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OBSERVATIONAL RESEARCH ARTICLE

TOBACCO RELATED CANCER INCIDENCE - A TIME TRAVEL COMPARATIVE ANALYSIS BEFORE AND AFTER IMPLEMENTATION OF NATIONAL TOBACCO CONTROL PROGRAMME IN INDIA

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ABSTRACT

India's responsibility towards the arrangement, and progressively successful reduction in the usage of tobacco under "Cigarette and Other Tobacco Products Act" (COTPA) and "Framework Convention for Tobacco Control" (FCTC) prompted the introduction of the National Tobacco Control Program (NTCP) in 2007–2008. This study aimed to compare the incidence of tobacco related cancers before and after implementation of NTCP in India. All the sources which have the statistics on cancer incidence in India were identified and the data was extracted to compare the cancer incidences. Secondary data from the sources such as National Cancer Control Registry, Global adult tobacco survey report etc. were collected and tabulated. The results showed that the usage of smokeless tobacco has decreased to 17.6% in 2015 after the implementation of NTCP from 23.4% in 2005. Same way the prevalence in the usage of smoked tobacco has reduced considerably from 18.3% in 2005 to 11.9% in 2009 after the implementation of NTCP. In Mumbai, the number of cancer patients due to tobacco usage has decreased from 7642 to 3625. But in Chennai, the total number have increased from 2000-2014. By the analysis of incidence of tobacco related cancers and tobacco consumption in India, it is evident that the usage of tobacco products both smoke and smokeless tobacco consumption have decreased after the implementation of NTCP.

KEYWORDS: National Tobacco Control Program, tobacco related cancers, Comparison, Tobacco, India

INTRODUCTION

Oral Cancer is one among the significant issues in the India and it takes a position in the first three kinds of cancers in the nation[1]. It has a significant importance in terms of public health in India.

Age-balanced rates of oral malignant growth is high in India, for instance, 20 for each 100,000 people and records for about 30% of the tumours in the nation[2]. The variety in incidences and prevalence of the infections can be credited to the ageing of the people, just as territorial variations in the common disease specific high risk factors[3].

Basically, oral cancer is analysed at later stages which bring about low treatment results and extensive expenses to the patients who regularly can't afford this sort of treatments[4]. Prior discovery of oral malignant growth offers the most obvious opportunity for better prognosis and can possibly improve treatment results and make medicinal services affordable[5]. Oral diseases affects mainly those from lower financial status, that is, individuals from the lower financial strata of society because of a higher presentation to hazard factors, for example, usage of tobacco[6]. Furthermore, rural areas and low-income nations additionally have lacking access to skilled health care providers. Therefore, delay has additionally been to a great extent connected with end stages of oral cancers[7].

In 2003, India ordered the "Cigarette and Other Tobacco Products Act," known as COTPA, yet the greater part of its arrangements came in 2004. In 2004, India turned into a signatory to the Framework Convention for Tobacco Control (FCTC), drove by the World Health Organization. From 2007 to 2008 ahead, the usage of all tobacco control laws is under the National Tobacco Control Cell under the National Tobacco Control Program[8].

India's responsibility towards the arrangement, and progressively successful reduction in the usage of tobacco under FCTC and COTPA prompted the instigation of the National Tobacco Control Program (NTCP) in 2007–2008[9]. Initially created as a pilot venture in two areas in every one of nine Indian states[10], the NTCP was extended in 2008–2009 to cover an aggregate of 42 districts and 21 states and has been extended to 400 regions across India[11].

The key objectives of NTCP are improving the awareness about existing tobacco control laws and the destructive impacts of tobacco usage; and encourage powerful usage of tobacco control laws and strategies[9-10].

There is an improved awareness about tobacco products, and reduction in the usage of tobacco products post NTCP in India. This study aimed to compare the incidence of oral cancer before and after implementation of NTCP in India.

MATERIALS AND METHODS:

This study was conducted to compare the incidence of oral cancer before and after implementation of "National Tobacco Control Program" in India. Secondary data regarding the incidence of oral cancer from 2004-2019 was collected and analysed.

The study population included patients who registered themselves having cancer according to National Cancer Control Registry. All men and women having cancer were included to compare the incidence of cancer during the year 2004-2019, i.e. before and after the implementation of National Tobacco Control Program.

The inclusion criteria included all the patients who registered themselves in the cancer control registry during the period of 2004- 2019.

Secondary data regarding the incidence of cancer in men and women were collected and compared to see the effectiveness of National Tobacco Control Program. The incidence of cancer before and after 2007 i.e. after the implementation of National Tobacco Control Program was collected from different sources to do year wise comparison. Articles from different databases such as Pub Med, Medline, Scopus etc. using the keywords tobacco related cancers and National Tobacco Control Program were collected and included in the study.

All the sources which have the statistics on cancer incidence in India were identified and the data was extracted to compare the incidences. Secondary data from the sources were collected and tabulated.

RESULTS:

TABLE 1: INCIDENCE OF CANCER IN INDIA BEFORE AND AFTER NATIONAL TOBACCO CONTROL PROGRAM AMONG MALES AND FEMALES

Year	Incidences of cancer in Male	Incidences of cancer in Female	Total No. of Patients
BEFORE National Tobacco Control Program			
2005	40000	43000	83000
2006	40000	45000	85000
2007	42000	47000	89000
AFTER National Tobacco Control Program			
2008	44000	49000	93000
2009	454842	507990	962832

2010	462408	517378	979786
2015	55000	60000	110000
2019	58000	65000	123000

Source: Cancer India growth statistics[12]

Table 1 shows the Year wise Incidence of Cancer before and after NTCP in Males and Females. It shows that there is an increase in terms of cancer patients after 2008 that is after the implementation of NTCP.

TABLE 2: DISTRIBUTION OF TOBACCO RELATED CANCERS IN INDIA ACCORDING TO STATES

CANCER TYPE	HIGHLY AFFECTED STATE	MODERATELY AFFECTED STATE	LEAST AFFECTED STATE
Lung	Jammu and Kashmir, Delhi, Himachal Pradesh, Maharashtra, Rajasthan, Andhra Pradesh. W. Bengal	Manipur, Uttarakhand, Tripura , Jharkhand, Kerala	Nil
Cervix	Himachal Pradesh, Tamil Nadu, Haryana	Goa, West Bengal, Rajasthan	Punjab, Andhra Pradesh, Uttar Pradesh.
Stomach	Tamil Nadu, Goa.	Andhra Pradesh, Uttarakhand	Jammu and Kashmir, Arunachal Pradesh, Sikkim, Manipur, Nagaland
Oesophagus	Karnataka, Assam	Jammu and Kashmir	None
Oral cavity	Uttar Pradesh, Gujarat, Pondicherry, Orissa	None	Assam
Tongue	Goa, MadhyaPradesh	None	None
Oro-pharynx	Haryana, Meghalaya	None	None
Naso-pharynx	None	Manipur, Assam	None
Neck	None	Tripura	Uttarakhand
Larynx	None	Uttarakhand	None

Source: Cancer India growth statistics[12]

Table 2 shows the State-wise distribution of tobacco related cancers in India. It shows that the states highly affected with oral cancer in India are Uttar Pradesh, Gujarat, Pondicherry, Orissa. The least affected state in India with oral cancer is Assam.

TABLE 3: CANCERS COMMON AMONG MALE, FEMALE AND CHILDREN IN INDIA

Male	Female	Child
Oral Cavity	Oral Cavity	Leukemia
Oesophagus	Breast	Central nervous system and Brain related tumours
Leukemia	Thyroid	Lymphoma
Pharynx	Stomach	Wilms tumour
Stomach	Leukemia	Neuroblastoma
Lymphoma	Oesophagus	Bone Cancer
Lung	Ovary	Retinoblastoma
Brain and Nervous system	Cervix	Rhabdomyosarcoma
Liver	Pharynx	Osteosarcoma
Larynx	Lymphoma	Ewing Sarcoma

Source: Cancer India growth statistics[12]

Table 3 shows Cancer common among Men, Women and Children. Oral cancer is more prevalent in case of men as well as women in India.

TABLE 4: TRENDS IN THE PREVALENCE OF TOBACCO CONSUMPTION AMONG ADULTS IN INDIA BEFORE AND AFTER NATIONAL TOBACCO CONTROL PROGRAM

YEAR	SMOKELESS TOBACCO	SMOKED TOBACCO
Before National Tobacco Control Program		
1987	15.0 %	19.8 %
1993	13.2%	17.2%
1995	14.1%	17.6%
1998	17.2%	13.7%
2005	23.4%	18.3%
After National Tobacco Control Program		
2009	24.2%	11.9%
2015	17.6%	12.5%
2016	19.3%	8.6%

Source: Trends in tobacco consumption in India 1987–2016: impact of the World Health Organization Framework Convention on Tobacco Control. International journal of public health. 2019;64(6):841-51[13].

Table 4 shows the trends in the prevalence of tobacco consumption among adults in India before and after National Tobacco Control Program. It shows that the usage of smokeless tobacco has decreased to 17.6% in 2015 after the implementation of National Tobacco Control Program

from 23.4% in 2005. Same way the prevalence in the usage of smoked tobacco has reduced considerably from 18.3% in 2005 to 11.9% in 2009 after the implementation of National Tobacco Control Program.

TABLE 5: TOBACCO RELATED CANCERS IN MAJOR CITIES OF INDIA BEFORE AND AFTER NATIONAL TOBACCO CONTROL PROGRAM

YEAR	MUMBAI	CHENNAI	DELHI	BANGALORE
	Total number of persons			
2000-2004	7642	1288	7467	3219
2004-2005	5411	2622	5958	2401
2006-2008	8547	3254	6793	2955
2009-2011	5917	1046	7621	3213
2012-2014	3625	2217	5326	1905

Source: Ncdirindia.org[14]

Table 5 shows tobacco related cancers in India before and after National Tobacco Control Program. It shows that in Mumbai, the number of cancer patients due to tobacco usage has decreased from 7642 to 3625. In contrast, the total number of cases in Chennai has increased from 2000-2014.

DISCUSSION:

Tobacco use slaughters almost 6,000,000 individuals every year worldwide. According to World Health Organization (WHO), all inclusive, there were about 100 million unanticipated deaths due to tobacco in the 12th century. In case if the current pattern of tobacco usage proceeds, this number is required to ascend in the 21st century to 1 billion[15] in India; tobacco is a major public health burden. The total cancer cases due to tobacco usage are nearly 45% of cancer in males and 20% of cancers in females[16]. This study aimed to compare the incidence of tobacco related cancers before and after implementation of National Tobacco Control Program.

In the present study, table 1 shows the Incidence of Cancer before and after NTCP in Males and Females. It shows that there is an increase in terms of cancer patients after 2008 that is after the implementation of National Tobacco Control Program. The total number of cancer patients has increased from 83000 in 2005 to 123000 in 2019.Although the various tobacco control programs implemented in India should have reduced the usage of tobacco, there is a rise in cancer. This could be due to the flaws in planning and implementation of National Tobacco Control Program or might be the various other confounding factors too.

Tobacco is dangerous in any structure or camouflage. Logical proofs have unequivocally settled that usage of tobacco causes demise, infections and various disabilities[17]. According to the "International Agency for Research on Cancer" (IARC) monograph, there is enough evidence in human beings that smoking tobacco causes disease of the oral cavity, lung, oro, naso and hypo-pharynx, paranasal sinuses and nasal cavity, larynx, throat, pancreas, stomach, kidney, liver, urinary bladder, ureter, cervix and bone marrow. Colorectal malignancy supposedly is related with smoking cigarettes, although there are no sufficient evidences, for it to be the cause[18]. Such tobacco related cancers and their state-wise distribution in India are discussed in Table 2. The states highly affected with oral cancer in India are Uttar Pradesh, Gujarat, Orissa which might be due to habit of smoking and tobacco usage being high in these states. The study done by Goud ML et al[19] showed a significant association of tobacco chewing and oral disease with a direct connection with the amount and term of use proves these findings. Pednekar et al[20]. In their study in Mumbai unveiled that the frequency of oral malignant growths was 42% higher in bidi smokers than that of cigarette smokers. Same way these might be the reason for oral cancers being more prevalent among men and women in India according to table 3.

Results in table 4 show that the usage of smokeless tobacco has decreased to 17.6% in 2015 after the implementation of NTCP from 23.4% in 2005. Same way the prevalence in the usage of smoked tobacco has reduced considerably from 18.3% in 2005 to 11.9% in 2009 after the implementation of NTCP. This might be attributed to the 2013 ban of sale, manufacture and distribution of Gutka, a smokeless, chewed form of tobacco containing areca nut in various states of India such as Andra Pradesh, Tamilnadu, Maharashtra, Assam, Madya Pradesh and Gujarat. The implementation of pictorial warnings in cigarette packets under the Cigarette and Other Tobacco Products Act in 2003 and advertisements on the ill effects of tobacco usages could also be a reason[8].

In the present study, table 5 shows tobacco related cancers in India before and after National Tobacco Control Program. It shows that in Mumbai, the number of cancer patients due to tobacco usage has decreased from 7642 to 3625. Whereas in Chennai, the total number has increased from 2000-2014. These findings can be due to the high illegal availability of tobacco products in a major city like Chennai. Vidhubala E et al[21] in their study have reported that the ban on smokeless tobacco has been systematically

violated in Chennai city due to which there might be illegal availability of such tobacco products in large amounts, which can be regarded as a reason for such a finding in the present study.

The "Ministry of Commerce and Industry", Government of India under the "Tobacco Board Act" in 1975, initiated the Tobacco Board, replacing the "Tobacco Export Promotion Council". The Tobacco Board Act, 1975 aims at the development of Tobacco Industry in the country. It regulates the production of Virginia Tobacco with regard to the demand in India[22]. On the other hand, the "Ministry of Health and Family Welfare" have implemented National Tobacco Control Programme and the National Tobacco Control cell to control tobacco products in India. Inspite of rise in the usage of tobacco and tobacco related cancers in India; the government promoting the production of tobacco and tobacco industries is a menace. The fact that on one hand India promotes the production of tobacco promotion board for the high revenue in this field and on the other hand trying to control tobacco by implementing National Tobacco Control cell can be an act of duplicity. The revenue from tobacco products in India being 19255 crores is the major reason for the promotion of tobacco products in India. Direct medical expense of treating disease related to tobacco in India is about $907 million in case of smoked and $285 million in the case of smokeless tobacco. Promoting tobacco for its midget revenue and spending double the cost to treat its complication is vapid. It can be looked through as a total waste of time, money and energy. Strict action to ban tobacco products must be taken to rule out the deaths due to tobacco.

Public health awareness programmes, raising any mass development against usage of tobacco and cancer due to its use, sharpening and instructing all human services experts for tobacco control and educational programs on cancers, nursing educational plan, different CMEs, meetings, scientific meetings, workshops are being done in India but are not viable at all in a country like ours. There is a major difference between awareness, control and ban which is the understanding needed. Awareness could not help whereas control can slightly bring down the tobacco usage, but only bans on tobacco can halt this public health disaster. Strict bans on tobacco and its products can only be a panacea. The ban on Gutka, a smokeless, chewed form of tobacco containing areca nut in various states of India such as Andra Pradesh, Tamilnadu, Maharashtra, Assam and Gujarat must be implemented in all the other states also to bring down the cancers due to tobacco usage.

Tobacco usage is the leading cause of preventable deaths all over the world[23]. India has probably the most noteworthy pace of oral malignant growth on the planet, with over half of it from smokeless tobacco use[24].

Even after the implementation of strict tobacco control acts if the tobacco usage and cancer related to it have not reduced a considerable amount in India, then there might be other confounding factors which might be the cause for such cancer. Hence all such factors have been discussed in this study.

Environmental pollution in industrialized Western countries, concerns that air pollution is the main cause of lung cancer in the current day scenario. This is based upon the fact that some carcinogens are still being released into the external environment from sources such as industries, motor vehicles and power plants[25]. This could eventually be a confounding factor causing cancer in humans other than tobacco products.

Irrational use of pesticides in the food products has made it poisonous which can be the major cause for cancers in India. Arsenic, Benzene, Ethyl oxide, Formaldehyde and Sulfax used in turmeric, ethephon used to ripen mangos and chillis, are turning to be major cancer causing carcinogens. Organophosphate pesticides like fonofos, phorate, and parathion which are very harmful for the human body and are carcinogenic are being used in wheat crops[26]. These can be the potential reason for rise of cancer in India even after the implementation of strict rules and programs for the control of tobacco in India.

RECOMMENDATIONS:

Exact factors:

1. Public health awareness, different CMEs, meetings, scientific meetings, workshops are being done in India but are not viable at all in a country like ours. Strict bans on tobacco and its products can only be a panacea.
2. A strong ban on tobacco products, smoke or smokeless must be immediately implemented to overcome this public health burden of increasing tobacco related cancers in India.
3. Agricultural promotion of tobacco must be banned to stop its production such that the usage of addictive nicotine tobacco reduces.
4. Prohibition of smoking in public places which includes workplaces, shopping malls, airports, bus and train stations, hotels, cinema halls, shops and restaurants is a rule under COTPA, in-spite of which people smoke in public places which is the major problem concerned with second hand smoke which is affecting non tobacco users also. Strict

action must be taken against those who prohibit the law to reduce the cancers in India.

5. Strict implementation of COTPA rules must be done to reduce the usage of tobacco in India. Smoking in roads causing cancer to others due to second hand smoke must be punished severely. Road side shops selling tobacco products must be banned and punished.

CONFOUNDING FACTORS:

1. Pesticides that are banned in United States, Brazil and chine are still being used in India. All that should be banned. Organic farming must be encouraged and practiced by all the people to reduce the incidences of cancer due to pesticides. Food control officers must be appointed to control the adulterations in food which causes cancer.
2. Pollution control board must take action to reduce the pollution that is a major confounding factor causing cancer.

CONCLUSION:

By the analysis of incidence of tobacco related cancers and tobacco consumption in India, it is evident that the usage of tobacco products both smoke and smokeless tobacco consumption have decreased after the implementation of NTCP and in the same manner, the incidence of tobacco related cancers have declined in Mumbai, Bangalore and Delhi but has raised in case of Chennai. If the above recommendations or not followed and put into action, India might soon transform to be a graveyard of tobacco users.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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