

An epidemiological study on the risk assessment of Gutkha chewing habit in certain districts of Assam

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ABSTRACT

Gutkha is a form of smokeless tobacco, available in market as commercial preparation containing many unhealthy additives. The ingredients of gutkha are well documented to have toxic potential and thereby creating major risk to human health. The chewing habit is spreading at an alarming rate in the society, which becomes a matter of great concern. Therefore, the present project was undertaken with an objective to study the risks associated with gutkha chewing habit and to create awareness among people. The study was executed through the survey of retail stores in certain districts of Assam along with case studies of the chewers by using standard questionnaire. The data obtained from surveys depicted that the age group II (16-25 years) and group III (26-40 years) used gutkha in a regular basis. Out of 426 studied cases of Gutkha chewers, 270 cases were recorded as affected. The affected individuals developed several clinical symptoms viz. Stomach pain, burning sensation in mouth, buccal cavity ulceration, stimulant effect etc. The age group II (16-25 years) was found to be more prone to develop those symptoms depending upon the duration of chewing habit. Owing to the importance of this challenging situation caused due to gutkha uses, a thorough investigation in experimentation and detailed survey works are essentially required in this regard.

Keywords: Gutkha, Smokeless tobacco, Health hazards, toxicity, Assam

INTRODUCTION

In recent time, the tobacco and other intoxicating drugs have posed a serious threat to human health. A large number of tobacco products are available in the market and about 35-40% of the tobacco consumption in India is in smokeless form, mostly of the species *Nicotiana rustica* (Gupta & Ray, 2003). Among the large variety of smokeless tobacco, Gutkha become more popular and are extensively used by all kinds of people in the society. Different manufacturing companies commonly advertised these narcotic products in a lucrative form through media for earning profit and thereby make it easily available to the people. On account of its easy access and low price, these products are consumed by all age groups irrespective of male and female. Indian moral values do not permit smoking for the women or young groups. However, there is no such limitation for using smokeless tobacco. As a result, it is now commonly prevalent among the women and teenagers as a regular habit. The chewing habit of tobacco in any form generally begins at an early age and gradually people become addicted with attainment of adulthood. Therefore, it causes a high risk to human health.

Recent studies had indicated that India is facing a serious public health challenge due to increased trend of oral cancer caused by consumption of Gutkha and Pan Masala. Pan Masala is basically a preparation of areca nut, catechu, cardamon, lime and a number of natural

and artificial perfuming and flavoring materials. Gutkha is a variant of pan masala, in which in addition to these ingredients flavored chewing tobacco is added. People often referred it as mouth freshener as well as a stress-diverting, pleasure producing product, which being poisonous victimizes the people irrespective of caste, class, age, gender and social status. It has been estimated that about 5 million young Indians are suffering from Oral Submucous Fibrosis (a disease which is precursor of oral cancer) as a result of increased popularity of habits of chewing Gutkha and pan masala (Nair *et al.*, 2004). Tobacco, the most harmful ingredient present in *gutkha* contains more than 4000 chemicals in it like nicotine which is always a risk-factor for oral cancer (Nayak, 2011). The physical consequences of using gutkha on the oral cavity ranges from initial tobacco stains on tooth and periodontal diseases to life threatening oral cancer (Mathur *et al.*, 2009) preceded by Pre-malignant red and white lesions. (Aruna *et al.*, 2010). Gutkha chewing may also cause cardiovascular diseases, disease of respiratory tracts and cancer of lung, oral cavity, liver, kidney, bone marrow and so on (Lopez *et al.*, 2006).

In order to reduce the hazards associated with the consumption of gutkha and other tobacco products, the Govt. of India had enacted the "Cigarette and other tobacco products [Prohibition of advertisement and Regulation of Trade and Commerce, Production, supply and

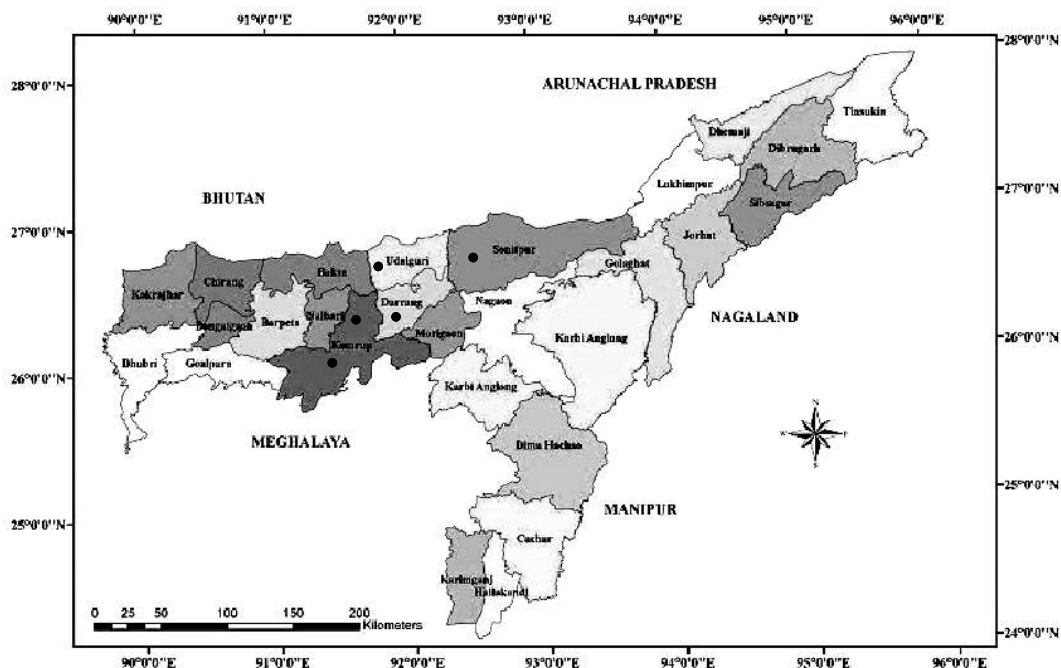


Figure 1. Location map of study areas (the dotted area indicates the districts where the study had conducted)

distribution] Act” (COPTA) as a multi measure law in 2003 (Ministry of law and justice, Govt. of India, 2003). Recently, the State Health and Family welfare department of Government of Assam has also enacted "Assam Health (Prohibition of Manufacturing, Advertisement, Trade, Storage, Distribution, Sale and Consumption of Zarda, Guthka, Pan masala etc., containing Tobacco and/or Nicotine) Act, 2013. But, in actual practice, these regulations are unable to tackle the problem due to lack of proper execution and awareness of people. As a result, a large scale human exposure is going on through consumer route which may bring severe

hazards to mankind. It will also cause deterioration of social values and instability in economic development in the society.

Keeping in view the above scenario, there is a strong need of thorough study that focuses on the overall problem dimension associated with gutkha chewing habit. Although, a few epidemiological studies have been conducted in some areas of India, but a detailed study in Assam has not been conducted so far. Therefore, the present study was undertaken with an aim to survey the level at which Gutkha and related products are being consumed by the people in certain districts of Assam. It was also aimed to study the development of

physical ailments by the chewers, if any.

METHODOLOGY

A survey study was performed among the people in certain districts of Assam viz. Darrang, Kamrup (Metro), Kamrup (Rural), Sonitpur and Udalguri district. The survey study was carried out in two phases. The first phase of study was conducted through a survey of different available sample of gutkha from sellers and retailers of selected area. It was carried on 550 numbers of retailers and sellers of chewing tobacco products by using standard bilingual questionnaire (English and Assamese). The questionnaire emphasized some important questions like the age group of customers, whether he/she is a regular or occasional customer, different available brands of smokeless tobacco, name of the largest selling brand, whether there is any significant difference between the previous and current market scenario etc. The location of the retail stores and its distance from the nearby educational institute was also noted down.

In second phase of survey, randomized case studies were carried out from the consumers of Gutkha and related products to know the presence or absence of any physical ailments. The study was conducted from May 2012 to June 2013 through standard bilingual questionnaire followed by personal interview. A total of 426 numbers of cases were studied during that period of time and emphasis was given

on both male and female. Prior to investigation the details of the questionnaire and objective of the study was clearly explained to the people in each cases who have voluntarily participated in this programme. The investigation was conducted on the basis of different duration of exposure and various age groups of both sexes. Three different terms of exposure were taken into consideration as-Immediate exposure (within 15 days), short term (1-3 years) and long term exposure (3-10 years and above). During the period of survey work, the consumers were divided into four age groups that includes Group-I (10-15 years), Group II (16-25 years), Group-III (26-40 years) and Group-IV (above 40 years) respectively.

The questionnaire used in this study contained a set of questions enquiring about the frequency of consumption of gutkha and pan masala product on daily basis, whether having any habit of taking alcohol or other narcotics, types of smokeless tobacco brand used, whether consumed for short term or long term period, health condition before and after consumption, any kind of health effect observed after short term and long term consumption, whether the habit is withdrawn or not, development of withdrawal symptom if any and so on. Cases were evaluated on the basis of presence of different physical ailments and their intensity in relation to different age group and exposure of gutkha.

RESULTS

Market Survey:

A total of 550 numbers of retail shops were visited during the survey study. Among these studied cases, ‘Sikhor’ was found to be the largest selling brand of gutkha in 478 retail shops. It was found that the age group –II (16-25 years) and group-III (26-40 years) were the most regular customers. The details of total number of studied retail stores in different districts with age group wise distribution of regular customers and their percentage are given in table 1. No significant difference had found in case of male and female consumer.

It was also found that lower income and middle income group people used these products most frequently. However, the higher income group of people also purchased it. A large number of school/

college going students were found to be the regular consumer of gutkha and other pan masala products. It had also found that some of the retail stores were located within an area of 200 meter from its nearby educational institution by violating government rule. It may be considered as a major risk factor for the students. The sellers and retailers regularly purchased those chewing products from different places within the state. At present, in Guwahati city, many companies are involving in manufacturing and distribution of Gutkha and pan masala products. The Government laws remain vague. According to the sellers and retailers, a significant difference has seen between the previous and present market scenario regarding sell of these products. Their sell and profit increases manifold with the increasing popularity of gutkha and related products.

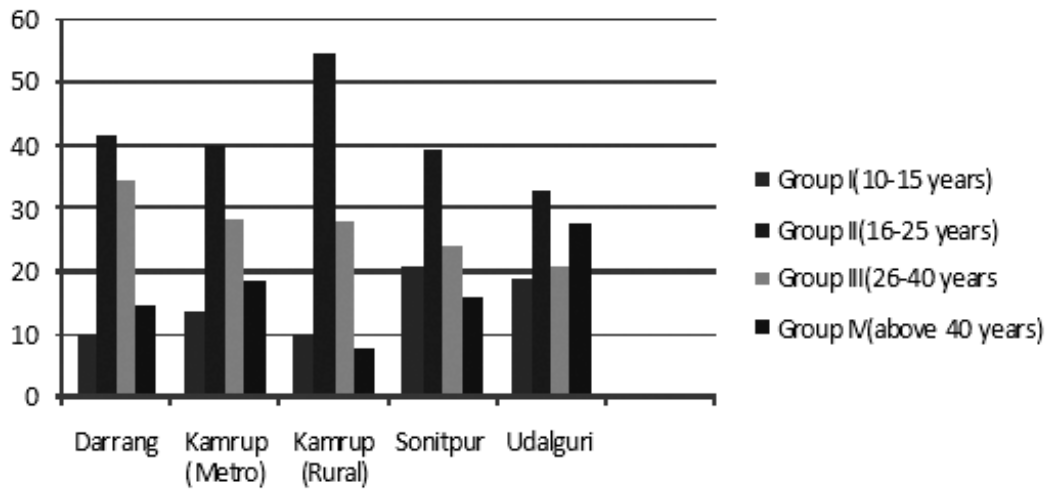


Figure 2. shows age group wise distribution of regular consumers of gutkha in different districts

Table 1. shows district wise distribution of studied retail stores and group wise percentage of regular consumers

Name of the district where the survey conducted	Total no. of retail stores studied	Name of largest selling brand	Regular consumer group (in percentage)			
			Group I (10-15 yrs)	Group II (16-25 yrs)	Group III (26-40 yrs)	Group IV (Above 40 yrs)
Darrang	163	Sikhor , Tulsi, Rajnigandha	16(9.8%)	68(41.7%)	56(34.3%)	23(14.1%)
Kamrup (Metro)	148	Sikhar, Wiz, Rajnigandha	20(13.5%)	59(39.8%)	42(28.3)	27(18.2%)
Kamrup (Rural)	93	Sikhar, Tulsi, Ranjnigandha	9(9.6%)	51(54.8%)	26(27.9%)	7(7.5%)
Sonitpur	88	Sikhar	18(20.4%)	35((39.7%)	21(23.8%)	14(15.9%)
Udalguri	58	Rajnigandha, Sikhar	11(18.9%)	19(32.7%)	12(20.6%)	16(27.5%)

Result of Case Studies:

A total of 426 cases were personally interviewed, out of which 318 cases were Gutkha chewers. Among those cases, 188 cases were recorded as affected and 130 cases were recorded as normal unaffected cases with chewing habit of gutkha. The details of affected and non affected cases with their different age group and percentage are given in the table 3. During the study, emphasis was also given in some of the risk habits, which may affect the consumer individually or in combination. The details of the risk habits according to the gender and age are represented in table 2. Among those cases 67.6% cases represent male and 32.3% cases are females. It is obvious that combination of two or more risk habits is more harmful for the consumers.

During the period of study, cases were evaluated for presence or absence of any physical ailments or any health effects, the details of which are incorporated in table 4. Persons with gutkha chewing habit were

taken into consideration. An average of 2-12 sachets were recorded to chewed daily in different cases. Maximum percentage of affected cases were recorded in age group II (16-25 years) and group III (26-40 years) showing 60.1% and 63.2% respectively. Again, mostly affected cases were found in the cases having exposure duration of 3-15 years. Health effects mostly reported were nausea, vomiting, gastrointestinal problems, burning sensation in mouth, loss of appetite, stomach pain etc. Some cases were also recorded to have effect on nervous system viz., stimulant effect, impaired coordination, tremors of hands and legs, slurred speech and giddiness in both short term and long term exposure duration. Most of the individuals became addicted to these chewing products. Besides, many of them reported about the development of withdrawal symptoms when the habit was withdrawn.

The gutkha chewers were assessed according to the type of risk habits viz. A) gutkha only, B) gutkha with betel quid C)

gutkha with pan masala, betel quid and tobacco, D) gutkha with Smoking habit, E) gutkha with Alcohol , and F) Gutkha with both smoking and alcohol habit. Factorial scores were given in a graded manner from group A to group F on the basis of different factors relative to the no. of affected cases (Table 5). Out of those studied cases, the highest percentage of affected individuals were recorded in group F (68.1%) having most of the factors. Despite of having minimal factors, the group A showed 65% affected cases , which indicated the high risk associated with gutkha chewing habit. The group E obtained greater factorial

score but comparatively lower percentage of affected individual. The table 5 represented that the chewing habit of Gutkha singly or with other chewing products and narcotics is strongly associated with several health effects. Among the affected cases, group A, B and C individuals were found to develop certain clinical symptoms as shown in the table 4. The other groups ie, Group D, E and F individuals developed problems in digestion, stomachache, Liver infection, heart burning, oral cavity ulceration, Tremors of hand and legs etc.

Table 2. shows details of the risk habit according to gender and age

Risk habits		Male	Female	Age group			
				10-15	16-25	26-40	Above 40
Chewing	Betel quid	31	29	12	15	11	22
	Pan masala	93	64	21	57	46	33
	Gutkha	149	76	44	89	62	30
	Tobacco	88	23	09	23	37	42
	Betel quid + Pan masala	19	16	06	08	09	12
	Betel quid + Gutkha	42	19	04	16	29	12
	Pan masala + Betel quid +	23	09	02	10	13	07
Smoking	42	11	08	11	27	07	
Alcohol	56	18	10	15	21	28	
Chewing + Smoking	27	06	03	13	05	12	
Chewing + Alcohol	37	08	04	16	12	13	
Smoking + Alcohol	28	05	02	09	08	14	
Chewing + Smoking + Alcohol	19	03	--	07	06	09	

Table 3. shows details of individuals with Gutkha chewing habit

Age group	Total no. of	Total no. of	% of affected	Total no. of	% of unaffected
Group-I (10-15 years)	56	33	58.9	23	41.07
Group-II (16-25 years)	118	71	60.1	47	39.8
Group-III (26-40 years)	98	62	63.2	36	36.7
Group-IV (Above	46	22	47.8	24	52.17
Total	318	188		130	

Table 4. shows the details of duration of Gutkha chewing habit and physical ailments according to age groups

Age group (In years)	Total no. of studied cases of people	Total no. of affected cases	No. of sachets of Gutkha chewed per day	Duration of habit	After initial exposure (within 15 days)	Health effects		
						After short term exposure (1-3 years)	After long term exposure (3-10 years and above)	
Group I (10-15)	56	33	05	2-5	0-15 days	Nausea, Vomiting, Dysentery, Stimulant effect	Increased appetite, Stomach pain, Abnor- mality in work	Stomach pain, Burning sensation in mouth after meal, Trem- ors of hands and legs, mood swings
			12	3-10	1-3 years			
			16	3-15	3-15 years			
Group-II (16-25)	118	71	08	2-6	0-15 days	Vomiting, confusion during work, stimulant effect	Gastritis, Indigestion, Ulceration in buccal cavity (a few case), hyperactivity	Increased appetite, Giddiness, Burning sensation in mouth, ulcer in buccal cavity,
			26	2-12	1-3 years			
			37	3-16	3-15 years			
Group-III (26-40)	98	62	07	2-8	0-15 days	stimulant effect, vomiting, constipation	Decreased body weight, Gastritis, stomach pain, Abnormality in work	Burning sensation inside mouth, ulceration, decreased appetite, giddiness, gastrointestin al problems
			28	2-10	1-3 years			
			27	2-20	3-15 years			
Group-IV (Above 40)	46	22	04	1-5	0-15 days	Stimulant effect on body, confusion, giddiness	Stomach pain, burning sensation in mouth after food, Abnormality in work	Ulceration in buccal cavity, Hallucination. Slurred speech, Burning sensation in mouth after food, tremors of legs and hands
			08	2-12	1-3 years			
			10	2-16	3-15 years			
Total= 318			Total= 188					

Table 5. Affecting factors, scores and no. of affected cases percentage wise

Groups	Factors	Scores	Total no. of studied cases	No. of affected cases	Percentage of Affected cases
A	Gutkha Only	2	225	148	65.0%
B	Gutkha+ betel quid	4	61	22	36.06%
C	Gutkha+pan masala+Betel quid+ tobacco	6	32	18	56.25%
D	With gutkha chewing habit+ Smoking habit	8	33	19	57.5%
E	Gutkha Chewing habit + Alcohol	10	45	23	51.1%
F	With Gutkha Chewing+ smoking+ Alcohol habit	12	22	15	68.1%

DISCUSSION

In the modern age, people are exposed to a number of harmful products as part of their lifestyle. Presently, Gutkha and pan masala products are used by all kinds of people in our society and its popularity and uses are on increasing trend due to easy availability and low price of it. Despite the pictorial health warnings and Governments restriction against it, people are unaware of the health risks associated with these chewing products. The present project was undertaken to study the epidemiology of gutkha chewing and to evaluate the health hazards caused by it. The analysis of the case studies revealed the occurrence of various physical ailments like gastrointestinal diseases, stomachache, vomiting etc., which may be due to the presence of harmful ingredients present in the swallowed juice of gutkha or pan masala by the chewer. According to Nigam *et al.* (2001), unlike the tobacco chewers who spit out the juice, pan masala users often swallow the saliva extract and thereby increasing possibility of carcinogenic effect at sites other than oral cavity. Besides,

various types of fungi, including *Aspergillus* sp. were isolated from pan masala which in turn produce aflatoxin that may cause liver carcinogenicity (Mishra & Nigam, 1991).

Other health effects on chewers as recorded in this study were giddiness, tremors of legs and hands, slurred speech, impaired coordination, mood swing and confusion. These may be result of the action of neurological interfering factors present in these chewing products. In some cases of short and long term exposure duration, it was seen that burning sensation and ulceration in buccal cavity had developed. The carcinogenic substances present in gutkha and pan masala may responsible for such changes. The major carcinogens in gutkha are derived from their ingredients – areca nut, catechu, lime, tobacco and flavorings (Nair *et al.*, 2004). The mutagenic, clastogenic and carcinogenic properties of areca nut have been extensively studied in a variety of experimental systems (Jyoti *et al.*, 2012). It contains arecoline and a number of phenolic compounds that are responsible

for the development of proliferative lesions and carcinogenicity. Catechu contains tannin and polyphenols which have mutagenic property and Clastogenecity (Giri *et al.*, 1988). Lime is another component of gutkha that is mainly responsible for generation of Reactive Oxygen Species (ROS) in mouth cavity. The ROS concentration may increase in oral cavity as soon as the areca nut and catechu polyphenols together with slaked lime dissolve in the saliva (Jyoti *et al.*, 2011). The tobacco of gutkha has been found to leaches out various Tobacco Specific Nitrosamines (TSN) in higher concentration, when kept in mouth. These TSN may undergo metabolic activation by cytochrome P450 and may lead to the formation of N-nitrosornicotine (NNK), a major carcinogen (Jyoti *et al.*, 2011). Its further activation leads to DNA damage and may cause cancer of respective organs. Pan masala has all other ingredients except tobacco and therefore, it has the potential to cause such effects on human health.

The result of the study also revealed that there was minor difference between male and female consumers. More males (67.6%) than females (32.3%) use these chewing products. The males are generally under stress due to their jobs and other problems use gutkha more than the females to find relief from the stress. The ingredients of gutkha may affect the reproductive system of male and female

and may lead to infertility problem. A study on reproductive toxic potential of pan masala by Kumari *et al.* (2011) supported this as it revealed about testicular damage, decreased sperm count and decreased 17 α -hydroxysteroid dehydrogenase activity, when tested in swiss albino mice. Epidemiological studies also showed that gutkha induces a very high risk of still birth when used by pregnant women.

Use of Gutkha and pan masala represents a complex phenomenon which has various socio-cultural, biological, economic and environmental aspects. These smokeless tobacco products are often referred as mouth freshener and its use has increased rapidly throughout the world in recent years especially among teenagers and young people. Because of vigorous efforts toward increasing awareness of the adverse effects of the tobacco, smoking has declined paradoxically and the use of SLT (Smokeless tobacco products) has greatly increased. Smokeless tobacco is now considered as safe alternative of smoking and Betel quid chewing (Pramanik, 2012). As the trend of betel quid chewing is now replaced rapidly by these new chewing substitutes ie. Gutkha and 'Pan Masala', there is possibility of oral cancer epidemic in near future due to absence of betal leaf and the much higher dry weight of Gutkha and Pan masala ingredients (Yadav and Chadha, 2002).

CONCLUSION

The consumption of tobacco products are responsible for about 5 million deaths annually mostly in our country. The toll will be doubled in 20 years unless available and effective interventions are urgently and widely adopted. On the other hand, it is one of the preventable causes of death by creating awareness among people. It is high time to save the individual in particular and the society in general for a healthy and a wealthy society. The present study was conducted not only to study overall problem dimension regarding Gutkha and related products but also to create consciousness among the general people. It can be concluded that active awareness among the people is inevitable to save the situation and society as a whole.

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