A Comparative Study of Prevalence of Hypertension among Tobacco Consumers in Adults of Rural and Urban Field Practice Area of a Private Medical College and Hospital, Bangalore

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Conflict of interest: Nil

Abstract:

Background: According to WHO, tobacco kills more than 1 million people each year in India, accounting for 9.5% of all deaths. The death toll is increasing, as the estimated 1 million tobacco-related deaths in India in 2018 compares to about 930,000 adult deaths in 2010. Smokeless tobacco has made a resurgence in the United States and other developed nations since the 1970s. Because of vigorous efforts toward increasing awareness of the adverse effects of tobacco, smoking has declined consistently over the last 30 years; paradoxically, the use of "snuff" and smokeless tobacco has greatly increased.

Aim and Objective: To estimate the Prevalence of Hypertension and the risk factors associated among Tobacco consumers in adults of the Rural and Urban field practice area of RajaRajeswari Medical College and Hospital (RRMCH), Bangalore.

Materials and Methods: A Cross Sectional study was conducted on 675 Rural subjects (18 years and above) and 500 Urban subjects (18 years and above) during January 2019 to June 2020 through multistage sampling method. The participants were interviewed using a pretested structured standard questionnaire to obtain data on Tobacco consumption, Demographic data, Dietary history, medical history in adults. The data was collected and compiled in MS Excel and analyzed by using SPSS software version 24.0.

Results: In this study it is observed that In the Urban study subjects, the association between Tobacco and Hypertension consumption was significant with Chi-square $(X2) = 11.1$; $DF = 2$; $p = < 0.05$.

Conclusion: We should note that tobacco smoking is also one of the main preventable causes of hypertension and myocardial infarction. The long-term effects of smokeless tobacco use on blood pressure levels seem to differ depending on the user's age and level of physical activity and on the amount of different forms of tobacco used.

Keywords: Prevalence Studies, Hypertension, Risk Factors, Tobacco Consumption, Cardiovascular Diseases.

Introduction

Tobacco use kills nearly six million people worldwide each year. According to the World Health Organization (WHO) estimates, globally, there were 100 million premature deaths due to tobacco in the 20th century, and if the current trends of tobacco use continue, this number is expected to rise to 1 billion in the 21st century[1]. The World Health Organization, Framework Convention on Tobacco Control (WHO FCTC) is a global public health treaty developed as a global response to the globalization of the tobacco epidemic, which aims at reducing the burden of disease and death caused by tobacco.

The hypertension and tobacco smoking are two major modifiable risk factors for Atheromatous disease and its cardiovascular complications.[2] Smoking leads to disease and disability and harms nearly every organ of the body.

Blood pressure levels are affected by the high sodium content of smokeless tobacco, as well as by [2] its pharmacologically active ingredients: nicotine and licorice. The sodium content differs among brands, and an increase in 24-hour urine sodium excretion by as much as 26 to 41 mEq/L has been demonstrated after the ingestion of several different types of smokeless tobacco.

According to Centre for Disease Control and Prevention (CDC) [3] Second hand smoke exposure contributes to approximately 41,000 deaths among non-smoking adults and 400 deaths in infants each year. Second hand smoke causes stroke, lung cancer, and coronary heart disease in adults. Children who are exposed to second hand smoke are at increased risk for sudden infant death syndrome, acute respiratory infections, middle ear disease, more severe asthma, respiratory symptoms, and slowed lung growth.[4]

Tobacco smoke contains various toxic substances liking nicotine, tar, acetone, hydrogen cyanide and many more as such. These are known to cause a rise in blood pressure. Beedi is a common smoking product in which tobacco is rolled in Diospyrus melanoylon leaf which is widely used among low social economic groups in India.

Materials and Method

Study Design and Study Setting

A Cross sectional study was conducted in Urban and Rural field practice area of Rajarajeswari Medical College and Hospital (RRMCH), Bangalore, Karnataka, India from January 2019 to June 2020. The Rural population under RRMCH, is about 8282 and total number houses are 2101. The Urban area, included layouts of Rajarajeswari Nagar, Municipal Ward Number 160, Bruhat Bengaluru Mahanagara Palike (BBMP). The total population is about 7745 people with about 5291 people who are aged 18 years and above (as per voters list).

Participants of the Study

Considering the study done by Ismail I.M4, May 2016 the Prevalence of Hypertension in Urban is 23% and the prevalence in Rural is 18% was considered for this study to calculate the sample size. The sample size is calculated with an Allowable Error of 18%.

This study was conducted, based on the formula (n = 4PQ/L2), Where: n = required sample size, L=allowable error, P=prevalence. Furthermore, giving due allowance to non-response of 20%, Hence sample obtained was 500 for Urban subjects and 675 for Rural subjects. Total subjects are 1175.

Sampling Method

The following stages were adopted for the selection of the study subjects in Rural and Urban population.

Rural: Chunchanakuppe, South Bangalore, Karnataka, India.

First stage: All 25 villages were considered.

Second stage: 27 houses were selected from each village (Chunchanakuppe) by Simple Random sampling technique using Lottery chit method. In case the houses were locked then the very next

houses were considered for the study and consent was also taken from them.

Third stage: 675 adults were selected.

Urban: Ward 160 of Rajarajeshwarinagar South Bangalore, Karnataka, India

First stage: 10 layouts were considered under ward 160 under RRMCH using convenient sampling technique.

Second stage: From each layout, 50 houses were selected using simple random sampling by lottery chit method.

Third stage: 500 adults were selected.

In case houses were locked then the very next houses were considered.

Tools and Technique

In this study the instruments used included the Physical instruments (Mercury Sphygmomanometer, Stethoscope, Weighing machine (accurate to 0.5 kilogram), Measuring tape) and a Questionnaire which is pre-tested, semi-structured Questionnaire was used. This is taken from the WHO STEP-wise approach to Surveillance (STEPS). The subjects were interviewed in vernacular language for about 55 minutes for each subject. Socio demographic data and risk factors (Alcohol consumption, Tobacco consumption, Diet history, Family history of diseases, Obesity) of Hypertension were assessed by interviewing the subjects with the help of a pre designed and pre texted Performa. [5] Assessment of Prevalence of Hypertension and its association with the risk factors (Tobacco consumption) were done. Hypertension is defined according to the Joint National Committee – Seventh6. Blood pressure was measured first by Palpatory method and then by Auscultatory method, by using a standardized Mercury Sphygmomanometer. Anthropometric measurements: such as Weight (accuracy to 0.5 kg) were measured by Omron digital machine. The Height (accuracy to 0.1 cm) was measured using a non-stretchable measuring Tape. The Waist circumference (in centimeter) was measured using a standard non stretchable measuring tape. The measuring tape was fitted snugly at the level midway between the lower rib margin and the iliac crest. Measurement was taken at the end of the normal expiration with the arms relaxed at the sides. The Hip circumference was measured by using the non-stretchable measuring tape. Before measuring the subjects, they were asked to stand with their feet fairly close together and their weight equally balanced on each feet. The measurements were taken at the widest part of the hip. The BMI (Body Mass Index) obtained, were classified according to Asian classification and WHO classification. Waist to Hip circumference (WHR) was determined by taking the

ratio of Waist circumference to Hip circumference.[6]

Tobacco[5,7]:

Current User[5,7]: Someone who smokes or uses tobacco product every day except on exceptions such as days of religious fasting or during acute illness during past one year.

Non-User: Individuals who have never consumed Tobacco products (smoked or smokeless) in their lifetime.

Past User: A past user is defined as someone who has consumed previously but not during the past one year preceding the survey.

Smoker: A Smoker was defined as someone who at the time of survey has smoked any Tobacco product.

Amount of Cigarettes, Beedis per day and the duration of smoking were also recorded.

Light Smoker: < 5 Cigarettes / Beedis per day

Moderate Smoker: 6 to 20 Cigarettes / Beedis per day

Heavy Smoker: > 20 Cigarettes / Beedis per day

Smokeless Tobacco Consumers: An individual who has consumed Gutka, Tobacco lime, Snuff available in wet and dry form, Paan-parag, Khaini, Jardah, Beetal nut/Quidor tobacco in any other chewable form were considered as smokeless tobacco consumers.

Smoked Tobacco Consumers: An individual who has Smoked Cigarettes, Hand rolled cigarettes, Pipe, Chuttas, Dhumtis, Cigar, Hookah, Shisha or tobacco in any other smoked form were considered as smoked tobacco products

Operational Definition Of Hypertension: JNC-7

Hypertension: is defined when Systolic Blood Pressure ≥140 mm Hg or Diastolic Blood Pressure≥ 90 mm Hg. The study subjects were classified as Pre-Hypertensive, Stage-1 Hypertension, Stage-2 Hypertension based on the Joint National Committee -7 criteria.[6]

Normal is defined: persons with Systolic Blood Pressure < 120 mm Hg AND Diastolic Blood Pressure < 80 mm Hg is considered.[6]

Pre- Hypertension: persons with Systolic Blood Pressure within 120 - 139mm Hg or Diastolic Blood Pressure within 81 – 89 mm Hg were considered.[6]

Stage-1 Hypertension: persons with Systolic Blood Pressure within 140 – 159mm Hg or Diastolic Blood Pressure within 90 – 99 mm Hg were considered.[6]

Stage-2 Hypertension: Persons with Systolic Blood Pressure ≥ 160 mm Hg or Diastolic Blood Pressure ≥ 100 mm Hg were considered.[6]

Inclusion and Exclusion criteria

All adults, 18 years and above in Urban and Rural areas of RRMCH, of who were permanent residents and also residents staying for more than 6 months were considered. Pregnant women, persons less than 18 years and those not interested in the study were excluded.

Ethical Approval

Ethical approval was obtained from the Institution Ethical Committee. This study did not involve any interventional methods. The family members were explained about the purpose of the study and the consent form was given in Kannada and English Languages respectively to obtain it from the participants.

Statistical Analysis

All the data collected was compiled and entered in Microsoft Excel worksheet and analyzed using the Microsoft Excel worksheet and SPSS (Statistical Package for Social Sciences) software v.24.0. Descriptive statistics and tests of Significance like Chi-square test were used as required. All the qualitative variables were presented as frequencies and percentages. To find the risk factors, Odd's Ratio was used to find out the association of various risk factors with Hypertension.

Results

In the study, out of 1175 subjects, 759(64.6%) are Male subjects and 416(35.4%) are Female subjects. Majority of the study subjects are Married: 1024(87.15%), while Unmarried are 85(7.23%) and Divorced and separated are 66(5.62%). Majority of them are Hindus with 957 (81.4%) of the total subjects, followed by Muslims 157(13.4%) and Christians with 61(5.2%).

Most 586(49.9%) of the subjects are living in a Nuclear family. In Rural area, subjects living in a Joint family were 190(28.1%) compared to Urban area, 119(23.8%) subjects who were living in the Joint family. In Urban area, 393(78.6%) of the subjects are having Pucca house compared to 485(71.9%) in Rural area. The overall majority of the people in the study are having a Pucca house 878(74.7%), followed by 133(11.3%) who have semi pucca and 164(14%) have a Kutcha house. , In the Rural area, majority 264(39.1%) of the subjects were of the age group 32-45 years, in which Male subjects 213(48.3%) were higher than Female subjects 51(21.8%). In the Urban area, majority 230(46%) of the subjects were of the age group 32-45years, in which Male subjects 166(52.2%) were higher than Female subjects 64(35.2%). In Rural area, 15.1% of the study subjects have had education

till Intermediate, 7% are Graduates and 1.3% of them are Post Graduates. 7.2% Females are Graduates and 1.2% are Post Graduates. Similarly in the Urban area, 46(9.2%) of the study subjects are educated till Middle school, 10.6% are Graduates and 6.6% are Post graduates. According the Modified B G Prasad classification, Overall 43% of the study population belong to Lower class, 21% belong to Upper Middle class, 6% belong to the Middle class and 17% belong to Lower Middle class.

In this study, Smokeless Tobacco were consumed by 38 (22%) of age group 18 to 31 years and 78 (45%) of age group 32 to 45years. With the age group 61 to 75 years also consumed smokeless Tobacco were 24 (14%). Smokeless included were – Beedi, Gutka, Jardah, Chuttah.

In this study, the Rural area consisted of 365(54.1%) of the study subjects who were Non-smokers; 75(11.1%) were Ex-smokers and 235(34.8%) are Current smokers.

In this study, the Urban area consisted of 183(36.6%) of the study subjects who were Non-smokers; 22(4.4%) were Ex-smokers and 295(59%) are Current smokers. Overall both Rural and Urban areas, the study subjects show overall 45.1% of Current Smokers. Current smokers are higher in Urban subjects (59%) compared to (34.8%) Rural subjects. Non-smokers are higher in Rural subjects (54.1%) compared to (36.6%) Urban subjects.

In the Urban study subjects the Tobacco consumption in Ex users (Past consumed) have ODDs of 4.15 times risk of developing hypertension than non-users of Tobacco and the difference is significant (p = 0.002). In the Rural study subjects, the Tobacco consumption was not significantly associated with hypertension. The ODDs for Hypertension among Current users are 1(Rural) and 1.49 (Urban) times risk than that of Non users, but not significant among Rural (p= 0.986) and Urban (p = 0.06).

Table 1: Distribution of study subjects according to age group and sex in rural area

AGE (years) Range	RURAL		TOTAL (N=675) (%)
	MALE (n=441) (%)	FEMALE (n=234) (%)	
18 - 31	99(22.4%)	92(39.3%)	191(28.3%)
32 - 45	213(48.3%)	51(21.8%)	264(39.1%)
46 - 60	76(17.2%)	58(24.8%)	134(19.9%)
61 - 75	51(11.6%)	24(10.3%)	75(11.1%)
76 - 80	2(0.5%)	9(3.8%)	11(1.6%)

In the Rural area, a majority of 264(39.1%) of the subjects were of the age group 32-45 years, in which Male subjects 213(48.3%) were higher than Female subjects 51(21.8%) .
In age group 18-31 years, there are 191(28.3%) in which the Female subjects 92(39.3%) were higher than Male subjects 99(22.4%).

Table 2: Distribution Of Study Subjects According To Age Group And Sex In Urban Area

AGE (years)	URBAN		TOTAL (N=500) (%)
	MALE (n=318) (%)	FEMALE (n=182) (%)	
18 - 31	88(27.7%)	59(32.4%)	147(29.4%)
32 - 45	166(52.2%)	64(35.2%)	230(46%)
46 - 60	45(14.2%)	38(20.9%)	83(16.6%)
61 - 75	17(5.3%)	18(9.9%)	35(7%)
76 - 80	2(0.6%)	3(1.6%)	5(1%)

Table 2, In the Urban area, majority 230(46%) of the subjects were of the age group 32-45years, in which Male subjects 166(52.2%) were higher than Female subjects 64(35.2%).
In age group 18-31 years, there are 147(29.4%) in which the Female subjects 59(32.4%) were higher than Male subjects 88(27.7%). There are 20.9% of female subjects in the age 46-60 years as compared to Males which are 14.2%.

FIGURE A. PIE CHART REPRESENTATION. DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO TOBACCO CONSUMPTION IN RURAL AREA.
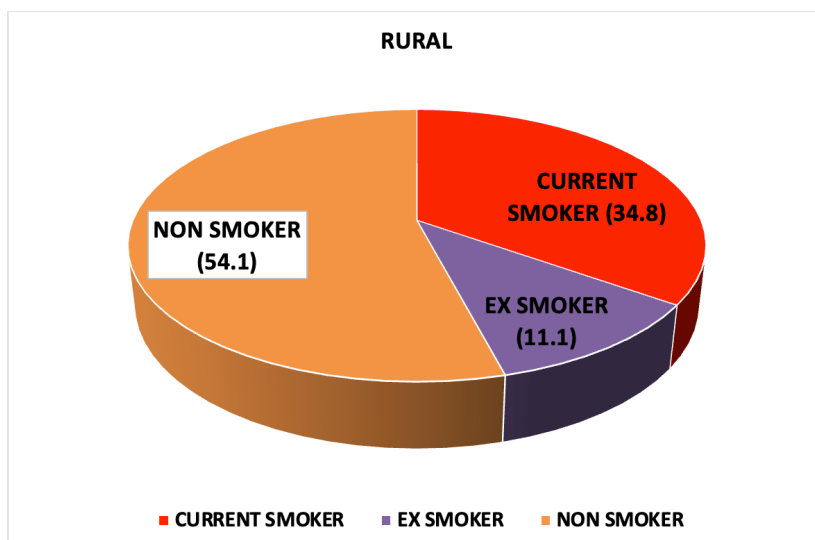
Figure A depicts that in the Rural area, overall 365(54.1%) of the study subjects were Non-smokers; 75(11.1%) were Ex-smokers and 235(34.8%) are Current smokers.

FIGURE B. PIE CHART REPRESENTATION. DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO TOBACCO CONSUMPTION IN URBAN AREA
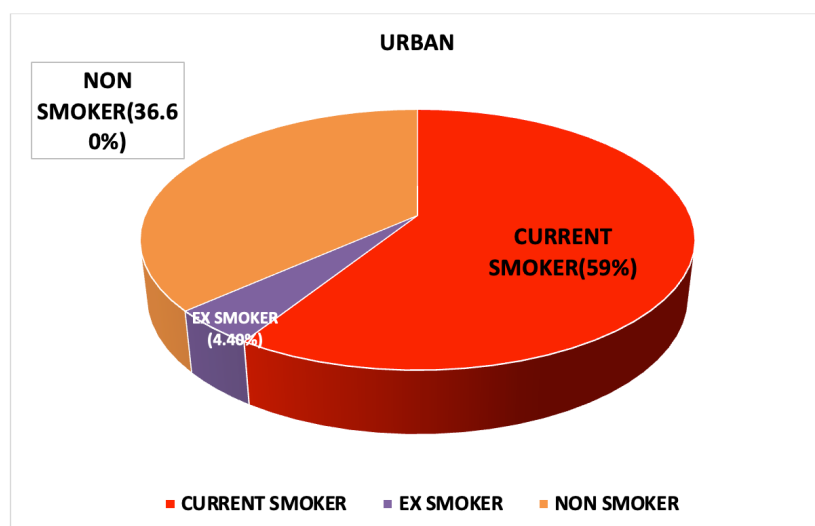

Figure B depicts that in the Urban area, overall 183(36.6%) of the study subjects were Non-smokers; 22(4.4%) were Ex-smokers and 295(59%) are Current smokers.

Table 3: Distribution of study subjects according to tobacco consumption in rural and urban area

TOBACCO SMOKING	RURAL (n=675)	URBAN (n=500)	TOTAL (N=1175)
CURRENT SMOKER	235(34.8%)	295(59%)	530(45.1%)
EX SMOKER	75(11.1%)	22(4.4%)	97(8.3%)
NON SMOKER	365(54.1%)	183(36.6%)	548(46.6%)

TABLE 3, In both Rural and Urban areas, the study subjects show overall 45.1% of Current Smokers. Current smokers are higher in Urban subjects (59%) compared to (34.8%) Rural subjects. Non-smokers are higher in Rural subjects (54.1%) compared to (36.6%) Urban subjects.

FIGURE C. A BAR GRAPH REPRESENTATION OF DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO TOBACCO CONSUMPTION IN RURAL AND URBAN AREA
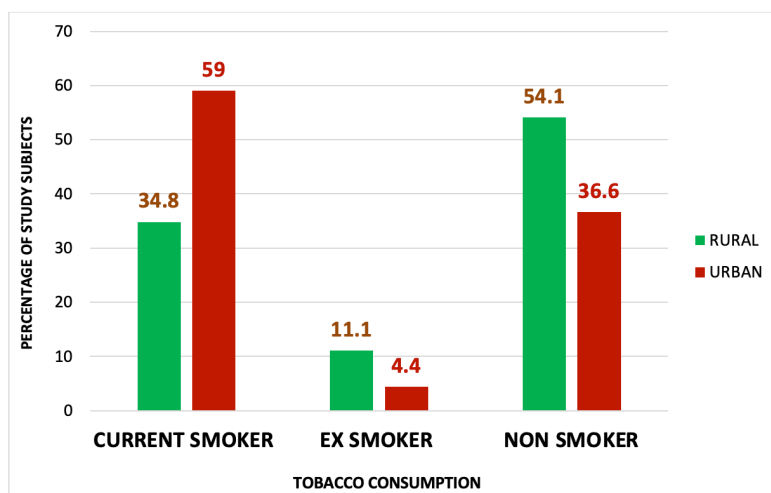
Table 4. Association of tobacco consumption with hypertension among rural and urban study subjects.

Risk Factor	Rural				Risk Factor	Urban			
Tobacco: Rural	Hypertension		Or (95% Ci)	P Value	Tobacco: Urban	Hypertension		OR (95% CI)	p value
	Yes (N=143)	No (N=532)				Yes (N=142)	No (N=358)		
Current User	51 (36%)	184 (34%)	1.00 (0.67-1.49)	0.986	Current User	89 (63%)	206 (57%)	1.49 (0.97 - 2.29)	0.064
Ex User	13 (9%)	62 (12%)	0.75 (0.39-1.45)	0.404	Ex User	12 (8%)	10 (3%)	4.15 (1.67 - 10.30)	0.002
Non User	81 (55%)	284 (54%)	1		Non User	41 (29%)	142 (40%)	1	

Table 4, shows the Association of Hypertension with Tobacco consumption in Rural and Urban study subjects.

In the Rural study subjects, the Tobacco consumption was not significantly associated with hypertension. In the Urban study subjects the Tobacco consumption in Ex users (Past consumed) have ODDs of 4.15 times risk of developing hypertension than non-users of Tobacco and the difference is significant (p = 0.002).

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The ODDs for Hypertension among Current users are 1(Rural) and 1.49 (Urban) times risk than that of Non users, but not significant among Rural (p= 0.986) and Urban (p = 0.06)

Discussion

Association between Tobacco Consumption and Hypertension

Tobacco consumption is a risk factor for Hypertension and the Current smokers were 34.8% in the Rural and 59% in the Urban area in the present study.

In the present study, hypertension was found more among current smokers than non-smokers. Current smokers meant that, the study participants had the habit of smoking tobacco during the period of the study.

More than 600 addictive go into manufacturing of a cigarette by cigarette companies and this list has hardly shown to the public. Relation between smoking and BP can be expounded by the fact that tobacco smoke contains various toxic substances like nicotine, tar, acetone, benzene, hydrogen, carbon monoxide and etc. These which are known to increase blood pressure by their vaso-constriction action. However the frequency and duration of the use is also influential in the development of hypertension in smokers. Nicotine is the ingredient that is mainly responsible for increasing the BP and cardiac contractility in the body.

Studies in India and abroad have found smoking to be an important risk factor of Hypertension. Thuy AB [8], et al, showed in the study that there was a significant trend of increasing prevalence of Hypertension with increasing years and pack years of smoking and concluded that there was an increased risk of hypertension for those who had smoked for 30 years or more.

Ajit Bhadoria [9] et al, concluded in a study that tobacco smoking was found to be an important

independent risk factor for the development of Hypertension among Rural and Urban population of central India. This is observed in the present study that in the Urban subjects the Tobacco consumption in Ex users (Past consumed) have ODDs of 4.15 times risk of developing hypertension than non-users of Tobacco and the difference is significant (p = 0.002).

In a study done by Padnekar MS and Gupta PC.[10] The risk of tuberculosis deaths among bidi smokers was 2.6 times higher than never-smokers in Mumbai.

In a study done by Prasad R[11], et al, There was a positive association between tobacco smoking and pulmonary tuberculosis.

Jha [12] et al concluded that Smoking causes a large and growing number of premature deaths in India. He had estimated that around 1 million deaths a year in India will be attributable to smoking by the next few years.

More than 16 million Americans are living with a disease caused by smoking. For every person who dies because of smoking, at least 30 people live with a serious smoking-related illness. Smoking causes cancer, heart disease, stroke, lung diseases, diabetes, and chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis. Smoking also increases risk for tuberculosis, certain eye diseases, and problems of the immune system, including rheumatoid arthritis.

Studies on bidi smoking, the most common form of tobacco smoking in India, provide evidence toward causality of it as carcinogenic substance. Case–control studies demonstrate a strong association of bidi smoking with cancers at various sites, such as oral cavity (including subsites), pharynx, larynx, oesophagus, lung and stomach. Almost all studies show significant trends with duration of bidi smoking and number of bidis smoked.[13]

In the study done by Gao K [14], et al. Among study participants aged between 36–55 years and 56–80 years, smoking was positively associated with the risk of incident respiratory diseases, hypertension and myocardial infarction from the life-course perspective, and the risk increased with age.

Smokeless tobacco caused a clinically significant acute elevation of systolic blood pressure, diastolic blood pressure, or pulse. In a study done by EC Westman, the acute effects of smokeless tobacco have been documented by increases of up to 21 mm Hg in systolic blood pressure and 14 mm Hg in diastolic blood pressure and by an average increase of 19 beats per minute in heart rate.[15]

In a study done by Prashanth KR [16], This study in a rural community in Nagpur among 445 individuals found out that tobacco use was significantly associated with hypertension.

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Shanthirani CS [18], et al, concluded in their CUPS Study concluded that smoking is a well-established risk factor for hypertension and it had an association with the development of hypertension in this study.

Every year, more than 8 million people die from tobacco use, approximately half of its users. More than 7 million of those deaths are from direct tobacco use while around 1.2 million are due to non-smokers being exposed to second-hand smoke. Most tobacco-related deaths occur in low- and middle-income countries, areas that are targets of intensive tobacco industry interference and marketing.[19]

A study done by Gupta BK [20], et al, in Bikaner, Rajasthan showed that Tobacco chewing is associated with similar cardiovascular risk as smoking.

The addictive effects of smoking are only partly known, but it is likely that haemodynamic effects of tobacco smoking may contribute to the habituation. It has since long been known that blood pressure and heart rate increases during smoking. The effects of this are specifically associated with nicotine while the other components of which more than 1000 have been isolated seem to be of some importance as well. The rise in the BP is due to both to an increase in cardiac output and to a total peripheral vascular resistance. The BP rise appears immediately and Occurs before any increase in circulating catecholamines. It is a paradox that while smoking acutely increases BP, a slight low BP level has been found among smokers and non-smokers in large epidemiological studies.

According to study done by Ghosh S, et al, out of the total 779649 persons who participated in the survey, were aged between 15 and 29 years. Hypertension was found to be more prevalent in men than in women. Although the prevalence of hypertension was relatively higher in urban than in rural areas at the national level, the rural–urban differences were small, implying that hypertension epidemic is spreading very fast even in the rural population.

In the present study, it was found that There is Association of Tobacco consumption with Hypertension in Urban study subjects (Chi-square (X2) = 11.1; DF = 2; p = < 0.05).

In the Urban study subjects the Tobacco consumption in Ex users (Past consumed) have ODDs of 4.15 times risk of developing Hypertension than non-users of Tobacco and the difference is

significant (p = 0.002). The Tobacco consumption in Current users have ODDs of 1.49 times risk of developing Hypertension than non-users of Tobacco yet the difference is not significant (p = 0.064).

Conclusion

In this study, the Urban study subjects with Tobacco consumption in Ex users (Past consumed) have ODDs of 4.15 times risk of developing Hypertension than non-users of Tobacco and the difference is significant (p = 0.002). Smoking causes cancer, heart disease, stroke, lung diseases, diabetes, and chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis. Smoking also increases risk for tuberculosis, certain eye diseases, and problems of the immune system, including rheumatoid arthritis. The long-term effects of smokeless tobacco use on blood pressure levels seem to differ depending on the user's age and level of physical activity and on the amount of smokeless tobacco used. There is a felt need for more community-based studies in Urban and Rural areas of our country (India) with a view to determine more such risk factors and to create awareness about the prevalence of Hypertension and the various risk factor which are associated with Tobacco consumption.

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