e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2023; 13(7); 160-168

Original Research Article

Prevalence of Hypertension among Alcohol Consumers in Adults of Rural and Urban Field Practice Area of Rajarajeswari Medical College and Hospital, Bangalore: A Comparative Study

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Received: 20-04-2023 / Revised: 21-06-2023 / Accepted: 22-07-2023
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Conflict of interest: Nil

Background: Hypertension is a Global Public Health issue. It contributes to the burden of Heart disease, Stroke, kidney diseases and premature mortality and Disability. A direct press or effect of alcohol is proposed as the basis for the association between regular alcohol consumption and an increase in blood pressure found in population studies.

Aim and Objective: To estimate the Prevalence of Hypertension and to describe the risk factor associated with Alcohol consumption among adults of the Rural and Urban field practice area of RajaRajeswari Medical College and Hospital (RRMCH), Bangalore.

Method: 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 Demographic data, Dietary history, Alcohol consumption, past medical history in adults. The data was collected and compiled in MS Excel and analyzed by using SPSS software version 24.0.

Result: The study included 1175 subjects, out of which Prevalence of Hypertension in Rural area is 21% and in Urban is 28%. Study subjects of the Rural area (OR=2.02) and Urban area (OR=2.81) showed higher risk of Hypertension associated with Alcohol consumption and they are found to be significant, (Rural: p value = 0.0009) (Urban: p value = 0.0001).

Conclusion: This study showed that Alcohol consumption had a significant association with Hypertension in both Rural and Urban areas. In Rural study subjects, Current consumer have an ODDs of 2.02 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0009). In Urban area, the Current consumer have an ODDs of 2.81 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0001). Similarly in the Urban areas, the Ex consumer (past consumer) have the ODDs of 2.91 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = < 0.0001). There is a felt need for more community-based studies in Urban And Rural areas of our country (India) with a view to determine the geographic differences in the prevalence of Hypertension and the various risk factor which are associated to it.

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

Introduction

Hypertension is a Global Public Health issue. It contributes to the burden of Heart disease, Stroke, kidney diseases and premature mortality and Disability. The main contributors to the rise in Hypertension are unhealthy diets, physical inactivity and the consumption of Alcohol and Tobacco. Increased Blood Pressure levels are directly responsible for the majority of Stroke deaths (more than 50%) and a substantial minority of deaths from Coronary Heart Disease (about 25%) in Eastern Asia. Both modest population-wide, Blood pressure reductions and more moderate targeted reductions are in those with Hypertension could be expected to produce greater reduction in the burden of Cardiovascular disease in these and other Asian regions[1].

The prevalence of Hypertension [2] in the late nineties and early 20th century in India range from 2% to 15% in Urban India and 2% to 8% in Rural India.

Hypertension disproportionately affects populations in low- and middle-income countries where health systems are weak[3]. There are significant health and economic gains attached to early detection, adequate treatment and good control of Hypertension.

Materials and Method

Study Design and Study Setting

A Cross sectional study was conducted in Rural and Urban field practice area of Rajarajeswari Medical College and Hospital (RRMCH), Bangalore 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.M[4], 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 **($n = 4PQ/L^2$)**, Where: n = required sample size, L=allowable error, P=prevalence. Furthermore, giving due allowance to non-response of 20%.

The estimated 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 Rajarajeshwari Nagar 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 the 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 0.5kilogram), Measuring tape) and a Questionnaire.

Socio demographic data and risk factors (Alcohol 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 (Alcohol consumption) were done. Hypertension is defined according to the Joint National Committee –Seventh[6].

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.

Alcohol [5,7]

Current Consumer/Alcoholic

A person was consumed alcohol in any form during last 12 months before the survey.

Non- Consumer/Alcoholic: Life time abstainer are individuals who had never consumed one or more drink of any type of alcohol in their lifetime.

Past Consumer/Alcoholic: A person who has consumed alcohol in the past for a duration of time but not during the last 12 months before the survey.

Amount and Type of Alcohol consumed per day/week and the duration of consumption were also recorded.

Regular User: consume Alcohol for > (more than) 3 days a week

Occasional User: consume Alcohol for < (less than) 3 days a week

Standard Drink: the Alcohol content of a standard drink is generally 10 grams of ethanol**,** depending on the country**.**

- Regular Beer = 285 ml
- 1Drink = 30 ml of spirit
- 1 Medium size of glass of Wine = 120 ml
- 1 Aperitif = 60 ml
- Ethanol Percentage in alcoholic beverages were:
- Rum = 50% to 60%
- Whisky, Gin, Brandy = 40% to 45%
- Wine = 10% to 15%
- Beer = 4% to 8%

Operational Definition of Hypertension: JNC-7

Hypertension

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-1Hypertension, Stage-2 Hypertension based on the Joint National Committee -7criteria [5].

Normal is defined: persons with Systolic Blood Pressure < 120 mm Hg and Diastolic Blood Pressure < 80 mm Hg is considered [5].

Pre- Hypertension: Persons with Systolic Blood Pressure within 120 - 139mm Hg or Diastolic Blood Pressure within 81 – 89 mm Hg were considered [5].

Stage-1 Hypertension: Persons with Systolic Blood Pressure within 140 – 159mm Hg or Diastolic Blood Pressure within 90 – 99 mm Hg were considered[5].

Stage-2 Hypertension: Persons with Systolic Blood Pressure ≥ 160 mm Hg or Diastolic Blood Pressure ≥ 100 mm Hg were considered [5].

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

A total of 1175 study subjects of age 18 years and above were interviewed, [Table 1] out of which 64.6% (759) of subjects are Male and 35.4% (416) are Female. Majority of them, Rural (39.1%) and Urban (46%) were in the age group (32-45) years. In the age group (61-75) years, the Rural were (11.1%) and Urban were (7%). Overall, 87.15% (1024) of them were married. Among the total, 81.4% (957) of them belonged to Hindu religion and 13.4% (157) belonged to Muslim religion. As many as 49.9% (586); 26.3% (309); 22.6% (266) of subjects were from Nuclear family; Joint family and Three generation families, respectively.

In Rural study subjects, Current consumer have an [Table 3] ODD's of 2.02 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0009). Similarly in Urban area, the Current consumer have an ODD's of 2.81 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0001). Also it was noted that, in Urban area, the Ex consumer (past consumer) have the ODDs of 2.91 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = < 0.0001).

Rural (Alcohol Consumers): Chi-Square (X^2) = 14.5; df = 2; p = < 0.05

Urban (Alcohol Consumers): Chi-square (X^2) = 26.5; df = 2; p = < 0.05

Table 1: Distribution of Study Subjects According to Socio-Demographic Characteristics in Rural and Urban Areas

Socio-Demographic Characteristics of Study Population			
Characteristics	**Rural (N=675)(%)**	**Urban (N=500)(%)**	**Total n=1175(%)**
Sex			
Male	441(65.3%)	318(63.6%)	759(64.6%)
Female	234(34.7%)	182(36.4%)	416(35.4%)
Marital Status			
Married	601(89%)	423(84%)	1024(87.15%)
Unmarried	40(6%)	45(9%)	85(7.23%)
Others*	34(5%)	32(6%)	66(5.62%)
Religion			
Hindu	574(85%)	383(76.6%)	957(81.4%)
Muslim	75(11.1%)	82(16.4%)	157(13.4%)
Christian	26(3.9%)	35(7%)	61(5.2%)
Type of Family			
Nuclear	280(41.5%)	306(61.2%)	586(49.9%)
Joint	190(28.1%)	119(23.8%)	309(26.3%)
Three Generation	197(29.2%)	69(13.8%)	266(22.6%)
Others*	8(1.2%)	6(1.2%)	14(1.2%)
Type of House			
Pucca	485(71.9%)	393(78.6%)	878(74.7%)
Semi-Pucca	69(10.2%)	64(12.8%)	133(11.3%)
Kutcha	121(17.9%)	43(8.6%)	164(14%)

*Include: widowed, separated

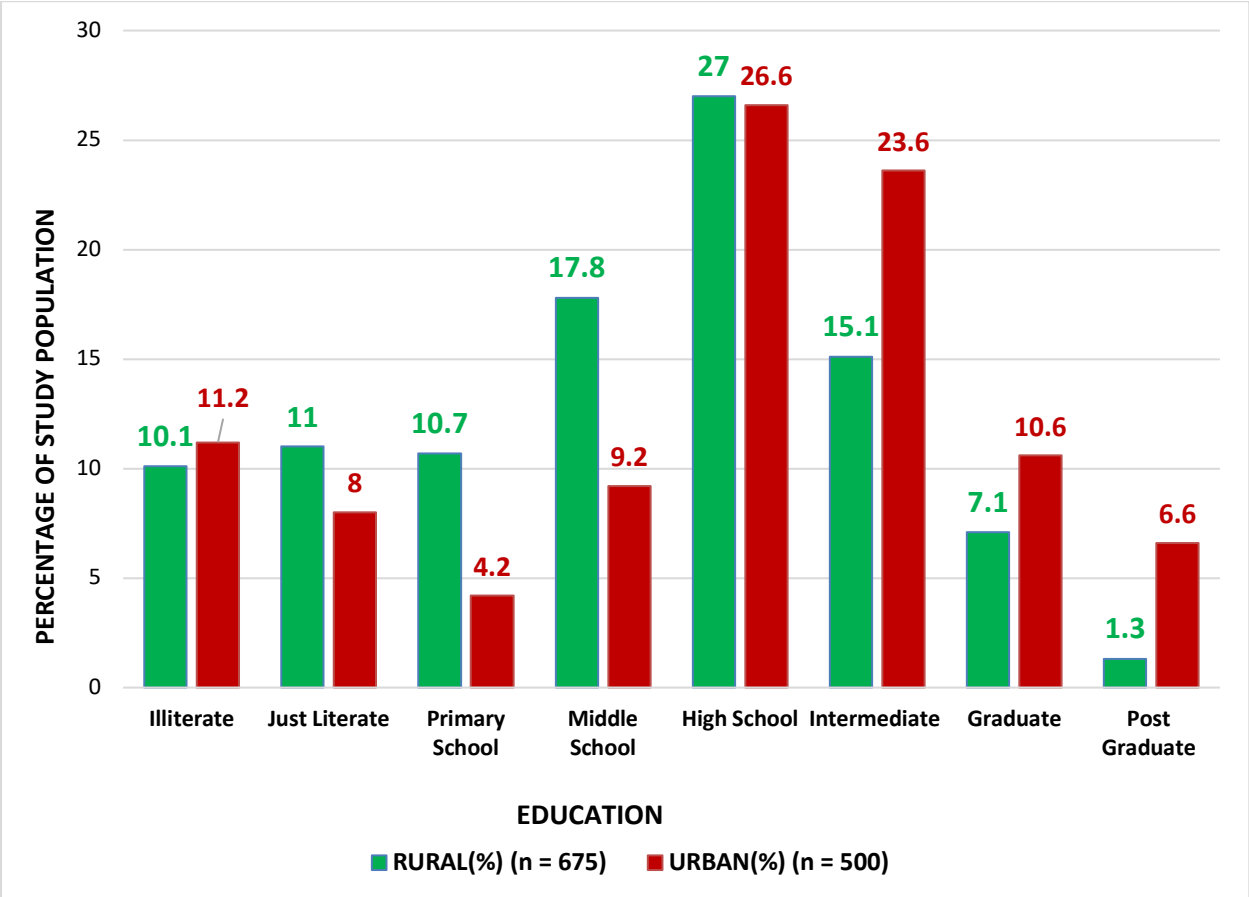

Figure A: Distribution of Study Subjects According to Education in Rural and Urban Areas

Figure A, depicts that in overall, 10.6% (124) of the study subjects are Illiterates. 26.8% (315) have studied till High-school; followed by 18.7% (220) have education up to Intermediate. There are 8.6% (101) of the study subjects who are Graduates and 3.6% (42) of them are Post graduates.

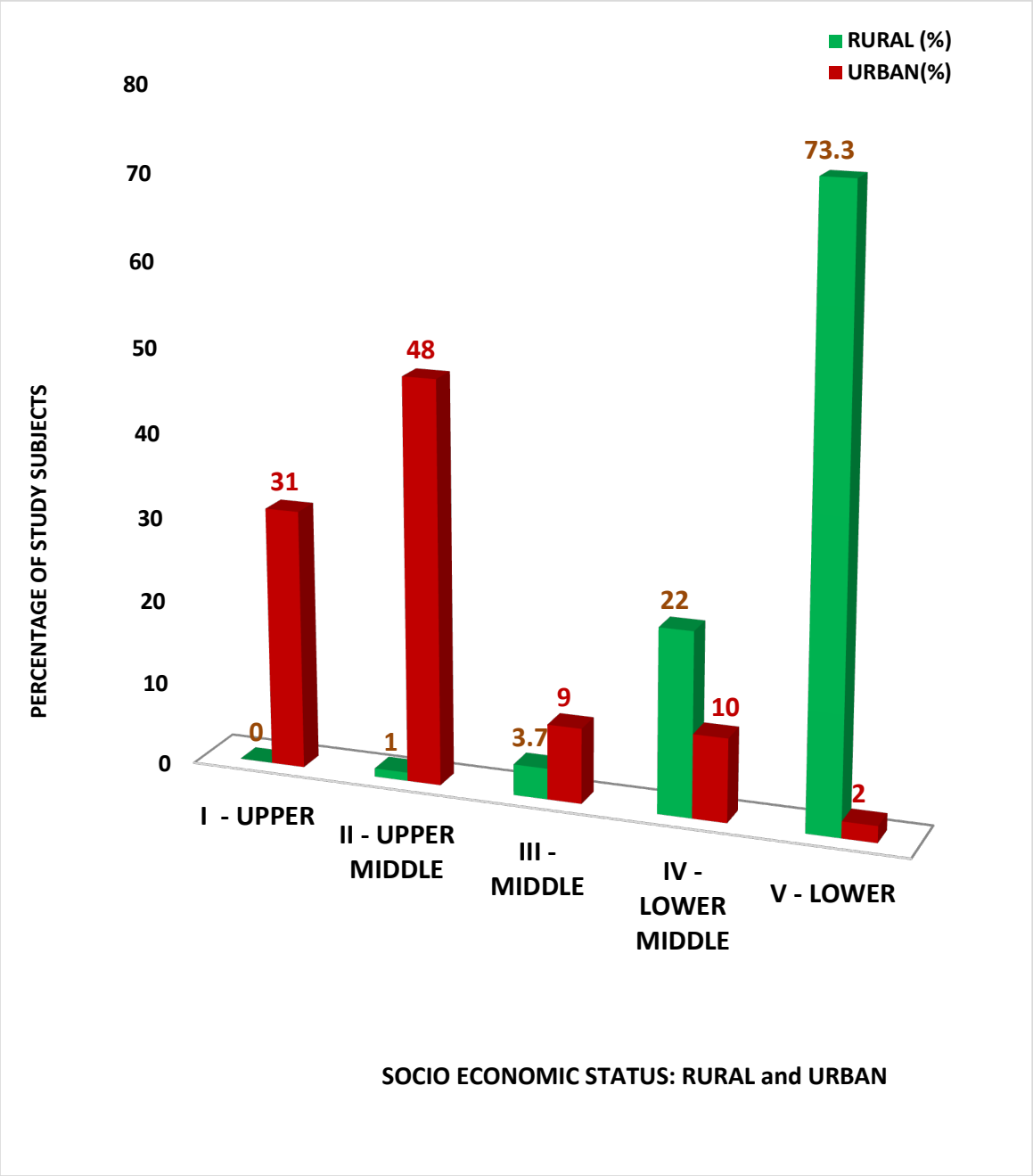

Figure B: Distribution of Study Subjects According to Socio Economic Status in Rural and Urban area

In Figure B, The Bar graph depicts the Socio Economic status of both Rural and Urban study population, according to 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.

Table 2: Distribution of Study Subjects According to Alcohol Consumption in Rural and Urban Area

Alcohol Consumption	Rural (N=675)	Urban (N=500)	Total (N=1175)
Current User	154(22.8%)	76(15.2%)	230(19.6%)
Ex User	73(10.8%)	79(15.8%)	152(12.9%)
Non User	448(66.4%)	345(69%)	793(67.5%)

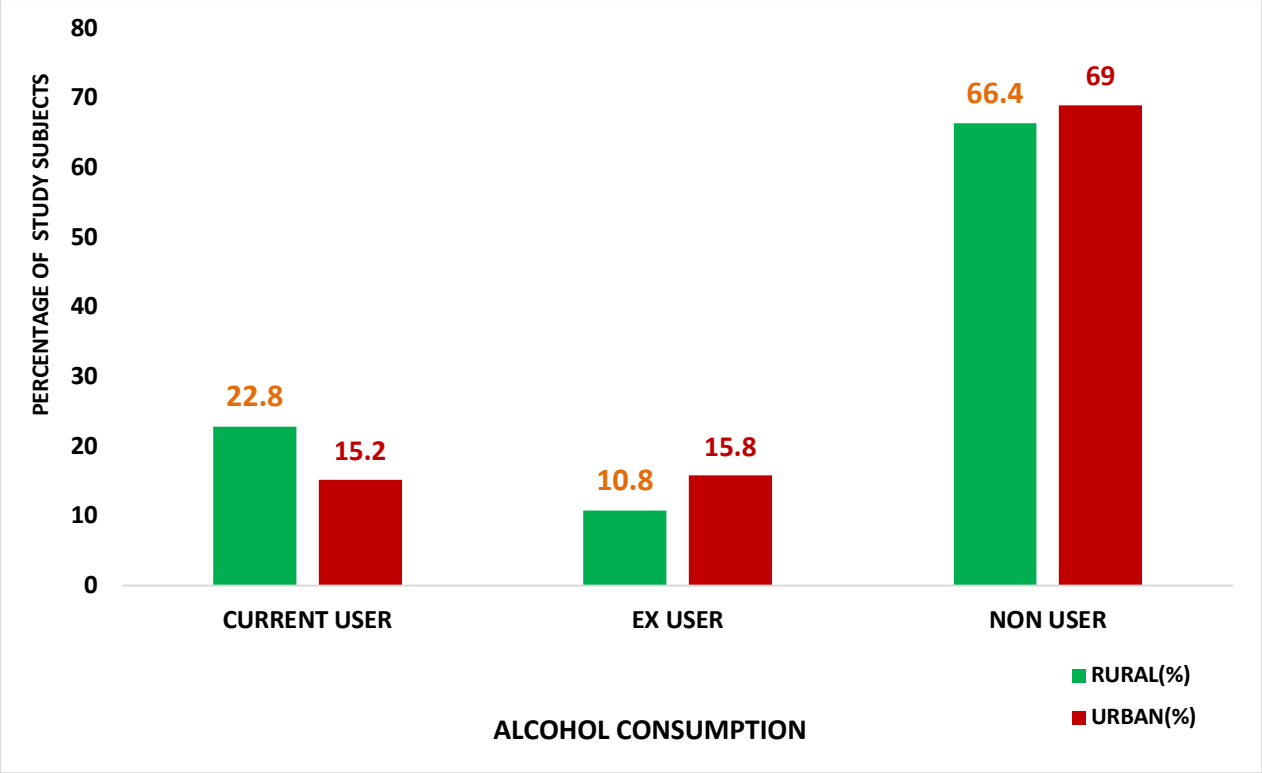

Figure C: Distribution of Study Subjects According to Alcohol consumption in Rural and Urban area, Depicted in a Bar Graph

In Table 2 and Figure C depicted in a Bar graph show both Rural and Urban areas, the study subjects show overall 19.6% are of Current User. Current users are higher in Rural subjects (22.8%) compared to (15.2%) Urban subjects. Non-users are higher in Urban subjects (69%) compared to (66.4%) Rural subjects. In Rural area, 154(22.8%) of the study subjects were Current users; 73(10.8%) were Ex-consumers and 448(66.4%) are Non users. In Urban area, 76(15.2%) of the study subjects were Current users; 79(15.8%) were Ex-consumers and 345(69%) are Non users.

Table 3: Association Of Alcohol Consumption With Hypertension Among Rural And Urban Study Subjects.

Risk Factor	**Rural**				**Risk Factor**	**Urban**			
Alcohol Rural	Hypertension		Or (95% Ci)	P Value	Alcohol: Urban	Hypertension		Or (95% Ci)	P Value
	Yes (N=143) (%)	No (N=532) (%)				Yes (N=142) (%)	No (N=358) (%)		
Current Consumer	49 (34%)	105 (20%)	2.02 (1.33-3.05)	0.0009	Current User	33 (23%)	43 (12%)	2.81 (1.66-4.73)	0.0001
Ex Consumer	10 (7%)	63 (12%)	0.68 (0.33-1.39)	0.300	Ex User	35 (25%)	44 (12%)	2.91 (1.74-4.86)	<0.0001
Non Consumer	84 (59%)	364 (68%)	1		Non User	74 (52%)	271 (76%)	1	

Table 3, depicts the association of Hypertension with Alcohol consumption in Rural and Urban study subjects. The current study showed that Alcohol consumption had a significant association with Hypertension in both Rural and Urban areas. In Rural study subjects, Current consumer have an ODDs of 2.02 times to get Hypertension than the Non consumer and the difference is statistically significant. ($p = 0.0009$). Similarly in Urban area, the Current consumer have an ODDs of 2.81 times to get Hypertension than the Non consumer and the difference is statistically significant. ($p = 0.0001$). In

Urban, the Ex consumer (past consumer) have the ODDs of 2.91 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = < 0.0001).

Discussion

Association between Alcohol Consumption and Hypertension

In the present study, there is association of Hypertension with Alcohol consumption in Rural and Urban study subjects. The current study showed that Alcohol consumption have significant association with Hypertension in both Rural (Chi-square (X^2) = 14.5; DF = 2; p = < 0.05) and Urban (Chi-square (X^2) = 26.5; DF = 2; p = < 0.05) areas.

In Rural study subjects, Current consumer have an ODDs of 2.02 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0009).

In Urban area, the Current consumer and Ex (past) consumers have an ODDs of 2.81 and 2.91 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0001) and (p = <0.0001).

In the present study the prevalence of Alcohol intake (current and past) among the total population is 32.5%.Current users are higher in Rural subjects (22.8%) compared to (15.2%) Urban subjects. Non-users are higher in Urban subjects (69%) compared to (66.4%) Rural subjects.

The prevalence of Hypertension in the current users are 34% and ex users are 7% in the Rural area. In the Urban area, the prevalence of Hypertension in the current users are 23% and ex users are 25% respectively.

Alcohol has a direct presser action on the vessel wall and stimulates the sympathetic nervous system. It also directly or indirectly increases the production of adrenocorticoid hormone in the body. Irrespective of the etiology, sympathetic over activity has been recognized as the main patho-physiological mechanism in the genesis of Hypertension.

The effects of Alcohol on Blood Pressure has been extensively studied in the studies.

A study conducted by Chacon EM[8], et al, in Costa Rica found that alcoholics had 1.4 times ODDs to develop hypertension compared to non-alcoholics. Subjects who were current or past users had 2.4 times more risk of hypertension then abstinence and this difference was statistically significant.

The results of the current study can be compared to the study done in Uganda by Wamala JF[9], et al, where the alcoholics had 2.3 times ODDs to develop hypertension compared to non-alcoholics.

Another study done by Howard D Sesso[10], et al, stated that alcohol intake was positively and significantly associated with the risk of hypertension among the study population.

Association between Age and Hypertension

In the present study, Age was found as a non-modifiable risk factor for the development of Hypertension with 37.19% of the total hypertensive's belonging in the age group 40 to 50 years.

There is a significant association between Age and Hypertension with the study subjects aged 40 years and above and were at high risk of Hypertension. From the age group 29 to 39 years, 40 to 50 years, 51 to 61 years, 62 years and above showed significant association between age and hypertension in both Rural and Urban areas respectively.

Many studies on the general population have shown increasing Age to be a major risk factor for the development of Hypertension. This can be compared to a study done by CS Shanta rani1[1] et al, showed that 60% of the Hypertensive is were aged 50 years and above in their Chennai urban population study CUPS[11]

One of the prime reasons for increase in blood pressure with advancing Age, is that the arteries and arterioles become less elastic and stiff due to atherosclerosis changes which set in [12].

A study on prevalence and determinants of Hypertension in the Urban population of Jaipur in western India, by Gupta R [13], et al, concluded that there was a significant correlation of BP with increasing age groups.

In the present study, males showed 31% prevalence of hypertension in the Rural areas and 24.1% in Urban areas, in the age group 29 to 39 years followed with 26% in Rural and 30.8% in Urban area in the age group 46-0 to 50 years. It can be attributed to high stressful work in the urban areas.

Female subjects in the urban and rural areas showed high prevalence of Hypertension during the age group 40 to 50 years of age. This peak can be due to menopausal changes which affects them more during this age group

Studies from Haryana done by Chadda S L[14],et al, showed the prevalence to be 4.1% in males and 2.8% in females in the age group 25 to 34 years which increased to 22.9% males and 32.9% females in the age group 55 to 64 years.

A study in Jaipur, done by Gupta V P [15], et al, the urban adults showed a significant increase in prevalence of Hypertension which Corresponds to the present study with increase in prevalence of

28.7% in Rural and 46% in Urban in the age group 40 to 50 years.

In the present study, both Rural and Urban,(males and females) were having equal risk of becoming Hypertensive. This is statistically significant.

Using ODDs ratio, it was found that, in Rural study subjects, in the age group of (40 – 50) years have high ODDs of 80.05 times risk to become Hypertensive than in age group (18 – 28) years and the difference is significant (p = 0.002). Compared to Urban area in the age group of (40 – 50) years have an ODDs of 63.7 times risk to become Hypertensive than in age group (18 – 28) years and the difference is significant (p = 0.0001).

Also in the age group 29 – 39 years, the Rural study subjects show ODDs of 21.55 times risk to become Hypertensive than in age group (18 – 28) years and the difference is significant (p = 0.031). Whereas In Urban study subjects show ODDs of 6.2 times risk to become Hypertensive than in age group (18 – 28) years, but is not significant (p = 0.07). Consequently, Rural study subjects, in the age group of (51 – 61) years have ODDs of 93.4 times risk to become Hypertensive than in age group (18 – 28) years and the difference is significant (p = 0.001). Compared to Urban area in the age group of (51 – 61) years have an High ODDs of 224 times risk to become Hypertensive than in age group (18 – 28) years and the difference is significant (p = < 0.0001).

With hormones like estrogen and put a strong adding a protective effect on the blood pressure, this difference decreases after the postmenopausal changes set in [16].

In a Chinese study done by Wildman R P, et al17, liquor drinking was associated with a higher odds ratio (OR) of isolated systolic hypertension, but this finding was probably because the liquor drinkers generally consumed more Alcohol.

Another study done by T Okarmura [18], et al on Japanese male workers. It was based of their total consumption of beer, sake, Shochu (traditional Japanese spirits), whiskey, or wine. Blood pressure was highest in the Shochu group but an analysis adjusting for total alcohol consumption resulted in disappearance of this difference.

According to the study done by Van den Elzen AP [19], et al, the findings suggest that moderate intake of Alcohol may affect vascular stiffness at an early age, notably in women.

The results of the current study can be compared to the study done in Uganda by Wamala JF [20], et al, where the alcoholics had 2.3 times ODDs to develop hypertension compared to non-alcoholics.

Another study done by Howard D Sesso [21], et al, stated that alcohol intake was positively and significantly associated with the risk of hypertension among the study population.

Conclusion

In this study, it showed that Alcohol consumption had a significant association with Hypertension in both Rural and Urban areas. In Rural study subjects, Current consumer have an ODDs of 2.02 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0009). Similarly in Urban area, the Current consumer have an ODDs of 2.81 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = 0.0001). In Urban, the Ex consumer (past consumer) have the ODDs of 2.91 times to get Hypertension than the Non consumer and the difference is statistically significant. (p = < 0.0001).

Alcohol has a direct presser action on the vessel wall and stimulates the sympathetic nervous system. It also directly or indirectly increases the production of adrenocorticoid hormone in the body. Irrespective of the aetiology, sympathetic over activity has been recognized as the main pathophysiological mechanism in the genesis of Hypertension. Encouragement of social use of beverages of lower alcohol content may have a Great impact on the prevalence of Hypertension and other Alcohol-related disorders.

Acknowledgement

Authors would like to thank the subjects for their active participation and the Primary Health Centre Medical Officers of the field area for their support and motivation.

Financial Support and Sponsorship: Nil

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