

A Study of Gastric Cancer caused by the prevailing habits of the citizens

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Abstract: - The anatomic distribution of cancers varies very considerably from country to country. Globally speaking stomach cancer ranks second in males and fourth in females. However, stomach cancer ranks second (10% of new cancer cases) next to lung cancer (12% of new cancer cases) regardless of sex (Parkin et al. 1993). A review of the incidence rates of stomach cancer in the 24 areas described by Parkin et al. (1993) provides a noteworthy observation. Most of the people in Japan, China, and USSR have the highest rates while those in India, Northern America, and Western Africa have the lowest rates suggesting the obvious heterogeneity in the types of people who have high and low rates of gastric cancer.

Keywords: Cancer incidence, Tobacco habits, smoking, non-smoking

Introduction: - Many of the studies gave the results that are; such as experimental animal, ecological migration, case referent, and cohort studies suggest that the major etiological factor in gastric cancer is diet. Dietary factors have important causative (salted, pickled foods etc.) and protective (fresh fruit, vegetables etc.) roles in gastric cancer. Alcohol and tobacco consumption have also been mentioned as possible causes in the literature. The data obtained from cancer registries in India have shown that both frequency and the age adjusted incidence rates (AAR) of gastric cancer are lower in Northern India compared to Southern India.

Cancer incidence in India

India, with its rich diversity of people, environment, geography and climate, could contribute much to cancer epidemiology. This contribution, however, was not entirely possible, mainly due to low relative magnitude of cancer among the various causes of morbidity and mortality, lack of resources and as well as lack of trained persons. India does not have a nationwide cancer registry. The first population based cancer registry in India, the Bombay Cancer Registry, was established in 1963 by the Indian Cancer Society with a view to studying, the problem of cancer in Bombay city in depth. Later, the National Cancer Registry Project was initiated by the Indian Council of Medical Research by augmenting the population based cancer registry at Bombay and establishing two new population based cancer registries, one at Bangalore and the other at Madras and three hospital cancer registries at Chandigarh, Dibrugarh and Trivandrum.

The immediate objectives of this project are to provide reliable data on

- (i) incidence rates in different regions of the country,
- (ii) incidence rates according to age, sex, anatomical site, and histological types of cancer,
- (iii) Patterns of different types of cancer through rate studies in various population subgroups taking into account religion, language, education, and other factors and

(iv) Stage of disease at which the patients reported to hospital for treatment. The long term objectives of the project are, however, much wider in scope. The project is expected to provide a research base for the development of appropriate strategies in all important aspects of a National Cancer Control Programme, viz.

(a) Primary prevention (b) Early detection (c) Effective treatment, and

(d) Survival rates (National Cancer Registry Project 1988).

The National Cancer Registry Project has expanded over the years. It now consists of twenty-eight registries collecting data on cancer. Most of them are five hospital cancer registries and six population based cancer registries. The hospital cancer registries in Dibrugarh and Trivandrum have been collecting data from general hospitals since 1982 and those in Bangalore, Bombay and Madras are from Cancer Centers since 1984. Five of the six population based cancer registries are urban based: Bombay since 1964. Bangalore and Madras are since 1982. Bhopal and Delhi are from 1986. The sixth is rural, and has been based in Barshi in the Sholapur district of Maharashtra State since 1988. The registry at Bhopal is a special cancer registry, set up in the aftermath of the methyl iso-cyanide gas tragedy in December 1984. As of present, the coverage of the National Cancer Registry Project is 12.8% of urban population and 0.06% of rural population in the country. Since its inception in 1982 the National Cancer Registry Project has contributed much to our understanding about the cancer problem in India. The analysis of lifetime cumulative incidence rate indicates that on an average, one out of 7 to 9 persons in the metropolitan cities and one out of 14 to 19 persons in the rural India will eventually develop cancer in their lifetime (0-74 years). No essential difference in the lifetime cumulative cancer incidence rate was observed in each sex within and between the Indian registries (Table-1). The male to female sex ratio in the population, in all the study areas of the Indian registries is less than one (male preponderance) whereas among cancer cases, the ratio is more than one (female preponderance) in Bangalore, Madras, and Delhi, In the remaining registries it is approximately equal to the population ratio.

Table 1: The life time of (0-74 years) cumulative cancer risk in India in the year 2010				
Registry	Cumulative Risk (%)		One in how many persons will get cancer in their life time	
	Male	Female	Male	Female
Bangalore	12.38	12.51	8	8
Barshi	7.09	5.10	14	19
Bhopal	11.66	10.72	9	9
Bombay	13.94	12.16	7	8
Delhi	12.37	13.97	8	7
Madras	12.32	13.39	8	7
<i>Source: National Cancer Registry Project 2013</i>				

All the registries in India suggest that cervical carcinoma is the leading cancer (in terms of both incidence rates

and frequencies) in women except in Bombay (population based cases regulatory where cancer of the breast is the leading site followed by cancer of cervix. The world standardized AAR of uterine cervical cancer, reported in the Cancer. Incidence in Five Continents (Parkin et al. 1992) reveals that the rates observed in Madras (47.2/100.000) are next to Peru, Trujillo (54.6/100,000) and Brazil, Goiania (48.9/100.000). In the hospital cancer registries, the proportion of cervical cancer among all female cancers ranged between 10.9% in Dibrugarh and 45.0% in Madras. Cancer of the breast is the second leading site in females (in terms of both incidence rates and frequencies) in all the Indian registries except the population based cancer registry in Bombay and the hospital cancer registries in Bangalore and Dibrugarh. In males, the rank order of site of cancer is different in all the registries However, almost all of the leading sites in males are related to tobacco habits. Almost 50% of male and 20% of female cancers are related to tobacco habits. It must be noted that lung cancer accounted for 15% of tobacco related cancers (Gajalakshmi et al. 1996). Gastric cancer has emerged as one of the commonest malignancies in South Indian men and women. In South Indian men, gastric cancer is the leading site (Madras, AAK-16.5; Bangalore, AAR-9.5; per 100,000) but in women it ranks fifth or sixth (Madras, AAR-7.1. Bangalore. AAR 4.3 per 100,000). The scenario in the South Indian hospital cancer registries, is that gastric cancer accounts for 7.2%, in Madras, 5.4% in Bangalore and 5.3% in Trivandrum (ranks fourth in Madras, fifth in Trivandrum, and sixth in Bangalore) of all male cancers, while it accounts for approximately 2% of all cancers in females in all these registries and takes seventh to ninth place. The most common forms of cancer observed in men and women in the population based cancer registries and in hospital cancer registries are given in Tables 2 and 3.

Table-2: Leading sites of cancer in males and females in the Indian population based cancer registries in 2010 (National Cancer Registry Project 2013)

Cities	Males			Females		
	Rank	Site of Cancer	Incidence	Rank	Site of Cancer	Incidence
Bangalore	1	Stomach	9.5	1	Cervix	26.4
	2	Oesophagus	9.4	2	Breast	22.3
	3	Lung	8.6	3	Oral Cavity	12.2
	4	Oral Cavity	8.1	4	Oesophagus	10.2
	5	Pharynx	8.0	5	Ovary	4.7
	6	Prostate	7.1	6	Stomach	4.3
	7	Lymphoma	5.5	7	Leukaemia	3.5
	8	Leukaemia	4.7	8	Thyroid	3.2
Barshi	1	Oesophagus	6.7	1	Cervix	26.2
	2	Oral Cavity	5.5	2	Breast	6.8
	3	Penis	5.1	3	Bone	2.4

	4	Pharynx	4.8	4	Skin other	2.3
	5	Rectum	4.0	5	Lymphoma	2.0
	6	Lymphoma	2.9	6	Rectum	1.7
	7	Leukaemia/Skin Other	2.7	7	Oesophagus	1.4
	8	Liver	2.6	8	Stomach/vagina	1.3
Bhopal	1	Oral Cavity	23.8	1	Cervix	24.3
	2	Pharynx	14.5	2	Breast	21.9
	3	Lung	14.1	3	Oral Cavity	8.2
	4	Oesophagus	7.7	4	Ovary	6.2
	5	Prostate	5.6	5	Gall bladder	5.2
	6	Rectum	5.5	6	Body uterus	4.1
	7	Stomach	3.7	7	Lung	3.2
	8	Brain	3.2	8	Colon/thyroid	2.1
Bombay	1	Lung	14.6	1	Breast	26.1
	2	Pharynx	13.2	2	Cervix	19.4
	3	Oral Cavity	12.6	3	Oesophagus	8.2
	4	Oesophagus	11.5	4	Ovary	7.0
	5	Larynx	8.8	5	Oral Cavity	6.0
	6	Stomach	7.0	6	Lung/lymphoma	3.7
	7	Prostate	6.9	7	Stomach	3.4
	8	Lymphoma	5.2	8	Pharynx	3.0
Delhi	1	Lung/Oral Cavity	11.9	1	Cervix	30.1
	2	Larynx	8.6	2	Breast	28.3
	3	Pharynx	8.1	3	Ovary	8.7
	4	Lymphoma	6.7	4	Gall bladder	8.6
	5	Oesophagus	6.4	5	Oesophagus	4.6
	6	Prostate/ Leukaemia	6.3	6	Oral Cavity	4.1

	7	Urinary bladder	5.6	7	Lymphoma	3.4
	8	Stomach/ Brain	3.4	8	Brain	2.6
Madras	1	Stomach	16.5	1	Cervix	43.5
	2	Oral Cavity	13.2	2	Breast	24.6
	3	Lung	11.1	3	Oral Cavity	10.6
	4	Oesophagus	10.2	4	Oesophagus	7.7
	5	Pharynx	9.4	5	Stomach	7.1
	6	Lymphoma	5.6	6	Ovary	6.0
	7	Larynx	5.5	7	Pharynx	3.6
	8	Rectum	4.5	8	Rectum	2.6

*Age adjusted (World population) cancer incidence rate per 10⁵ persons.

Table 3:- Leading sites of cancer in males and females to the hospital cancer registries, India, in 2004-2008 (National Cancer Registry Project 2012)

Cities	Males			Females		
	Ranks	Site of Cancer	Incidence	Rank	Site of Cancer	Incidence
Bangalore	1	Pharynx	15.0	1	Cervix	41.3
	2	Oral Cavity	13.1	2	Oral Cavity	13.4
	3	Oesophagus	10.7	3	Breast	11.2
	4	Lung	8.0	4	Oesophagus	6.7
	5	Lymphoma	5.5	5	Ovary	3.3
	6	Stomach	5.4	6	Leukaemia	2.4
	7	Leukaemia	4.9	7	Pharynx/Stomach	1.9
	8	Larynx	4.7	8	Rectum/ thyroid	1.5
Bombay	1	Oral Cavity	19.3	1	Cervix	30.6
	2	Pharynx	13.1	2	Breast	21.5
	3	Oesophagus	8.0	3	Oral Cavity	7.4
	4	Leukaemia	7.2	4	Oesophagus	5.4
	5	Lung	6.6	5	Leukaemia	3.8
	6	Larynx	6.5	6	Ovary	3.7

	7	Lymphoma	6.3	7	Pharynx	3.1
	8	Rectum	2.7	8	Lymphoma	2.5
Chandigarh	1	Lung	10.7	1	Cervix	40.3
	2	Oral Cavity	8.8	2	Breast	15.0
	3	Pharynx	8.1	3	Oesophagus	5.0
	4	Lymphoma	7.3	4	Ovary	4.0
	5	Oesophagus	6.5	5	Pharynx	2.9
	6	Larynx	5.8	6	Oral Cavity	2.7
	7	Leukaemia	5.6	7	Leukaemia/Brain	2.2
	8	Brain	5.1	8	Lymphoma/Uterus	2.1
Dibrugarh	1	Pharynx	27.7	1	Cervix	18.9
	2	Oesophagus	17.5	2	Oesophagus	13.6
	3	Oral Cavity	13.6	3	Breast	10.8
	4	Stomach	4.8	4	Oral Cavity	9.5
	5	Lung	4.6	5	Pharynx	9.0
	6	Larynx	4.0	6	Stomach	4.9
	7	Lymphoma	2.6	7	Ovary	3.9
	8	Leukaemia	2.1	8	Lymphoma/Lung	2.0
Madras	1	Oral Cavity	21.3	1	Cervix	45.9
	2	Pharynx	12.5	2	Breast	14.0
	3	Oesophagus	8.9	3	Oral Cavity	10.1
	4	Stomach	7.2	4	Oesophagus	3.4
	5	Lung	6.5	5	Pharynx	2.9
	6	Lymphoma	5.2	6	Ovary	2.6
	7	Leukaemia	4.9	7	Vagina	2.5
	8	Larynx	4.1	8	Leukaemia	2.3
Trivendrum	1	Oral Cavity	21.3	1	Cervix	23.0
	2	Lung	10.3	2	Breast	19.9
	3	Pharynx	6.8	3	Oral Cavity	13.1

	4	Oesophagus	5.6	4	Ovary	5.3
	5	Stomach	5.3	5	Thyroid	4.7
	6	Lymphoma	5.0	6	Leukaemia	3.6
	7	Leukaemia	4.5	7	Brain	2.6
	8	Larynx	4.1	8	Stomach	2.0

Background: - For inclusion, a case must have proven neoplastic disease and be the resident of the geographical area covered by the respective registries, for a minimum period of one year, prior to the date of diagnosis. The methods of diagnosis adopted by all the registries are same as mentioned in NCRP-PBCR standard proforma. Cancer registration is active and relies on voluntary cooperation. In order to determine incidence rates and conduct epidemiological studies, the social investigators visit the participating hospitals of their respective registries, interview cancer patients and suspected cases, extract pertinent data from hospital records, and verify patients' permanent addresses. Those who are not residents or who have been diagnosed before moving are not included. All new cancer patients' pertinent information is also extracted in a standard format from several sources, including radiotherapy, pathology, hospital inpatient and outpatient records, and partner centers' death records. A lot of patients arrive with advanced disease, so therapy can start right away without waiting for test results. Consequently, even cases that are identified solely based on clinical findings are also recorded. Cruse of death and date of death are the only commonly gathered follow-up information. This kind of data collecting from various hospitals can occasionally reveal that a patient is registered at two or more hospitals. We take care to avoid entering the same patient more than once in our records.

Tobacco habit: - Considerably quite different ways of tobacco consumption prevail in India than in other countries. The tobacco consumption can be categorized into:

- (a) Smoking and
- (b) Non-smoking tobacco use.

The types of tobacco used are different both within and between the categories i.e, the same type of tobacco is not used for all purposes. In whatever form it is used, the tobacco imparts an addictive narcotic effect on the consumers, maybe at different levels. Though there were no figures of tobacco usage on national basis, there are many reports from different parts of the country. Gupta (1988) reported a prevalence of tobacco usage varying from 62% to 82% in males and 15% to 67% in females in different parts of the country.

a) Smoking

Tobacco is consumed by smoking cigarette, pipe, shutta, cigar and cheroots, bidi or hookah. The first two listed above are the same as in other countries.

Shutta consists of cured tobacco folded into a dried tobacco leaf and is hand made. The shutta is frequently associated with the unusual habit of reverse smoking, during which the burning end is held inside the mouth. Often a wet cloth is wrapped around the smoking end to act as a filter and to reduce the heat.

Cigars and cheroots are made from uncut tobacco. Cigar consists of a center core or filler, a middle portion

which holds the filler in shape and the outer wrapper which imparts colour, texture, and feels. Cigars have a finished head which is closed or tapered. Cheroots have a thick and thin end, both of which are open. Cigars are milder, more flavoured and costly

Bidi consists of a relatively small amount of locally grown tobacco, which is flaked and hand rolled in rectangular pieces of dried temburni leaf (*Diospyros melanoxylan*). Bidis are sometimes rolled in other leaves and the size varies considerably. They may produce a smaller volume of smoke than cigarettes but result in two or three times more pulls than an ordinary cigarette and deliver up to 40 or 50 mg of tar [Hoffman et al. 1974]. Since bidis lack added burning agents they must be puffed continuously to be kept alight.

Hookah is a type in which a small amount of tobacco seasoned with molasses and at times with narcotics is placed in a bowl and topped with pieces of burning charcoal. Before being inhaled, the smoke is passed through water which acts as a filter (IARC, 1986).

Tobacco smoking is prevalent among people of all castes and religions. There are also religious groups among whom smoking is forbidden, such as Parsis and Sikhs. In general, more men than women smoke tobacco. Whether rural or urban, smoking of bidis by old or young is more prevalent in low income groups because of their lower price.

(b) Non-smoking tobacco use

In the non-smoking way, tobacco is consumed alone or in combination with one or a variety of other ingredients. The predominant use of non-smoking tobacco is by oral although it may be inhaled into the nasal cavity.

Betal quid: In India, where a substantial proportion chew betel quid, the habit is practiced by taking a betel leaf, which is a leaf of the vine piper betel on which aqueous lime (Calcium hydroxide) and/ or catechu are smeared. Pieces of areca nut are then placed on the leaf, which is folded, put into the mouth and chewed. Tobacco may be added and depending on personal taste spices such as cardamom, cloves, grafted fresh coconut, ginger, and sugar are added. Generally the quid is chewed after meals, but the frequency of chewing by regular quid chewers ranges from two to 10-15 times per day. The areca nut is also chewed with or without tobacco. Tobacco is chewed. Some times in the presence of lime. A pinch of raw powdered tobacco is taken in the palm and a small amount of slaked lime paste is added, the mixture is then rubbed with the thumb and placed in the mouth. Pieces of areca nut are sometimes chewed with it.

Mishari is a form of tobacco used as a substitute for chewing tobacco. It is a roasted or half burnt tobacco, prepared by baking tobacco on a hot plate until it becomes uniformly black. It is then powdered and a user may apply and retain it in the mouth (usually along the teeth and in the sulcus) several times a day.

Zarda is another form of tobacco used. During the manufacture of Zarda, tobacco leaf is first broken into small pieces and boiled in water with lime and spices until evaporation. The residual particles of tobacco are then dried and coloured with vegetable dyes. Zarda is usually chewed with finely cut areca nut and spices.

Generally all types of quid are placed in one or both the cheeks the quid is retained for 10-15 minutes. Occasionally it is left to stay overnight between the gum and buccal mucosa. The saliva produced during oral use may be swallowed or spit out, according to custom or a person's preference. A number of reasons are given for chewing betel. One of them is that it leads to increased salivation and thereby suppresses hunger. Tobacco chewing is prevalent among people of all castes, creeds and religions, except Sikhs and Parsis. Chewing tobacco is more among illiterate than literate.

Snuff is a fine tobacco powder. Scented snuff is used for deep intranasal inhalation and unscented snuff is used as a dentifrice (IARC 1986)

Alcohol Habit- Alcoholic drinks in India may be sharply divided into two categories i.e. foreign liquors and local liquors.

Foreign liquor includes all imported from other countries and those made in India on the formulae of imported liquors i.e. manufactured in India but by a foreign process (Indian made foreign liquors). Liquors such as whisky, rum, wine, gin, brandy, and beer are included in this category.

Local liquor includes all liquors produced or manufactured in India by indigenous process; Liquors such as toddy, arrack are included in this category. A one month old flower bud at the axis of the palm is selected and a triangular hole is then made either at the base of a flower bud at the axis of the palm is selected and a triangular hole is then made either at the base of a flower bud or at a short distance below the terminal bud with a broad bladed, razor sharp tapping knife. The tapper then places the clay pot, supported by strings, to collect the sap freely from the cut point. After 24 to 36 hours the juice starts to ooze out from the point. During collection the upper shaves off tissue from the tap hole using the same knife to ensure regular flow. Although the exact physiology of the process is not known, it is believed that the burshing with the knife somehow directs the sap to the wounded place. Among the palms, the most frequently tapped ones are the coconut palm, oil palm and wild date palm. During full production, a daily yield of 1.5 to 3.5 liters per palm is possible. Fresh palm sap is generally dirty brown in colour but as yeasts in it multiply, it becomes pale and eventually turns milky white and opalescent. Thus palm wines are generally sweetish, heavy, milky white, vigorously effervescent alcoholic beverages. This type of beverage is called toddy. Arrack is locally brewed liquor with approximately 40% ethanol content. Drinking patterns vary between regions and countries, between groups within country, between individuals belonging to the same social and ethnic group and between different times in the lifetime of an individual. The relationship between drinking behavior and social class is more complicated and varied. In some countries, heavy drinkers belong to lower socio-economic classes, while in others they are of higher social status. The quantity consumed also varies from person to person depending upon one's capacity and capability to drink. Besides it also depends upon the circumstances in which drinking is done (IARC 1988). In India, depending upon the type and pungency of the Indian made foreign liquors; it is consumed with ice, soft drinks, or with other beverages in various dilutions. In some instances it is consumed neat. Normally with this type of liquor people like to take, chips, fried cashew nuts and fried non vegetation items. Generally this type of liquor is beyond the purchasing capacity of the majority of the people. Toddy is a mildly alcoholic beverage. Generally toddy is consumed every day in the morning as it is brought down fresh from the tree. However some consumers drink it after 24 hours of fermentation. In either case, it is consumed alone except in some instances, where water is added. However, arrack is consumed neat. While drinking toddy or arrack, people like to eat prepared (with hot chillies) grams, peas or groundnuts. As is the case with other alcoholic beverages consumption varies markedly among individuals. Toddy and arrack are generally a poor man's drinks as they are cheaper than beer and even cost less than a soft drink in India. Owing to religious practice as well as other reasons, consumption of alcoholic beverages in India is restricted to a section of people: more men than women drink alcohol. In general, illicit liquor, toddy, or arrack consumption is more prevalent in low income groups because of the lower price than others. Epidemiological studies carried out in India have shown an association between bidi smoking, alcohol drinkers and cancers of oral cavity.

Conclusion

Cancer of the uterine cervix is a leading site of malignancy seen in Indian women. The studies carried out in different parts of the world and evaluated that mass scale cervical cytology is the most effective strategy for the control of this disease. The present study tried to study the reduction in the cumulative incidence rate of cervical cancer when one life time selective screening based on clinical symptoms and clinical diagnosis was carried out in order to further conserve the resources. It was observed that cumulative incidence rate of cancer cervix reduced by 17% when only high risk women at the age of 45 years were screened. This would prevent women of this great country who is dedicated to the care of the family from the morbidity and mortality due to cancer of uterine cervix.

Only a few descriptive studies on gastric cancer have been reported from India, and suggested that,

- Chewing (with or without tobacco) did not emerge as a risk factor of gastric cancer in either sex.
- Smokers, especially bidi smokers showed a two to threefold higher risk of gastric cancer in males

The risk of gastric cancer was increased with an increase in the number of bidis smoked indicating a dose-response relationship. Alcohol drinkers (of any beverage) showed a two to threefold increased risk of gastric cancer in males. Arrack drinking increased the risk of gastric cancer in males. The proportion of disease that could be attributed to alcohol drinking and/or smoking was more than 50% among males.

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