



Assess the Association between Alcohol Use and Hypertension among the Population of Jumla, Nepal.

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ABSTRACT

Background and Objective: Heavy alcohol consumption leads Alcohol dependence and harmful Alcohol consumption increases the risk of hypertension, whereas nonalcoholic are more likely not to have alcohol induced hypertension. In this case control study, we aimed to identify the association between alcohol consumption and hypertension.

Methods: Study participants were 228 men and 12 women, aged 20 years and above, cases were chosen purposively from district health office (Hospital) while, the controls are obtained from five random wards of the Chandanath VDC by simple random sampling (lottery). The Alcohol Use Disorders Identification Test (AUDIT) developed by the world health organization was used in face to face interviewed to collect the information. To, measure the blood pressure of individuals BP Set with Stethoscope was used. The numbers of measurements were two duplicates a day (twice in the morning and twice in the evening) for three consecutive days with exclusion of BP readings taken at the first day, actual measurement was obtained by the Average of 2nd and 3rd day measurements.

Results: As Compared with nonalcoholic, harmful Alcohol consumption ($p < 0.001$) of these respondents had a significant effect on Hypertension and Alcohol dependence ($p < 0.05$) also indicates the significant association with hypertension followed by mean difference of these alcoholic respondents had a significant effect on Hypertension

Conclusions: Light to moderate alcohol consumption can decrease the risk of hypertension, whereas heavy alcohol is associated with alcohol dependence and hazardous alcohol consumption with an increased risk of hypertension.

Keywords: Alcohol dependence, Harmful alcohol consumption, Hypertension, Alcohol Used Disorder Identification test

Introduction

Alcohol abuse is a frequent contributor to elevated blood pressure and may be the most common cause of secondary hypertension. The mechanism of this association is unknown. In most cases, the blood pressure elevations are reversible and return to normal upon discontinuation of alcohol use [1].

Epidemiological studies suggest that light to moderate alcohol intake is associated with lower all-cause mortality than abstinence or heavy alcohol intake, primarily through reduced risk of coronary heart disease. The underlying mechanisms are incompletely understood [2].

In epidemiological studies, consumers of moderate amounts of alcohol have lower all-cause mortality than non-drinkers and heavy drinkers with large amount of alcohol intake [3].

About 2 billion people worldwide consume alcoholic drinks, which can have immediate and long term consequences on health and social life. Over 76 million people are currently affected by alcohol use disorders, such as alcohol dependence and hazardous alcohol use [4].

Depending on the amount of alcohol consumed and the pattern of drinking, alcohol consumption can lead to drunkenness and alcohol dependence. It can result in disablement or death from accidents or contribute to depression and suicide. Moreover, it can cause chronic illnesses such as cancer and liver disease in those who drink heavily for many years [5].

Alcohol causes 1.8 million deaths a year resulting in high mortality rate, which represents 3.2% of all deaths worldwide, Unintentional injuries account for about a third of the deaths from alcohol. Alcohol is the third most common cause of death in developed countries. In the limited number of developing countries where overall mortality is low, alcohol is the leading cause of illness and disease. Damage to human life is often described in terms of loss of "disability-adjusted life years" (DALYs). This measure takes into account the number of years lost due to premature deaths as well as the years spent living with disability [6].

Worldwide, alcohol causes a loss of 58.3 million DALYs annually, which represents 4% of the total loss of DALYs from all causes. Mental disorders and diseases of the nervous system account for about 40% of DALYs lost as a result of alcohol intake. Drinking patterns vary greatly from country to country and so do health impacts and policy responses [7].

Materials and methods

Data definition

Alcohol use: Drinking more than one to two drinks of alcohol per day tends to raise blood pressure in those who are sensitive to alcohol.

Alcohol dependence: A chronic medical condition that typically includes a current or past history of excessive drinking, a strong craving for alcohol, continued use despite repeated problems with drinking, and an inability to control alcohol consumption.

Harmful alcohol consumption: A quantity or pattern of alcohol consumption that places patients at risk for adverse health events,

Hypertension: High blood pressure, defined as a repeatedly elevated blood pressure exceeding 140 over 90 mmHg - a systolic pressure above 140 with a diastolic pressure above 90 mmHg.

Blood pressure: Blood pressure is a measurement of the force applied to the walls of the arteries as the heart pumps blood through the body. The pressure is determined by the force and amount of blood pumped, and the size and flexibility of the arteries.

Medications: Certain drugs, such as amphetamines (stimulants), diet pills, and some medications used for [cold](#) and allergy symptoms such as [pseudoephedrine](#), tend to raise blood pressure.

Study Area

The study was conducted in Jumla, one of the ten districts of the [Karnali province](#) of [Nepal](#) with its headquarter khalanga. Jumla has an area of 2,531 square kilometres (977 sq mi); it had populations of 108,921 in the national censuses of 2011. Its territory lies between longitudes 81° 28' and 82° 18' East, and between latitudes 28° 58' and 29° 30' North.

Sample size

The sample size for the study was determined as follows-

$$n = \frac{Z_{\alpha}^2 pq}{d^2}$$

Where,

n= Desired sample size

z= Value of standard normal distribution in 1.96 level of significant with 95% confidence interval.

p = Proportion of high blood pressure was found 5.3% = 0.053 in Mountains (Jumla) [8].

q = 1-p therefore, 1-0.053= 0.947d = Acceptable error in the study 5% (0.05)

By formula, Sample size (n) = (1.96)² x 0.053 x 0.947/ (0.05)² = 77.125=78

However, to increase the reliability of the study the sample size of cases were 80.

The usual case control ratio is 1:1. Nevertheless, increasing the ratio of controls to cases increases the precision and efficiency of the analysis. Thus, in this study cases and controls were taken in the ratio of 1:2 i.e. 80:160

The total sample size calculated as per formula basis was 80 cases and 160 controls

Sampling techniques

As the study design was a case control study, cases were chosen purposively from district health office (Hospital) while the controls are obtained from five random wards of the Chandanath VDC by simple random sampling (lottery).The controls were derived from the population at risk of disease having same source as that of population from where the cases were drawn. (Controls were eligible for the exposure or with having same exposure rate).

People with hypertension without any heart disease including CHD or any other cause of hypertension and having age of ≥ 20 years were included to assess the association between the alcohol and hypertension and people with hypertension with/or without history of antihypertensive treatment, with heart disease including coronary heart disease, and other causes of hypertension were excluded to rule out the possible influence of a diagnosis of hypertension and heart disease on the pattern of alcohol consumption. The controls resembling the case in all respects (same exposure, at risk, same study

base, matched) except for the presence of hypertension and having age of ≥ 20 years were included and those controls who doesn't resemble the case in all respects (same exposure, at risk, same study base, matched) except for the presence of hypertension and having age of ≥ 20 years were excluded. Informed consent was taken from the respondents before the interview and respondent's right to refuse and withdraw from the study at any time was accepted. Respondent's privacy and confidentiality was maintained along with ethical issues related to research have been addressed according to the guidelines of Nepal Health Research Council till the study is complete.

Research instrument

The Alcohol Use Disorders Identification Test (AUDIT) is a simple ten-question test developed by the World Health Organization to identify individuals whose alcohol use has become potentially hazardous and/or harmful to their health. The test was designed to be used internationally, and was validated in a study using patients from six countries. Questions 1-3 deal with alcohol consumption, 4-6 relate to alcohol dependence and 7-10 consider alcohol related problems. A score of 8 or more in men (7 in women) indicates a strong likelihood of hazardous or harmful alcohol consumption. A score of 20 or more is suggestive of alcohol dependence [9].

To, measure the blood pressure of individual with identified alcohol use disorder the standard aneroid monitor (sphygmomanometer) will be used contains a gauge that is read by looking at a pointer on a dial. The cuff is placed around the upper arms of individual's and inflated by hand, by squeezing a rubber bulb and the stethoscope was used to listen the blood pumping through the artery.

The numbers of measurements were two duplicates a day (twice in the morning and twice in the evening) for three consecutive days with exclusion of BP readings taken at the first day. Measurements on the first day are persistently higher than subsequent measurements, and for that reason the data from the first day should be discarded and acute measurement was obtained by the Average of 2nd and 3rd day measurements [10].

Statistical analysis

All the values and data were entered and analyzed in SPSS 16 and EXCEL. Simple frequency, percentage and appropriate statistical tools central tendency, cross tabulation were used. Data was presented in the frequency tables, bar and pie charts. Association between the alcohol and socio-demographic factors with hypertension was illustrated with p-value less than 0.05 were considered statistically significant.

Results

General information regarding socio-demographic characteristics of the respondents that describes their age structure, gender distribution, marital status, religion, caste/ethnicity, occupation, socio-economic status and types of family

Table 1
Demographic characteristics of the respondents

| Variables | Frequency | Percentage |
|--------------------------------|-----------|------------|
| Age (years) | | |
| <35 | 66 | 27.50% |
| ≥ 35 | 174 | 72.50% |
| Gender | | |
| Male | 228 | 95% |
| Female | 12 | 5% |
| Marital status | | |
| Married | 228 | 95% |
| Unmarried | 12 | 5% |
| Religion | | |
| Hindu | 210 | 87.50% |
| Buddhist | 30 | 12.50% |
| Ethnic group | | |
| Brahman | 90 | 37.50% |
| Chhetri | 78 | 32.50% |
| Magar | 30 | 12.50% |
| Other's(dalit) | 42 | 17.50% |
| Occupation | | |
| Farmer | 162 | 67.50% |
| Service | 78 | 32.50% |
| Socio economic status | | |
| Enough to eat for one year | 72 | 30% |
| Not enough to eat for one year | 168 | 70% |

| | | |
|---------------------|-----|--------|
| Types of family | | |
| Nuclear | 120 | 50% |
| Joint | 120 | 50% |
| Educational group | | |
| Illiterate | 66 | 27.50% |
| Primary | 84 | 35% |
| Secondary and above | 90 | 37.50% |

Table 2 Shows that Alcohol dependence respondents are hypertensive and had a statistically significant relationship with hypertension.

| Alcohol dependence | Normotensive | Hypertensive | Chi -square | P Value |
|--------------------|--------------|--------------|-------------|---------|
| NO | 126 (63.6%) | 70 (36.4%) | 9.4 | 0.002 |
| YES | 0 (0%) | 44 (100%) | | |

Table 3 Elucidated that harmful Alcohol consuming almost respondents are hypertensive and had a significant effect on Hypertension whereas only few respondent among the nonalcoholic were hypertensive.

| Respondents | Normotensive | Hypertensive | Chi- square | P value |
|-----------------------------|--------------|--------------|-------------|---------|
| Non alcoholic | 209 (96.7%) | 7(3.3%) | 18.2 | 0.001 |
| Harmful alcohol consumption | 6 (25.0%) | 18(75.0%) | | |

Table 4 Non Parametric comparison of scores between normotensive and hypertensive subjects illustrate that mean score of cases shows a significant relationship between the alcohol intake and the Hypertension whereas mean score of controls is very less comparatively.

| HTN | Mean | Median (IQR) | Mean Rank | Sum of Ranks |
|--------------|------------|--------------------|-----------|--------------|
| Normotensive | 1.7 (1.2) | 2.0 (0.5 -3.0) | 11.45 | 240.50 |
| Hypertensive | 16.2 (7.1) | 17.0 (10.0 – 17.0) | 30.50 | 579.50 |

Discussion

The Major finding of the study was that Alcohol dependence ($p < 0.002$) and harmful Alcohol consumption of these respondents had a significant effect on Hypertension ($p < 0.001$) whereas nonalcoholic respondents are insignificant to hypertension

Socio-demographic characteristics

In this study we found that (95%, $n=228$) of total respondents were male and the rest (5%, $n=12$) were female and More than 3/4th of total respondents (87.5%, $n= 210$) were Hindu and the rest (12.5%, $n=30$) were Buddhist. A little more than 37% of the respondents (37.5%, $n=90$) had their ethnic group Brahman, while ethnic group chhetri (32.5%, $n=78$) and the rest (12.5%, $n=30$) and (17.5%, $n=42$) have ethnic group magar and dalit respectively, (95%, $n=228$) of the respondents were married while the rest (5%, $n=12$) were not married and it also describes that majority of the respondents (67.5%, $n=162$) belonged to farmers, followed by (32.5%, $n=78$) have had service.

Around (70%, $n=168$) of the total respondents reportedly have not enough to eat for one year while only (30%, $n=72$) have enough to eat for one year, half of the respondents (50%, $n=120$) of the total respondents are from Nuclear family and rest of (50%, $n=120$) have joint family type around (27.5%, $n=66$) of the respondents are illiterate while (35.0 %, $n=84$) have a primary level education and rest of (37.5%, $n=90$) have secondary and above.

Association between the alcohol and Hypertension

Alcohol dependence ($p < 0.05$) and harmful Alcohol consumption ($p < 0.001$) of these respondents had a significant effect on Hypertension whereas nonalcoholic are more likely not to have alcohol induced HTN. Association of nonalcoholic respondents and harmful alcohol consuming respondents with hypertension reveals harmful Alcohol consuming almost respondents near about 75% are hypertensive in number and had a significant effect on Hypertension ($p < 0.001$) whereas only 7% of the respondent among the nonalcoholic were hypertensive. Non Parametric comparison of scores between normotensive and hypertensive subjects illustrate that mean score (16.2) of cases shows a significant relationship between the alcohol intake and the Hypertension ($p < 0.001$) whereas mean score of controls is only (1.7).

A positive association between the prevalence of hypertension and alcohol consumption of ≥ 19 drinks per week was found for patients aged ≥ 60 years (OR = 2.47; 95% CI, 1.21–5.05), but not in patients aged < 60 years (OR = 1.54; 95% CI, 0.72–3.32). Light to moderate alcohol consumption from 4 to 10 drinks per week was significantly associated with a decreased risk of hypertension in subjects aged < 60 years (OR = 0.32; 95% CI, 0.11–0.97), but not in subjects aged ≥ 60 years (OR = 0.70; 95% CI, 0.31–1.58). Conclusions: Light to moderate alcohol consumption can decrease the risk of hypertension, whereas heavy alcohol intake is associated with an increased risk of hypertension [1].

This study lacked details on beverage-specific intake and drinking patterns. This limitation of the present study deserves mention since some studies have reported the relationship between pattern of alcohol use and hypertension risk [2].

Study indicated that light to moderate alcohol consumption can be associated with a decreased risk of hypertension, whereas heavy alcohol intake can increase the risk of hypertension. It is suggested that the effect of alcohol consumption on the risk of hypertension may be influenced by age. There should be a consideration of age when assessing the relationship between alcohol consumption and blood pressure. However, further studies are needed to verify these results since the present study is limited to cross-sectional design [6].

This cross-sectional study confirmed that heavy alcohol intake increases hypertension risk, whereas light to moderate alcohol intake can decrease hypertension risk. In accordance with previous studies, there was a threshold level for this association. Light to moderate alcohol consumption had a protective effect on the prevalence of hypertension when consuming ≥ 4 drinks per week in this study. Heavy alcohol intake was significantly associated with an increased risk of hypertension for subjects who consumed ≥ 19 drinks per week. However, several studies have reported different thresholds [12].

A direct pressure 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. Reduction of alcohol intake also caused a significant decrease in weight ($p < 0.001$). After adjustment for weight change, an independent effect of alcohol on systolic but not diastolic blood pressure was still evident, with a 3.1 mm Hg fall predicted for a decrease in consumption from 350 ml of ethanol equivalent per week to 70 ml per week ($p < 0.01$). Systolic blood pressure rose again when normal drinking habits were resumed. These results provide clear evidence for a direct and reversible pressure effect of regular moderate alcohol consumption in normotensive men and suggest that alcohol may play a major role in the genesis of early stages or blood pressure elevation resulting in HTN [13].

It is speculated that the mechanisms underlying the association between light to moderate alcohol consumption and hypertension may differ from those for coronary heart disease and ischemic stroke. Although this study has indicated that light to moderate alcohol consumption can decrease the risk of hypertension in young patients as previous studies have reported, some studies have shown that light to moderate alcohol consumption may have unassociated or deleterious effects on the risk of coronary heart disease, ischemic stroke, and mortality in young patients [14]

There was an increased risk of hypertension in those who consumed large amounts of ethanol (≥ 210 g per week) compared with those who did not consume alcohol over the 6 years of follow-up. The adjusted odds ratios (95% confidence interval) were 1.2 (0.85 to 1.67) for white men, 2.02 (1.08 to 3.79) for white women, and 2.31 (1.11 to 4.86) for black men. Only 4 black women reported drinking > 210 g ethanol per week. At low to moderate levels of alcohol consumption (1 to 209 g per week), the adjusted odds ratios (95% confidence interval) were 0.88 (0.71 to 1.08) in white men, 0.89 (0.73 to 1.09) in white women, 1.71 (1.11 to 2.64) in black men, and 0.88 (0.59 to 1.33) in black women. The consumption of alcohol in amounts ≥ 210 g per week is an independent risk factor for hypertension in free-living North American populations. The consumption of low to moderate amounts of alcohol is associated with a higher risk of hypertension in black men [15].

A number of the studies, particularly those from North America (7, 8, 14, 15), have suggested a threshold for this effect of alcohol at around three standard drinks per day, with something of a J-shaped relation with blood pressure. However, many other studies, including those from different centers in Australia (9, 16, 17), have shown a - 2 - linear relationship throughout the entire range of alcohol consumption from one standard drink a day upwards. Possible reasons for these discrepancies are the inclusion of some heavy drinkers and ex-heavy drinkers in the so-called teetotal population and failure to adequately control for other factors such as obesity in some of the studies. There are particular difficulties in quantitating alcohol intake accurately from questionnaires, but despite this the estimated alcohol blood pressure relationships overall between many different communities remain consistent, in stark contrast with the difficulty in demonstrating within-population relationships between dietary sodium intake and blood pressure. For example, the Inter salt study of dietary factors influencing blood pressure levels in populations worldwide showed a greater effect from alcohol consumption and obesity, than from salt intake [16].

Epidemiological, preclinical and clinical studies established the association between high alcohol consumption and hypertension [17]. Alcohol-related hypertension is in the causal pathway between alcohol use and increased risk for several cardiovascular outcomes [18]. Alcohol consumption is also linked to high blood pressure (BP) and addiction among adolescents – important risk factors for hypertension [19].

Conclusion of the study

Alcohol dependence and hazardous alcohol consumption is associated with risk of hypertension. Light to moderate alcohol consumption can decrease the risk of hypertension, whereas heavy alcohol is associated with alcohol dependence and hazardous alcohol consumption with an increased risk of hypertension.

Recommendation

Alcohol dependence group and group with harmful alcohol consumption should be targeted to reduce alcohol induced HTN and initiation of Community awareness program on alcohol induced hypertension must be focused to remove the wrong idea about the alcohol as the most common method of self-medication

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