



Assessment of role of social habits and genetics in inducing various cancers

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Abstract

Cancer is one of the major threats to public health in the developed world and increasingly in the developing world. Many cancers can be prevented by not smoking, maintaining a healthy weight and having a balanced diet. Our objective was to determine the role of genetics and social habits that would lead to cancer. The study was conducted for a period of 6 months, in certain wards of Eraviperoor grama panchayat, Kerala. Our study was a prospective observational study with a total study population of 300. The study population was selected by inclusion and exclusion criteria. Data was collected by means of face to face interviews. Our study analysis showed that the primary signs and symptoms of lung, stomach, mouth and skin cancer were associated with smoking and drinking. Ever increasing use of alcohol and tobacco were seen generally in the population. It was also observed that genetics had a strong association with incidence of primary signs of cancer. Our study suggests that methods to improve the awareness of increasing incidence of cancer along with programmes to increase public awareness of harmful etiologic factors such as smoking and alcohol, could lead to reduction of incidence and thus reduce the resulting harmful consequences.

Keywords: primary signs; cancer prevalence; genetics; social habits

Introduction

Cancer is the second most common cause of death after heart disease. Cancer is more curable when detected early [1]. Although some cancers develop completely without symptoms, the disease can be particularly devastating if the symptoms are ignored, as these symptoms may represent cancer. Cancer often has no specific symptoms, so it is important that people limit their risk factors and undergo appropriate screening [2, 3]. The risk factors for cancer are - smoking, heavy alcohol use, high sun exposure, and genetics. The best way to fight cancer is by prevention and early detection [3].

Role of Genetics in Inducing Various Cancers

Cancer is a genetic disease. Several genes are known to increase a person's chance of developing certain cancers such as colon, ovary and breast cancers. [3] Common genetic variants account for a large proportion of cancer incidence, even though they do not individually lead to strong clustering within families [4]. It appears that families pass on an altered gene that carries with it a high chance of acquiring cancer [3]. Some cancer-causing gene changes increase the production of a protein that makes the cells grow. Others result in the production of misshapen, and therefore non-functional, form of a protein that normally repairs cellular damage. Only a very small percentage of people in the general population have abnormal copies of these genes, and known as familial cancers, which account for only two to five percent of all cancers [3]. Cancer causing genetic changes can be inherited or acquired during one's lifetime. It occurs as a result of errors that occur as cells divide or from exposure to carcinogenic substances that damage DNA such as chemicals in tobacco smoke, and radiation such as ultraviolet rays. Inherited genetic mutation

play a major role in 5 to 10 percent of all cancers. Researchers associate mutations in specific genes with more than 50 hereditary cancer syndromes which are disorders that may predispose individuals to developing certain cancers [4]. Inherited mutations in BRCA1 and BRCA2 genes are associated with hereditary breast cancer and ovarian cancer syndrome in women and pancreatic and prostate cancers in men [5]. Environmental factors may cause gene alterations which can cause permanent changes in genes and can lead to cancer [3]. Thus, the combination of effects from genetic and environmental factors account for cancer susceptibility [4].

Role of Social Habits in Inducing Cancer

Both alcohol and tobacco use are associated with numerous adverse health consequences, including an increased risk of various cancers. Many people use and abuse alcohol and tobacco, and their combined effects on cancer risks have been widely investigated [7]. The health risks of smoking were established half a century ago by epidemiological evidence of associated morbidity and mortality [8]. Smoking harms nearly every bodily organ and diminishes a person's overall health. Cigarette, cigar, pipe smoking, chewing tobacco, snuff and second hand smoking have all lead to increased cancer risk. They have been associated with cancers of the lungs, mouth, bladder, colon, kidney, throat, nasal cavity, oesophagus, liver, pancreas and leukemia [9]. Exposure to carcinogens in tobacco products accounts for one – third of all cancer deaths in the US. Cigarette smoke contains more than 100 carcinogens. The risk for cancers of mouth, throat and oesophagus increases in those who drink more than two drinks/day. Nicotine is the additive component in the more than 7000 compounds and more than 70 identified chemical carcinogens in tobacco smoke.

Nicotine alone has not shown to be carcinogenic, but can be metabolized to form carcinogenic tobacco specific N-nitrosornicotine and a nicotine derived nitrosamine ketone. E – Cigarettes are gaining popularity as a smoking cessation strategy but can act as nicotine gateway to take up tobacco smoking again [8].

Alcohol consumption has a complex and controversial relationship to health. Alcohol was classified as the first-class carcinogen by IARC. Previous studies indicate that alcohol drinking is a risk factor for cancer of the oral cavity, pharynx, larynx, esophagus, female breast cancer and colorectal cancer [10, 15]. The amount of alcohol a person drinks over time, not the type of alcoholic beverages, seems to be the most important factor in raising cancer risk [11]. Heavy drinkers (more than two drinks/day) have an increased risk of cancer, particularly among those who also smoke. Studies conducted in animals have demonstrated that alcohol itself (ethanol) does not cause tumor development. Instead, the primary breakdown product of ethanol in the body, acetaldehyde, has been shown to cause damage to the organism's DNA, thereby contributing to cancer risk. Additional studies have found out that, those anatomic sites that come into closest contact with the ingested alcohol, are at highest risk of being affected by cancer [12, 15].

Alcohol use and smoking, together raises the risks of various cancers even more than drinking or smoking alone [11]. The effect of combined exposure on the risk of oral and pharyngeal cancers seem to be multiplicative – that is the risk of combined exposure is the product of the increases in risk associated with exposure to either habits [14]. This is because alcohol can cause harmful chemicals in tobacco, get inside the cells that line the mouth, throat and esophagus, as well as, it may limit the efficiency of DNA repair gene. Some studies have even found supra- multiplicative increases in risk [7].

Spit or smokeless tobacco is a less lethal, but still unsafe alternative to smoking. Smokeless tobacco is available as chewing, oral or spit tobacco, snuff or dipping tobacco and as dissolvable tobacco. Overall, people who dip or chew get about the same amount of nicotine as regular smokers. They also get at least thirty chemicals that are known to cause cancer. The most harmful cancer-causing substances in smokeless tobacco are tobacco specific nitrosamines. Cancers linked to the use of smokeless tobacco include mouth, tongue, cheek, gum, esophagus and pancreatic cancer. Using any kind of spit or smokeless tobacco is a major health risk. Its less lethal than smoking tobacco, but less lethal is a far cry from safe [8, 9].

2. Materials and Methodology

Design of study: Prospective observational study

Location of the Study: The study was carried out in certain wards of Eraviperoor grama panchayat, Pathanamthitta, Kerala, after obtaining the approval from the Institutional Review Board at the college.

Duration of study: 6 months (November 2018-May 2019)

Sample size: A sample size of 300 people was selected.

Study eligibility

Inclusion criteria

- Population willing to participate

Exclusion criteria

- Patients who are not willing to participate

Study variables

- Patient demographic data such as: as age, sex, occupation, height and weight
- Social habits
- Family history
- Dietary habits
- Physical activity
- Coughing up blood
- Lumps in the body
- Changes in skin viz colour, itchy patches or lesions
- Ulcer
- Unexplained weight loss
- Altered bowel habits

Data collection tool

Predesigned data collection form was used.

Data collection procedure

This prospective observational study was conducted in certain wards of Eraviperoor gramapanchayat, Kerala. It was a 6 months study in which patients were recruited based on the inclusion and exclusion criteria. 300 eligible study subjects were taken prospectively and the data was collected according to the approved pre-designed data collection form. All people were provided with a brief introduction regarding the study and the confidentiality of the data.

Data required as per the data collection proforma was collected prospectively by means of interview.

Data Analysis

The data collected were entered in Microsoft excel -2010 version and results were analysed and presented in tabular form as frequency and percentages.

3. Results

In the six months study, 300 eligible populations were enrolled as per the inclusion exclusion criteria. The results are as follows.

3.1. Distribution of Social Habits

Table 1: Distribution of Social Habits

Sl. No:	Social habits	Status	Frequency	Percentage (%)
1	Smoking	Current	23	7.6
		Ex-Smoker	2	0.8
2	Alcohol	Current	15	5
		Ex-Drinker	3	1
3	Smoking with Alcohol	Current	15	5
		Ex-Smoker and Ex-Drinker	3	1
4	Tobacco Chewing	Current	1	0.3
5	Snuff	Current	1	0.3
6	No Social Habits	Never	237	79
	Total		300	100

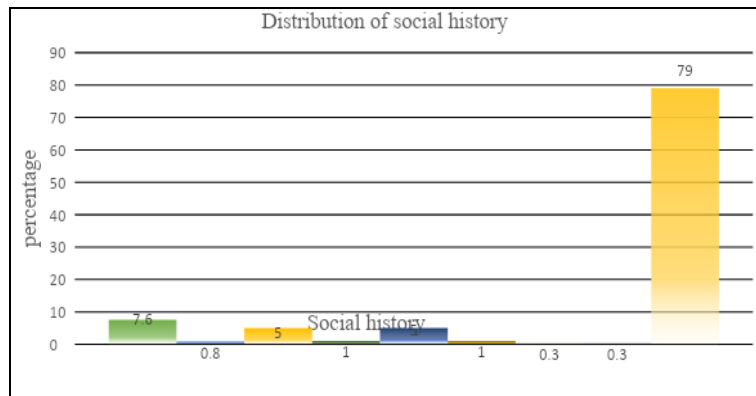


Fig 1: Distribution of Social History

Here, 79% of the study population had no history of alcoholism and smoking. 6% had a history of alcoholism. 8.4% had a history of smoking and 6% had a history of both alcoholism and smoking. 0.3% population had history of tobacco chewing and snuff each.

2. Distribution of Subjects According to Their Family History

Table 2: Distribution According to Family History

Si. No:	Type of Cancer	Frequency	Percentage (%)
1	Stomach Cancer	16	5.3
2	Breast Cancer	8	2.6
3	Uterine Cancer	7	2.3
4	Lung Cancer	6	2
5	Mouth Cancer	4	1.3
6	Blood Cancer	3	1
7	Bone Cancer	1	0.4
8	Brain Tumor	1	0.4
9	No Family History	254	84.7
	Total	300	100

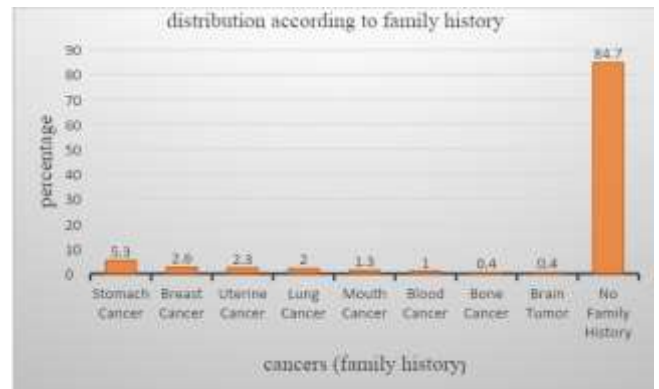


Fig 2: Distribution According to Family History

84.7% of the total population had no family history of cancer. 5.3% had a history of stomach cancer, 2.6% had history of breast cancer followed by 2.3% showing a family history of uterine cancer.

3. Distribution of Subjects According to Social Habits

Table 3: Distribution of Subjects According to Social Habits

Si. No:	Type of cancer	Social habits	Frequency	Percentage (%)
1	Lung Cancer	Current Smoker	1	5.2
		Ex-Drinker	1	5.2
		Ex-Drinker and Smoker	1	5.2
2	Stomach Cancer	Ex-Smoker	1	5.2
		Current smoker and drinker	1	5.2
		Current drinker	1	5.2
3	Mouth Cancer	Never	2	11
		Ex-Smoker	1	5.2
		Ex-Smoker and Ex-Drinker	2	11
4	Skin Cancer	Tobacco Chewing	1	5.2
		Ex-Drinker	4	21
		Current Drinker	3	15.7

The study analysis showed; 5.2% of the total population showing primary signs of lung cancer were each found to be current smokers, ex-drinkers and ex-drinkers and smokers. 11% of never drinking and smoking population showed primary signs of stomach cancer, while 5.2% each were ex-smokers, current drinkers

and current smoker and drinker. 11% of population experiencing primary signs of mouth cancer were ex-smokers and ex-drinkers. 21% of the total population experiencing primary signs of skin cancer were ex-drinkers, while 15.7% of the population experiencing primary signs of skin cancer were current drinkers.

4. Distribution of Subjects Having Primary Signs of Cancer According to Family History

Table 4: Distribution According to Family History

Si. No:	Cancer	Family history	Frequency	Percentage (%)
1	Lung Cancer	Lung Cancer	3	15
2	Stomach Cancer	Stomach Cancer	5	25
3	Mouth Cancer	Mouth Cancer	4	20
4	Skin Cancer	Skin Cancer	8	40
	Total		20	100

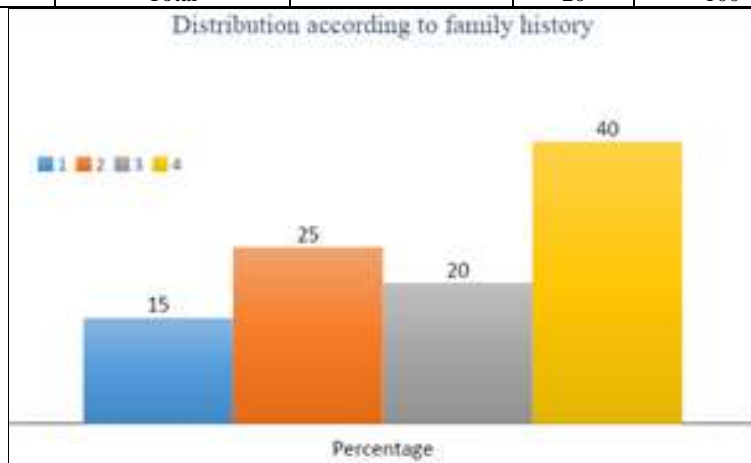


Fig 3: Distribution According to Family History

From the study analysis, 15% of the total population having primary signs of lung cancer had family history of lung cancer. 25% of the total population having primary signs of stomach cancer had family history of stomach cancer. 20%

of the population having primary signs of mouth cancer had a family history of mouth cancer. 40% of the population experiencing primary signs of skin cancer had a family history of skin cancer.

Primary Symptoms

Table 5: Table of Primary Symptoms

SI.NO:	Symptoms	Lung Cancer(n=3)	Stomach Cancer(n=5)	Mouth Cancer(n=4)	Skin Cancer(n=8)
1	Coughing up blood	Not included	Not included	Not included	Not included
2	Coughing or worsening cough less than 3 weeks	3	Not included	Not included	Not included
3	Breathlessness	3	Not included	Not included	Not included
4	Chest pain	3	Not included	Not included	Not included
5	Decreased appetite	Not included	5	Not included	Not included
6	Unexplained weight loss	Not included	5	3	Not included
7	Fatigue	3	5	4	Not included
8	Back Pain	Not included	4		Not included
9	Altered bowel habits	Not included	5		Not included
10	Ulcer	Not included	3	4	Not included
11	Unexplained intermittent fever	Not included	1		Not included
12	Lumps in the body	Not included	1	2	Not included
13	Difficult in swallowing	Not included	Not included	4	Not included
14	Gum bleeding	Not included	Not included	4	Not included
15	Pain or tenderness anywhere in your mouth, including your tongue	Not included	Not included	4	Not included
16	Change in skin color	Not included	Not included	Not included	8
17	A pain lesion that itches or burns	Not included	Not included	Not included	8
18	Bleeding lesion	Not included	Not included	Not included	4
19	Over use of cosmetics	Not included	Not included	Not included	1

4. Discussion

Assessment of Genetic Role in Inducing Cancer

In our study, we analysed that there is a strong genetic role associated with primary signs of cancer. The highest was observed in skin cancer (40%) followed by stomach cancer (25%). A study conducted by Christopher I. *et al.*, (2017) concluded the same.

Assessment of Social Habits in Inducing Cancer

Our study analysis showed that the primary signs and symptoms of lung, stomach, mouth and skin cancer were associated with smoking and drinking. 5.2% of the population showing the primary signs of lung cancer were smokers. 11% of the population showing primary signs of mouth cancer were ex-smokers and drinkers and 5.2% of those showing signs of stomach cancer were current

smokers and drinkers. Andrews T. *et al*; (2015) conducted a similar study and positive linear associations were observed between lifetime alcohol consumption and cancer related mortality and total cancer incidence. Nirmala C. *et al*; (2017) conducted a case control study which concluded that tobacco smoking shows higher risk for oral cancer and a great need to augment tobacco control measures.

5. Conclusion

Cancer is a major disease of concern in the present scenario. Early detection helps in early cure of the disease. This study was aimed at evaluating the primary signs of various cancers as well as etiological factors associated with it. A total of 300 population was interviewed to analyse these factors.

The study has shown that most of the population with primary signs of cancer has shown a clear association with family history. As the full spectrum of alleles associated with cancer comes in to focus, it may ultimately improve the prevention, diagnosis and treatment of cancer. Alcohol and tobacco use remains the single main cause of cancer. The Dietary Guidelines for Americans, 2015–2020, recommend that if you drink alcohol at all, drink in moderation—no more than one drink a day for women, and no more than two drinks a day for men.^[13]

Thus, our study strongly suggests more effective methods for creating the awareness regarding the importance of early detection of cancer signs which would aid in improving prognosis of the disease. As well as programmes to increase public awareness of harmful etiologic factors such as smoking and alcohol, could lead to its reduction and thus reduce the resulting harmful consequences.

There are also some limitations in this study by its sample size. Time constraints of six months do not allow us to perform a follow up of those who showed the signs to determine if they occur due to any other reasons. There was no control group in our study to compare the results with. There is limitation owing to response bias to the questionnaires. Also, no laboratory tests were performed to confirm diagnosis.

6. References

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