

Effect of «ozu» consumption on blood pressure parameters

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ABSTRACT. Objective. «Ozu» is the name for the alcoholic liquor locally brewed from palm juice. It is the beverage commonly consumed in Ika land, Delta State Nigeria. No documented information is yet available on the health disturbances associated with ozu consumption in Ika Province. This baseline study therefore attempts to report the effect of ozu consumption on blood pressure parameters and body mass index.

Material and methods. Seven hundred and eighty apparently healthy-looking and most suitable men, who gave their consent were selected after interview.

Results. The results showed that heavy consumption of ozu induced significant increase in blood pressure parameters (systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and pulse rate) in older men (41-60 years) when compared with the age-matched control (non-drinkers) values. Such heavy drinking also reduced body mass index. About 6% of heavy drinkers of ozu between the ages of 41-60 years were underweight, an indication of nutritional disorders. Within the same age bracket (41-60 yrs) about 28%, 35%, 30% and 7% of the heavy drinkers were normotensive, prehypertensive, stage I hypertensive and stage II hypertensive subjects, respectively.

Conclusions. By extension, it can be speculated that heavy consumption of 'ozu' may likely elicit cardiovascular and nutritional complications. However, further epidemiological, biochemical and post-mortem investigations are required to convincingly document the effects of ozu consumption. This is imperative in order to advise, and possibly, alert the communities and the lay public of the health implications of consuming ozu.

KEY WORDS: «ozu», blood pressure, body mass index, alcohol consumption.

Efecto del consumo de «ozu» sobre la presión arterial

RESUMEN. Objetivo. «Ozu» es el nombre del licor producido a partir del extracto de la palma, una bebida frecuentemente consumida en el territorio de Ika, en el delta de Nigeria. No existe información acerca de las consecuencias para la salud del consumo de ozu en el territorio de Ika. Este estudio pretende analizar el efecto del consumo de ozu sobre la presión arterial y el índice de masa corporal.

Material y métodos. Se han incluido en el estudio 780 voluntarios sanos, varones. Todos los participantes en el estudio firmaron el consentimiento informado.

Resultados. Los resultados del estudio muestran que el consumo excesivo de ozu induce a un incremento significativo de la presión arterial (presión diastólica, presión sistólica y presión arterial media) y de la frecuencia cardíaca en personas adultas (41-60 años) en comparación con personas del mismo rango de edad que no han consumido bebidas alco-

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hólicas. El consumo elevado o excesivo de ozu reduce el índice de masa-corporal. Cerca del 6% de los consumidores de ozu entre los 41 y 60 años de edad presentaban un peso menor al ideal, indicativo de un trastorno nutricional. Dentro de este rango de edad (41-60 años), el 28, 35, 30 y 7% de los bebedores excesivos de ozu fueron catalogados, respectivamente, como normotensivos, pre-hipertensivos, hipertensivos estadio I e hipertensivos estadio II.

Conclusiones. Se podría especular que el consumo excesivo de ozu pudiera acarrear complicaciones cardiovasculares y nutricionales. Sin embargo, son precisos posteriores estudios epidemiológicos, bioquímicos y post-mortem con el fin de documentar con precisión los efectos del consumo de ozu. Ello es necesario con el fin de aconsejar, y posiblemente alertar, a la población acerca de las consecuencias para la salud del que consume este licor.

PALABRAS CLAVE: ozu, presión arterial, índice de masa corporal, consumo de alcohol.

Introduction

In Ika, a small province in the northern part of Delta state, Nigeria, «ozu» refers to the alcoholic liquor obtained from palm sap. The Ikas like 'ozu' for friendship and so, their socio-cultural activities centre on its consumption. Individuals engage themselves in the local production of the wine for private consumption, and those who do not, patronize drinking outlets. Though, there are no documented data on daily consumption, speculated information obtained from commercial tappers suggest staggering quantity.

Ozu alters the mood of the drinker and gives him the courage to commit crime, hence deviance behaviours are common and increasing in Ika communities. In these communities the Elders in Council have constituted local vigilante anti-crime squad to help reduce crime wave. Heavy consumption of ozu also appears to threaten the health of addicts.

Ozu, a highly intoxicating product of fermentation, obviously contains ethanol, though the amount in the liquor is yet to be documented. The ingestion of ethanol in fairly high amount has been reported to increase blood pressure^{1,2} and induce hypertension^{3,4}.

In this investigation, we measured blood pressure parameters and body mass index of light, moderate and heavy drinkers of ozu in apparent good health, with the intention of classifying them into the different categories of blood pressure according to current

guidelines⁵. It is hoped that the baseline data derived from this research would spark-off intervention studies, if need be.

Materials and methods

Subjects and Sample Areas

The town crier announced the scheduled meeting round the community and the congregation that gathered in the community's hall on the arranged date was briefed on the aims and objectives of the research. Thereafter, those who volunteered were interviewed in order to select the most suitable subjects. Individuals with factors that could possibly interfere with blood pressure parameters and alter cardiovascular function were eliminated using information on obesity (body mass index), occupation, stress, history-limited to first degree relatives, drug use (caffeine, nicotine), diet, physical activities, life style and habits, obtained from the respondents during the interview section. The elimination exercise was important in order to ensure that the changes in blood pressure parameters of the subjects selected were to a large extent induced by ozu (alcohol) consumption.

Seven hundred and eighty (780) apparently healthy – looking men were selected from twenty-six (26) communities in Ika Province of Delta State. Informed consent was obtained from the enlisted subjects and their participation was approved by a committee of the ruling Elders in Council and our Faculty's Research and Ethics Committee. The volunteers were then separated into two major age categories (21-40 and 41-60 years). Each age bracket was further divided into four (light: 10.075 ± 0.015 l/day moderate: 0.20 ± 0.10 l/day, heavy > 0.30 l/day and non-drinkers) groups based on their average daily consumption of ozu.

Measurement of blood pressure parameters

Systolic and diastolic blood pressure, and pulse rate were measured oscilometrically using an automatic digital sphygmomanometer (SE – 7000; Seinex Electronics Ltd., Belfast, UK) in a well – seated position after about 10 min of rest as previously documented⁴. The mean arterial (blood) pressure (MAP) was in turn estimated mathematically. $MAP = \frac{2}{3}$ diastolic pressure + $\frac{1}{3}$ systolic pressure. Subjects were then classified into: normal, prehypertension, hypertension stage I or II depending on the obtained values for the blood pressure parameters. The classification was done according to current guidelines⁵.

Measurement of body mass index

Height and weight were measured to the nearest 0.1 cm and 0.1 kg, respectively, by a standard meter rule and weighing balance (Bathroom scale; BR 119; Hana Ltd., Nigeria). These values were used to derive the body mass index, BMI. $BMI = \text{weight}/\text{Height}^2$. Subjects were then separated into four BMI groups according to National Institute of Health (NIH) Classification criteria⁶.

Statistical analysis

Statistical significance of the differences between the population in the various classes of blood pressure categories was assessed by repeat measure analysis of variance (ANOVA) followed by Dunnett's test for multiple comparisons and statistical difference was established at the 5% probability level. The EPI computer software package was used.

Results

Table 1 shows the information obtained from the subjects and the various measured values. Older subjects (41-60 years) drinking ozu heavily have higher risk of cardiovascular dysfunction, significantly different ($P < 0.05$) from the risk of non-drinkers in the same age-range. Thus, heavy consumption of ozu may be a risk factor of essential hypertension and other cardiovascular complications especially among older consumers.

Judging from the classification of BMI data (table 1, heavy consumption of ozu reduces body weight, especially among the 41-60 age (yr) range. This indicates that chronic excessive consumption of ozu may complicate nutrient (energy) metabolism. Light or moderate consumption appears not to have considerable risk in this regard.

Table 1. Some demographic information and classification of 'ozu' drinkers into blood pressure groups based on values obtained

	21-40 yrs				41-60 yrs			
	Non-drinkers (n = 61)	Light drinkers (n = 56)	Moderate drinkers (n = 163)	Heavy drinkers (n = 202)	Non-drinkers (n = 43)	Light drinkers (n = 68)	Moderate drinkers (n = 101)	Heavy drinkers (n = 86)
Social and demographic information obtained from subjects								
Drinking duration (years)								
0-5	—	51.7	52.8	33.2	—	51.5	31.7	11.6
6-10	—	32.2	25.2	60.9	—	38.2	37.6	58.2
> 10	—	16.1	22.0	5.9	—	10.3	30.7	30.2
Smoking status								
Never	100	89.3	92.6	50.0	93.0	66.2	75.3	44.2
Former	—	7.1	—	5.5	2.3	7.4	8.9	—
1-2 cigarettes/day	—	3.6	6.8	32.1	4.7	17.6	9.9	39.5
3-4 cigarettes/day	—	—	0.6	12.4	—	8.8	5.9	16.3
Household income (₦)/month								
≤ 10,000	—	3.6	7.4	16.3	4.6	11.8	3.0	39.5
10,001-29,999	32.8	37.5	31.3	51.0	18.6	17.6	7.9	48.8
30,000-49,999	54.1	48.2	50.9	25.8	25.6	23.5	41.6	7.0
≥ 50,000	13.1	10.7	10.4	6.9	51.2	47.1	47.5	4.7
Classification of measured data based on recent recommendations								
Body mass index								
Underweight	—	—	—	1.0	—	—	—	5.8
Normal weight	98.4	100	98.2	99.0	95.3	100	97.0	94.2
Overweight	1.6	—	1.8	—	4.7	—	3.0	—
Obese class I	—	—	—	—	—	—	—	—
Obese class II	—	—	—	—	—	—	—	—
Blood pressure groups								
Normal	96.7	94.6	98.8	87.6	93.0	92.6	98.0	27.9*
Prehypertension	3.3	5.4	1.2	10.9*	7.0	7.4	2.0	34.9*
Stage I hypertension	—	—	—	1.5	—	—	—	30.2*
Stage II hypertension	—	—	—	—	—	—	—	7.0

Values are reported in percentages; * $p < 0.05$; ₦ is the naira symbol-the Nigerian currency; light drinkers: 0.075 ± 0.015 l ozu/day; moderate drinkers: 0.200 ± 0.100 l ozu/day; heavy drinkers > 0.300 l ozu/day

Discussion

From this investigation, it appears that heavy consumption of ozu significantly increased blood pressure (cardiovascular) parameters in older drinkers (41-60 years, table 1).

The relationship between chronic ethanol consumption and hypertension has been reported to be solid⁷. This relationship has been observed in white, black and Asian men and women^{3,8} suggesting that it is not unique to a specific group. The demonstrated effect of 'ozu' an alcoholic beverage, on blood pressure parameters and the associated risk of hypertension appears to further strengthen the reported relationship between alcohol and hypertension among black men. Ethanol and its metabolite, acetaldehyde have been observed to activate the sympathetic nervous system which constricts blood vessels and increase the contractile force of the heart⁹. Numerous epidemiological studies have demonstrated that chronic ethanol consumption is associated with hypertension⁸.

One plausible mechanism recently postulated for this relationship centres around the oxidation of acetaldehyde, the first metabolite of ethanol oxidation. Acetaldehyde oxidation by acetaldehyde dehydrogenase increases mitochondrial NADH/NAD⁺ ratio and this stimulates the respiratory chain in order to re-oxidize NADH and maintain the NAD⁺: NADH redox state¹⁰. The resulting increase in electron flow along the respiratory chain has been reported to generate reactive oxygen species¹⁰, which directly react with en-

dothelial nitrogen (II) oxide, NO. The product of the above 'destructive' reaction activates xanthine oxidase^{11,12} known to produce uric acid and reactive oxygen species that could further destroy endothelial NO, a potent regulator of blood pressure¹³. The uric acid produced by the stimulation of xanthine oxidase activity, exhibits an increase in juxtaglomerular renin and a decrease in *macula densa* neuronal NO synthase enzyme activity¹⁴, and these limit the synthesis and release of NO, further complicating endothelial NO availability. Reactive oxygen species generated during the metabolism of ethanol have also been implicated in the pathogenesis of ethanol-associated cell injury¹⁵, microvascular changes and even hypertension¹⁶. Thus, cardiovascular and nutritional (evidence by the proportion of underweight heavy drinkers) disorders may contribute to the ill-health and death of heavy drinkers of ozu. Further research is therefore needed to completely establish facts that would help to alert the public on the inherent dangers of the communities' permissive behaviour to ozu consumption.

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