6-47.7) per 100000 in 1990.[2] The top five cancers in men and women account for 43.7% of all cancers; these are those that can be prevented, screened for and/or detected early and treated at an early stage.[4] Five major cancers that are responsible for more than 5% of total cancer Disability-adjusted life year (DALY) were stomach cancer (9.0%), breast cancer (8.2%), lung cancer (7.5%), lip and oral cavity cancer (7.2%), and pharynx cancer other than nasopharynx (6.8%).[2] The highest proportion of cancer DALYs in India could be attributed to tobacco and alcohol. Odisha is in the low epidemiological transition level group indicating a higher mortality − incidence ratio. The crude death rate for Odisha was 70.6 per 100000 for females and 72.7 per 100000 for males in 2016.[5]

The estimated future cancer burden will be considerably larger due to the adoption of lifestyles that are known to increase

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cancer risks, such as unhealthy diet, physical inactivity, smoking, and alcohol use. Lack of awareness, late diagnosis, and inequitable access to affordable curative services are attributed to the poor prognosis of cancer patients in low and middle-income countries.[5,6] In India, there is a low level of health awareness and significant information asymmetry.

Lack of awareness contributes to the late reporting of cancer cases among the general population.[7] Data from four major centers in India (Mumbai, Trivandrum, Chennai, and Lucknow) show that the majority of individuals with cancer seek healthcare for the first time at late stages.[8] At present, India lacks screening programs for cancers. Most of the screening tests are available at higher centers only. A community-level screening program has not started in full fledge in India yet. With such limited facilities, active participation of the target group becomes vital for the screening program to be successful, and awareness level is one of the most important determinants for the level of participation. Hence, this study aimed to assess the level of awareness regarding cancers and their determinants among rural populations and the factors associated with it.

Methods

Study setting and design

This cross-sectional study was conducted among the adult population of selected villages of Tangi block of Khordha district of Odisha from August 2017 to August 2018. All individuals of 18 years or above having a permanent residence address (staying at least for 1 year at the village or AADHAR card having a village as a permanent address) were included in the study. Persons not able to comprehend due to mental retardation or psychiatric illness and seriously ill were excluded from the study. The sample size was calculated by taking an awareness level of 16.37% from a study conducted by Tripathi *et al.*,[9] assuming a relative precision of 20% and a design effect of two. The sample size of 1055 was calculated using the formula $Z\alpha^2pq/d^2$, where P = expected prevalence, q = 1-p, d = precision. The final sample size was calculated to be 1172 with an assumption of a 10% nonresponse rate. Four Panchayats were selected by multistage random sampling. Study participants selected from each village were proportional to the total population of the village [Figure 1].

Data collection

A list of households was collected from Accredited Social Health Activists (ASHA) in each village. A landmark (like a temple, school, or cyclone relief center) was selected in each village. The house nearest to the landmark was selected as the first house. From there the researcher moved to the right for the next house. Subsequently, all houses were visited and all the adult members present at the time of the visit were interviewed. Those who could not be contacted even after the second visit were excluded from the study.

An interview schedule was developed to collect data on various domains. It was translated into Odia and back-translated into English. Pretesting was done in a nearby rural area other than the study area in 20 samples. The questionnaire was refined as per the feedback and the final version was developed. The questionnaire was subdivided into five large domains, namely, demographic characteristics, awareness regarding cancer, its risk factors, awareness regarding screening of cancer, and awareness regarding the treatability of cancer.

Ethical consideration

Ethical approval was taken from the Institute Ethics Committee of All India Institute of Medical Sciences, Bhubaneswar. Participants were provided participant information sheets mentioning about aim and objectives of the study and written informed consent was obtained in the presence of a witness before data collection. For the illiterate participants, the informed consent form was read out and the thumb impression was taken.

Statistical analysis

Data were entered in Microsoft Excel 2014. Data analysis was done using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 22. The proportion was calculated for the outcome variables. Bivariate logistic regression analysis was done between the sociodemographic factors with the outcome variables like awareness of cancer, its risk factors, treatability, and preventability to find out the association. When the number was less than five in any of the categories in the bivariate table, two or more categories were merged before analysis. P value of less than 0.05 was considered as significant.

Results

A total of 1157 persons were contacted. Of these, 41 were excluded from the study. Twenty-three persons didn't give consent, 11 were not able to comprehend and seven were excluded as they were uncooperative. A total of 1116 participants were included in the study. The mean age of the participants was 39.24 (15.06) years. Ninety-five percent of the participants were Hindu and more than half (59.7%) of the participants were living in a three-generation family. Per capita monthly income ranges from INR 750 to INR 18000. According to the modified BG Prasad scale, the proportion of the participants in the upper class, upper-middle-class, middle class, lower-middle-class, and lower class was 3.0, 40.5, 43.8, 12.3, and 0.4, respectively. Among the participants, 38.0% were homemakers and 32.8% were manual workers or farmers. 40.1% of the participants had education up to high school, whereas illiterate constituted 8.2% of the participants [Table 1].

Awareness of cancer among study participants

Around three-fourth (73.5%) of the participants (821 out of 1116) had heard of cancer; 483 male (81.9%) and 383 female (65.9%) participants had heard of cancer. Common cancer sites reported by respondents were the mouth, stomach, breast, blood, throat, liver, lungs, cervix-uteri, brain, bone, kidney, tongue, heart, etc., The tumor was wrongly perceived as cancer by 46 respondents (5.6%). The most common cancer the participants were aware of was oral cancer, followed by

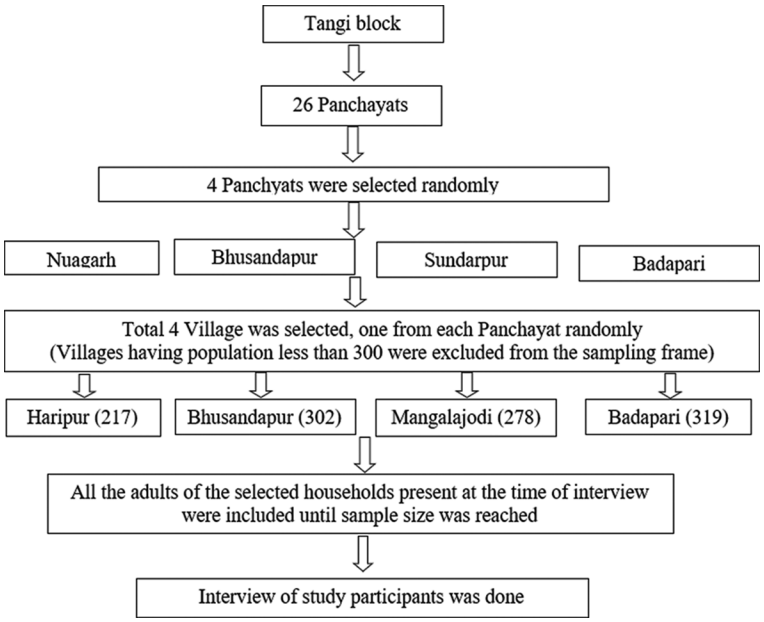

Figure 1: Flow chart of participant recruitment

Table 1: Sociodemographic characteristics of study participants (*n*=1116)

Characteristics	Sub group	Heard of cancer, *n* (%)		*P* (Chi-square, DF)
		Yes	No	
Gender	Male	438 (53.3)	97 (32.9)	<0.001
	Female	383 (46.7)	198 (67.1)	(36.430, 1)
Age group	18–29 years	318 (38.7)	35 (11.9)	<0.001
	30–39 years	261 (31.8)	32 (10.8)	(249.780, 3)
	40–49 years	127 (15.5)	58 (19.7)	
	>49 years	115 (14.0)	170 (57.6)	
Occupation	Manual worker/farmer	296 (36.1)	70 (23.7)	<0.001
	Office worker/business	120 (14.6)	8 (2.7)	(59.770, 3)
	Homemaker	275 (33.5)	149 (50.5)	
	Not working currently	130 (15.8)	68 (23.1)	
Education	Illiterate	6 (0.7)	85 (28.8)	<0.001
	Up to primary school	67 (8.2)	133 (45.1)	(518.311, 5)
	Middle school	161 (19.6)	41 (13.9)	
	High school	414 (50.4)	34 (11.5)	
	Intermediate	136 (16.6)	2 (0.002)	
	Graduate and above	37 (4.5)	0 (0)	
Per capita income	<938	17 (2.1)	16 (5.4)	<0.001
	938–1875	314 (38.2)	138 (46.8)	(19.694, 3)
	1876–3126	373 (45.4)	116 (39.3)	
	3127 and above	117 (14.3)	25 (8.5)	
Marital status	Married	623 (75.9)	268 (90.8)	<0.001
	Unmarried	190 (23.1)	1 (23.1)	(115.800, 2)
	Not staying with spouse	8 (1.0)	26 (8.8)	
Type of family	Nuclear	68 (8.3)	10 (3.4)	0.007
	Extended	279 (34.0)	93 (31.5)	(9.791, 2)
	Three generation	474 (57.7)	192 (65.1)	

stomach and breast cancer (Supplementary File). Half of the respondents (47.3%) were not aware of the most common cancers among males and two-third (65.0%) were not aware of the most common cancers among females.

Source of awareness about cancer

Around four-fifths of the respondents (672, 81.9%) cited television as the source of information, whereas villagers or neighbors were the sources for three-fourths of the

respondents (601, 73.2%). Other sources of information were books, doctors, radio, newspapers, family members, and the Internet [Table 2].

Preventability and treatability of cancer

The preventability of cancer was known to 170 (20.7%) participants, whereas 550 (67.0%) thought cancer was not preventable and 101 (12.3%) did not know about the preventability of cancer. Stopping the use of tobacco was the most common (38.8%) mentioned measure to prevent cancer. More than half (432, 52.6%) of the respondents answered that it cannot be detected at an early age and only 236 (28.7%) could only answer that it can be detected at an early age.

Three-fourths of the participants (614, 74.8%) thought that cancer was treatable, but treatment modalities were known to only 337 (44.1%) respondents. The most common treatment modality known to the respondents was medicine or chemotherapy; known by two-fifth of the respondents (251, 40.9%) who responded that cancer was treatable. Other treatment modalities such as operative procedures and radiotherapy were known to 84 (13.7%) and 3 (0.5%) respondents, respectively.

Awareness of risk factors of cancer

Tobacco products and alcohol use were the common risk factors for cancer known to the respondents. Other than that, betel (pan), junk food, and radiation were the causes identified by the respondents. Three respondents said that it can happen without any cause. Among the 821 participants, 327 (39.9%) respondents were not aware of any of the risk factors of cancer. Rest 494 (60.1%) study participants knew about at least one risk factor of cancer [Table 3].

Factors associated with cancer awareness

Bivariate logistic regression was done to find out the association between the level of awareness and attitude with demographic characteristics. Male and younger age groups (18-39 years) were more likely to be aware of cancer than females and older age groups. Participants working in an office or business were 2.5 times more likely to be aware of cancer than manual workers, but homemakers and persons not engaged in any kind of work are less likely to be aware of cancer [Table 4]. Educational status played a crucial role in cancer awareness as awareness levels steadily increased with an increase in educational status. The higher-income group was more aware of cancer than the lower-income group but the association was not statistically significant. Similarly, unmarried persons are more aware of cancer than married ones. Persons living in the nuclear family were more aware of cancer than those of an extended and three-generation family [Table 4]. Similarly, treatability, preventability, and awareness about the risk factors of cancer were found to be significantly associated with educational level [Table 4].

Table 2: Source of information about cancer among study participants (*n*=821)

Characteristics	Male *n* (%) *n*=438	Female *n* (%) *n*=383	Total *N* (%) *n*=821
Source of cancer awareness			
Television	376 (85.8)	296 (77.3)	672 (81.9)
Villagers	325 (74.2)	276 (72.1)	601 (73.2)
Books	100 (22.8)	97 (49.2)	197 (24.0)
Doctor	95 (21.7)	96 (25.1)	191 (23.3)
Radio	67 (15.3)	6416.7)	131 (16.0)
Newspaper	51 (53.7)	44 (11.5)	95 (11.6)
Family members	22 (11.6)	28 (7.3)	50 (6.1)
Internet	19 (4.3)	15 (3.9)	34 (4.1)
Family member had cancer	4 (0.9)	1 (0.3)	5 (6.1)

*Multiple responses possible, total numbers are more than study participants

Discussion

The present study assessed the level of awareness of the general population regarding cancer and various aspects of cancer, like common cancer sites, risk factors, treatability, treatment modalities, and preventability. In the current study, 73.6% of the participants were aware of cancer. The awareness level reported in other studies ranges from 60.5% to 87%.[10–13] The higher level of awareness reported by Puri *et al*.[11] and Raj *et al*.[12] could be due to the involvement of the urban population who are supposed to be more educated than their rural counterparts. The population studied in these studies was also different. One study conducted by Sheshachalam *et al*.[10] in Mysore reported a lower level of awareness. Though the study population was more educated than our study population, the lower level of awareness was probably due to the assessment procedure, where the participants were asked about the understanding of cancer or defining cancer rather than merely heard of cancer as assessed in our study.

Regarding the awareness of commonly occurring cancers, the common cancers quoted by the participants were oral cancer (47.1%) followed by stomach (20.7%) and breast cancer (19.3%). A comparatively lower percentage of people were aware of cervical, lung, and liver cancer. People were ignorant about prostate and colon cancer. Oral cancer was also the most commonly identified cancer in a study done by Raj *et al*.[12] in six selected states of India. In contrast to

Table 3: Awareness about risk factors of cancer among study participants (*n*=821)

Awareness about risk factor	Male *n* (%) *n*=438	Female *n* (%) *n*=383	Total *n* (%)
Cigarette	245 (55.9)	236 (61.6)	481 (58.6)
Bidi	218 (49.8)	202 (52.7)	420 (51.2)
Gutkha	172 (39.3)	180 (47.0)	352 (42.9)
Alcohol	119 (27.2)	60 (15.7)	179 (21.8)
Khaini	36 (8.2)	31 (8.1)	67 (8.2)
Junk food	3 (0.7)	0	3 (0.4)
Without any cause	3 (0.7)	0	3 (0.3)
Radiation	0	1 (0.3)	1 (0.1)

*Multiple responses possible, total numbers are more than study participants

Table 4: Association of awareness and demographic characteristics

	Aware of cancer (*n*=1116)	Crude OR (CI)	Aware of treatability (*n*=821)	Crude OR (CI)	Aware of preventability (*n*=821)	Crude OR (CI)	Aware of Risk factors (*n*=821)	Crude OR (CI)
Gender								
Male	438 (53.3)	1	302 (49.2)	1	109 (64.1)	1	253 (50.6)	1
Female	383 (46.7)	0.42 (0.32–0.56)	312 (50.8)	1.06 (0.52–2.15)	61 (35.9)	1.17 (0.53–2.61)	247 (49.4)	1.52 (0.82–2.84)
Age group								
18–39 yr	579 (70.5)	1	452 (73.6)	1	120 (70.6)	1	372 (74.4)	1
>39 yr	242 (29.5)	0.32 (0.22–0.48)*	162 (26.4)	0.90 (0.70–1.36)	50 (29.4)	0.68 (0.44–1.05)	128 (25.6)	1.01 (0.70–1.47)
Occupation								
Manual worker/farmer	296 (36.1)	1	189 (30.8)	1	75 (44.1)	1	161 (32.2)	1
Office worker/business	120 (14.6)	3.54 (1.65–7.59)*	95 (15.5)	1.66 (1.00–2.92)*	38 (22.4)	1.35 (0.81–2.27)	79 (15.8)	1.25 (0.78–2.00)
Homeworker	275 (33.5)	0.45 (0.30–0.66)*	226 (36.8)	2.54 (1.10–5.48)*	47 (27.6)	0.38 (0.25–0.95)	169 (33.8)	0.99 (0.49–1.99)
Not working currently	130 (15.8)	0.43 (0.31–0.60)	104 (16.9)	1.63 (0.83–3.32)	10 (5.9)	0.43 (0.17–1.08)	91 (18.2)	1.11 (0.63–2.14)
Education								
Up to middle school	234 (28.5)	1	147 (23.9)	1	41 (24.1)	1	106 (21.2)	1
High school	414 (50.4)	6.36 (4.14–9.79)*	321 (52.3)	1.95 (1.32–2.89)*	104 (61.2)	1.58 (1.02–2.46)*	265 (53.0)	2.07 (1.45–2.96)*
Intermediate and above	173 (21.1)	19.55 (4.62–82.72)*	146 (23.8)	2.99 (1.67–5.35)*	25 (14.7)	0.84 (0.45–1.57)	129 (25.8)	3.18 (1.92–5.27)*
Per capita income								
<1875	331 (40.3)	1	248 (40.4)	1	65 (38.2)	1	194 (38.8)	1
1876 and above	490 (59.7)	1.36 (0.97–1.91)	366 (59.6)	0.98 (0.69–1.38)	105 (61.8)	1.12 (0.78–1.62)	306 (61.2)	1.13 (0.84–1.53)
Marital status								
Ever married	631 (76.9)	1	459 (74.8)	1	150 (88.2)	1	362 (72.4)	1
Unmarried	190 (23.1)	26.74 (3.35–213.08)*	155 (25.2)	1.27 (0.72–2.24)	20 (11.8)	0.38 (0.20–0.73)	138 (27.6)	1.30 (0.79–2.16)
Type of family								
Nuclear	68 (8.3)	1	57 (9.3)	1	19 (11.2)	1	48 (9.6)	1
Extended	279 (34.0)	0.44 (0.21–0.89)*	207 (33.7)	0.51 (0.24–1.06)	58 (34.1)	0.78 (0.42–1.48)	168 (33.6)	0.57 (0.31–1.04)
Three generation family	474 (57.7)	0.36 (0.18–0.72)*	350 (57.0)	0.48 (0.23–0.97)*	93 (54.7)	0.66 (0.36–1.21)	284 (56.8)	0.55 (0.31–0.99)

this, Puri *et al.*[11] found lung cancer as the most commonly mentioned (71.1%) cancer and only 28.1% of participants knew about oral cancer. This may be probably due to the exposure of urban and slum populations to the advertisement of cigarettes and the statutory warning signs in them. The awareness level of oral cancer in our study was higher, probably due to the high prevalence of smokeless tobacco use. Despite breast cancer being the most common cancer in India, very few participants in the current study knew about it. In our study, the awareness of female cancers like breast and cervical cancer was only 19.3% and 7.2%, respectively. However, it was higher in other studies done in India for common cancers.[11,12] This shows a low level of awareness about female cancers in the current study probably due to the low level of education and source of information which was limited to only tobacco-related cancers.

Television was the most common source (81.9%) of cancer information in the current study. This was similar to the results of other studies done in India.[12,14,15] As cancer-related information is frequently advertised on television, it could be the reason for being the most common source of information. Most of the cancer-related advertisements were advertised on government channels. The initiative should be taken by the government to advertise cancer in all channels with an increased frequency.

We found out that 23.3% of the participants got cancer-related information from health professionals and 73.2% from villagers. Few of the studies mentioned health professionals as the major source of information, 69% by Tran *et al.* and 29% by Mon *et al*.[16,17] Higher results in both studies could be due to the reason that both studies were confined to female cancers and participants were also females. The health professional as a source of information was very low in our study which was probably due to the nonavailability of doctors in the health facility.

In our study, 4.1% of participants had reported the Internet as a source of information, whereas only 0.4% reported the Internet was the source of information in the study by Raj *et al*.[12] This could be due to the inaccessibility of the Internet during that period (2012) in India. As Internet penetration is good both in urban and rural areas in India, it can be used as an effective way of cancer awareness generation targeting the rural population. Participants of our study had not mentioned sources like banners, posters, pamphlets, and awareness programs as a source of information. However, Raj *et al.*[12] have mentioned these as a source of information. This suggests the poor penetration of the awareness programs.

Cancer was considered as treatable by 74.8% of the participants in our study. Similar results were observed in studies conducted by Sheshachalam *et al.*[10] (75%), and Elangovan *et al.*[13] (70%). A study conducted by Ray *et al.*[14] in West Bengal found a lower level (58.33%) of awareness of treatability of cancer among study participants which was lower than our result. Raj *et al.*[12] observed different results regarding awareness of treatability of cancer in different states of India, 75.2% in Kerala, 66.3% in Mizoram, 54.2% in Maharashtra, 54.1% in Rajasthan, 48.9% in Madhya Pradesh, and 44.1% in West Bengal. This result was in line with the educational status of the states, and it may also be due to the reason that half of the study participants were from the urban area.

Only 20.7% of the participants considered cancer as preventable in our study. Preventability of cancer was not studied in any of the studies based on overall cancer. In all other specific cancer studies, the awareness about the preventability of cancer was found to be higher. A study conducted by Agrawal *et al*.[18] in Gorakhpur showed that 74% of the participants considered cancer as preventable. The reason for this higher awareness level could be due to the semiurban population that was studied, which was expected to have better access to the health care system and a higher level of education.

Tobacco use was the major risk factor of cancer as responded by participants in the current study. Cigarette and bidi smoking were the commonest risk factors of cancer as responded by 58.6% and 51.2% of the participants. Studies conducted in different parts of the world and India showed a higher awareness of risk factors than our study. In a study conducted by Raj *et al.* (79.2%) in six selected states of India and Puri *et al.* (74.7%) in Chandigarh, a higher level of awareness was seen.[11,12] For individual cancer studies, awareness was higher for oral cancer but lower for female cancers like breast and cervical cancer. Higher results were also seen in international studies by Ravichandran *et al.*[19] (65.2%), Monteiro *et al.* (89.5%),[20] and Ghani *et al.* (90%).[21] In other countries, tobacco was mostly used in the smoking form and higher awareness about smoking as a risk factor could be due to the pictorial warning on the cigarette packet. Other than these, few studies reported risk factors like fat, physical inactivity, family history, environmental pollution, and radiation.[11,12,19,22] In a study by Sabeena *et al.*[23] for cervical cancer, none of the participants had heard of human papilloma virus.

Awareness about the risk factor of cancer was not found to be significantly associated with any sociodemographic variables in the current study, possibly due to the low overall awareness level. This risk factor awareness was found to have a significant association with education, age, and presence of risk factors in a study by Elango *et al.*[24] in a study of oral cancer in Kerala. A similar result was reported by Ghani *et al*.[21] The higher level of cancer risk factor awareness in these studies was probably due to the better exposure from books and social media.

Strengths and limitations of the study

This study is the first of its kind in the rural predominant state of Odisha. This study was carried out with a sufficient sample size after taking into account the design effect and nonresponse. Responses could be affected by the presence of in-laws as they were shy of talking about female cancers. Data collection was done mostly during working hours. There is a possibility that office goers are missed, who may have better cancer awareness.

Conclusion

This study revealed that general awareness about cancer was good in the study population, but the specific awareness regarding danger signs of cancer, treatability, preventability, and treatment modalities was low. This indicates the need for a cancer awareness program in this population. Cancer awareness was found to be better among males, businesspeople, and office workers, higher educational status, higher-income groups, and people living in larger families. Awareness regarding risk factors of cancer was mostly limited to tobacco and alcohol. There is a need to improve awareness about cancer in the community and it has to be a multipronged approach. Health education campaigns on cancer, especially targeting the rural community should be developed, and include strategies like using community gatherings to spread awareness. The content of the health education campaign should include the preventability and treatability of cancer. As Internet coverage is good and mobile phones are ubiquitous these days, it can be taken as an opportunity to create awareness. Since television has high penetration, it should be fully utilized to educate people about cancer by not restricting themselves to government channels. Since the information about cancer obtained from health care workers was abysmally low, there is a need to relook at their training and monitoring components for chronic diseases.

Ethical statement

Ethical approval was obtained from institute ethics committee of All India Institute of Medical Sciences, Bhubaneswar, with Ref Number: IEC/AIIMS BBSR/PG Thesis/2017-18/6. Written informed consent was obtained from the study participants.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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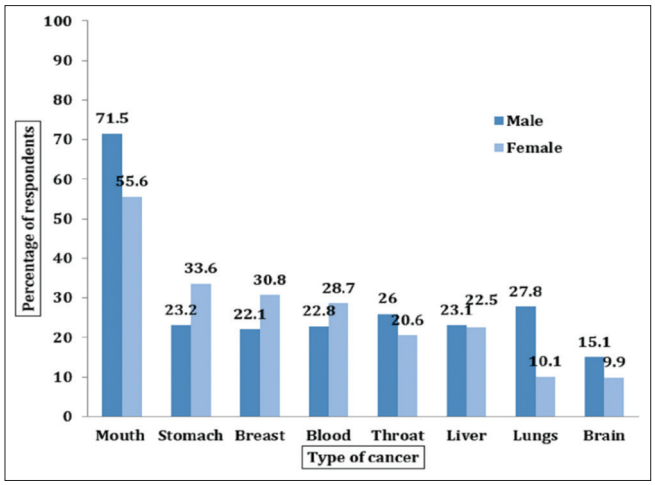

Supplementary file (Figure): Awareness regarding common sites of cancer according to respondents ($N = 821$)