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Beverage Consumption among Polytechnic Students in Selected Tertiary Institutions in Ogun State South West Nigeria.

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ABSTRACT
Globally, substance abuse is a cause of increased concern among youths. Studies conducted have associated consumption of alcohol as a major contributory factor to manifest and latent violence, crime, and bodily injuries, as well as to other economic, social, in addition to the academic failures. This cross-sectional epidemiological study was conducted between May 2021 to May 2023 to investigate the prevalence of hypertension and hot beverage intake among the Polytechnic Students in Ogun state Southwest Nigeria. Two thousand respondents were randomly selected and examined to determine their socio-economic characteristics and beverage consumption level. A structured pre validated interview guide and Nigeria Beverage Consumption Survey questionnaires were used to determine the beverage intake of the respondents. Data were analyzed using Statistical Package for Social Science version 21. Pearson Correlation was used to determine the P values of the variables. The results of socio demographic characteristics showed that ninety percentage (90%) of respondents were between the age range of 18-44years in was in majority, fifty two percent (52%) were male while forty eight percent (48%) were female, About eighty seven percent (87%) were single while thirteen percent (3%) were married. Beverage consumption result showed that Seven percent (7.4%) took 30ml of fresh fruit juices, two percent (2%) took 600ml of fresh fruit juices, eight percent (8%) took 850ml of fresh fruit juices, one percent (1.4%) took 1000ml of fresh fruit juices, two percent (2%) took 3000ml of bottled fruit juices(without sugar), Two percent (2%) took 850ml of bottled fruit juices(with sugar), two percent (2%) while took 120ml of non-alcoholic wine. There is a significant positive relationship between the beverage intake of the respondents ($p<0.05$). The study showed that the students were not strong drinkers of beverages including water intake ($p>0.05$). There is a need for proper education to the students on the need to stay hydrated to avoid health issues that can arise because of dehydration.

INTRODUCTION
Globally, substance abuse is a cause of increased concern among youths. Studies conducted have associated consumption of alcohol to a major contributory factor to manifest and latent violence, crime, and bodily injuries, as well as to other economic, social, in addition to the academic

failures. The World Health Organisation argued that consumption of alcohol in a way is harmful and a major cause of injuries that have resulted in about two million hundred thousand (2.5 million) deaths globally. The report also estimated that about three hundred and twenty thousand (320, 000) youths aged 15-29 years have lost their lives as a consequence of alcohol-related causes, the figure represents 9 percent the total deaths in the age group. Many of the existing studies on alcohol consumption, however, do not focus on students drinking, usage and attitude in Africa. Despite the deleterious effects of alcohol abuse, it one of the most common psychoactive drugs consumed globally, after caffeine (Stolle et al., 2009).This makes it a global health challenge. However, the pattern of alcohol consumption and abuse vary depending on the studied population; 69.5%, 52.7%, 37.3%, and 29.3% in Europe, America, Western Pacific Region, and Africa respectively. In Nigeria, different studies put the prevalence of alcohol use at about 9.2%–65% (WHO, 2018). The result of this trend has also reflected on fatal outcomes; the WHO puts the percentage of death directly associated to alcohol use at 4% (WHO, 2018).

Alcohol abuse has been linked to a number of medical conditions, affecting different systems, including the cardiovascular, respiratory, and endocrine (especially diabetes) systems. It has also been implicated in immune suppression and other metabolic disorders most importantly obesity, anemia, and malnutrition. CVDs are the number 1 cause of death globally: more people die annually from CVDs than from any other cause. An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke. Over three quarters of CVD deaths take place in low- and middle-income countries. Out of the 17 million premature deaths (under the age of 70) due to noncommunicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by CVDs. Most cardiovascular diseases can be prevented by addressing behavioural risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol using population-wide strategies (WHO, 2018). People with cardiovascular disease or who are at high cardiovascular risk (due to the presence of one or more risk factors such as hypertension, diabetes, hyperlipidaemia or already established

disease) need early detection and management using counselling and medicines, as appropriate (WHO,2018).

The importance of polytechnic students are germane to every nation and their wellbeing, physical health and psychological state are indispensable to the local, state and national development. Beverage intake and its implications on health are major threats to students' academic performance, health status and their future. Since this can be prevented or it's negative effects limited, it is thus important to study the extent of these problems among students of tertiary institutions in Ogun state. Very few published studies have reported quantitative intakes of even other beverages and beverage consumption in Nigeria.

SUBJECTS AND METHODS

Study Location

This study was carried out in three selected institutions in Ogun state namely: Moshood Abiola Polytechnic, Federal Polytechnic Ilaro and Ogun state college of Health Technology Ilese.

Study Population and Sampling

The study was descriptive and cross sectional study was carried out in three selected institutions of the states in Nigeria between May to September 2021 when the project commenced and was consummated between January to May 2023 when the final write up was collated. The study population consisted of students in tertiary institutions in Ogun state.

Selection Criteria

- Participants were registered students in any of the selected institution.
- Those who had been clinically ill 24 hours previous to the day of the interview were excluded.
- Participants must not be on any medications.

Sample Size Selection

Since part of the objectives of this study is to estimate the hypertensive proportion of subjects, a prevalence value of 40±2.5% was used. The

choice of this value was based on the results of the pilot survey and an earlier study on beverage consumption patterns of civil servants (Nupo 2016). The margin of error was put at 5% and anticipated non-response rate at 10% to obtain a minimum sample size of 2000. A total of 3000 sample size was to be sampled.

Sampling Procedures

A multi stage sampling procedure was be used to select the three Thousand students. For the second stage, students sampled were selected randomly. In the third stage, respondents were randomly selected from the sample institution.

Ethical Approval

Ethical approval for this survey was obtained from the Nutrition and Dietetic Moshood Abiola Polytechnic Ethical committee and individual consent was sought and obtained from the participants. A full description of the aim and Objectives of the study was provided to the students and every participant, with a clear indication of the nature of questions. Firm assurances were given to them about the commitment of the research team to preserve the confidentiality of all the information provided. In line with the principles of informed consent, they were given the option to participate voluntarily or not in the survey. Subsequently those who consented participated in the study.

24- Hour Dietary Recall

The 24-hr intake recall has been recommended as a method for determining fluid intake especially where the 7-day diary method is unsuitable. Indeed, many countries like Belgium, Hungary and Iceland as well as USA (Kant *et al.*2019) have used data from 24-hr dietary recall for establishing their National beverage intake recommendations. This present study employed the multiple pass 24-hr intake recall procedure to capture fluid intake during and outside meal events, at home and outside home. The probes that was used in this study have been published earlier. Estimation of fluid volume consumed was aided by the use of local cups, mugs and bottles.

The fluids of consign in this study were recorded and classified into the following categories: Hot beverages (including hot tea and coffees as well as chocolates), Sport and energy drinks. Pilot testing of the questionnaire will be conducted earlier in the survey area to ensure clarity of the questions. The recalls were administered on two days; one weekday and one weekend day and the average of the two was calculated and used for final analyses. The fluids were recorded and classified into the following categories: 1. Drinking water intake such as tap water, bottled water and sachet water, 2. Milk and milk alternatives, 3. Sodas including regular and diet sodas in cans or bottle, 4. Fruit juices (to include 100% fruit juices, all fruit drinks and concentrates, all non-alcoholic "wines"), 5. Vegetable juices to include fresh and bottled vegetable juices, 6. Alcoholic beverages such as beer, stout, wine, brandy and gin, 7. Herbal mixture such as non-alcoholic mixture, proprietary and non-proprietary alcohol. Pilot testing of the questionnaire was conducted earlier in the survey area to ensure clarity of the questions. The recalls were administered on two days; one week day and one weekend day and the average of the two were calculated and used for final analyses.

DATA ANALYSIS

Data analyses were carried out testing for gender variations as well as socio demographic variations in beverage consumption. Means and standard errors will be calculated for continuous variables while proportions with percentages was calculated for categorical variables. Associations of beverage intakes with demographic and socio-economic characteristics were determined using analysis of variance (ANOVAs). Pearson correlation was used to determine the statistical difference between the variables.

RESULTS

Socio-Demographic Characteristics of the Respondents

Table 1 shows that ninety percentage (90%) of respondents were between the age ranges of 18-25 years in was in majority. It shows that fifty two percent (52%) were male while forty eight percent (48%) were female, about eighty seven percent (87%) were single while thirteen percent (3%) were married.

Water Intake of the Respondents

Table 2 below shows that twenty-eight percent (28%) took less than 3700ml of sachet water and eighty-five (85%) took greater than 3700ml of sachet water. It shows that six percent (6%) took 750ml of bottled water, two percent (2%) took 1500ml of bottled water, eight percent (8%) took 300ml of bottled water, four percent (4%) took 3750ml of bottled water, eight percent (8%) took 4500ml of bottled water, two percent (2%) took 5250ml of bottled water, two percent (2%) took 6000ml of bottled water and two percent (2%) took 6750ml of bottled water , two percent (2%) took 500ml of tap water, two percent (2%) took 1000ml of tap water, six percent (6%) took 1500ml of tap water, two percent (2%) took 1750ml of tap water, two percent (2%) took 2500ml of tap water, two percent (2%) took 3500ml of tap water, two percent (2%) took 75ml of well/bore/river water, four percent (4%) took 750ml of well/bore/river water, two percent (2%) took 4750ml of well/bore/river water. Table 3: shows that Four percent (4%) took 250ml of liquid milk, six percent (6%) took 300ml of liquid milk, two percent (2%) took 500ml of liquid milk, two percent (2%) took 140ml of milk alternatives, five percent (5%) took 250ml of milk alternatives, two percent (2%) took 300ml of milk alternatives, two percent (2%) took 300ml of milk alternatives, two percent (2.4%) took 70ml of yoghurt, four percent (4%) took 140ml of yoghurt, two percent (2.2%) took 145ml of yoghurt, one percent (1.2%) took 140ml of yoghurt, twenty-one percent (21.4%) took 500ml of yoghurt, two percent (2%) took 570ml of yoghurt, two percent (2%) took 800ml of yoghurt, one percent (1%) took 1000ml yoghurt.

Table 4. shows that Seven percent (7.4%) took 30ml of fresh fruit juices, two percent (2%) took 600ml of fresh fruit juices, eight percent (8%) took 850ml of fresh fruit juices, one percent (1.4%) took 1000ml of fresh fruit juices, two percent (2%) took 3000ml of bottled fruit juices(without sugar), Two percent (2%) took 850ml of bottled fruit juices(with sugar), two percent (2%) took 120ml of nonalcoholic wine. Table 5 expressed the mean and standard deviation of beverage intake of the respondents. It shows the mean and standard deviation of sachet water (4769.78±13001), Bottled water (1781.25±1530.8), Tap water (1718.75±920.4), well/bore/river water (1581.25±2136.3), liquid milk (266.0±57.5), Milk alternatives (247.86±23.2), yoghurt (422.27±274.3), Soft drinks (608.96±274.3), fresh fruit juice (451.02±274.3), Non-alcoholic wine (120.0), Bottled juice (with

sugar) (355±173.9), tea (253.4±12.9), chocolate (324.3±195.9), Energy drink (395.5±54.2), Zobo (523.3±105.9), malt (330.00±0)

Table 6 shows that there is a significant positive relationship between sachet water and weight(0.131),sachet water and BMI(0.115),sachet water and waste (0.097),sachet water and hip(0.155),sachet water and systolic(0.034),sachet water and diastolic(0.026). It also shows that there is a significant positive relationship between bottled water and weight(0.187),bottled water and BMI (0.271),bottled water and waste (0.100),There is negative inverse correlation between bottled water and hip (-0.210), there is a significant positive relationship between bottled water and systolic(0.109),bottled water and diastolic. It reveals that there is a significant positive relationship between tap water and weight, tap water and waist, tap water and hip, tap water and systolic($p>0.05$),there is negative inverse correlation between tap water and diastolic($p>-0.05$). It also shows that there is a significant positive relationship between well/bore/river water and weight, well/bore/river water and BMI, well/bore/river water and waist, well/bore/river water and hip, well/bore/river water and systolic, well/bore/river water and diastolic ($p<0.05$). It indicates that there is a negative inverse correlation between liquid milk and weight, liquid milk and BMI, liquid milk and waist, liquid milk and hip, liquid milk and systolic, liquid milk and diastolic($p>-0.05$).

Table 1.Sociodemographic of the Respondents

Age of Respondents	Frequency	Percentage (%)
18-25 years	1700	90
26-45 years and above	300	30
Total	**2000**	**100**
Gender		
Male	1565	52
Female	435	48
Total	**2000**	**100**
Marital Status		
Single	1579	87
Married	353	13
TOTAL	**1932**	**100**
LEVEL/CLASS		

Table 2: Water Intake of the Respondents

LIQUID INTAKE(ml)	PERCENTAGE
SACHET WATER	
Less than 3700	28
Greater than 3700	85
Total	**98.6**
BOTTLED WATER	
750	6
1500	
2250	8
3000	6
3750	4
4500	8
5250	2
6000	2
6750	2
	11.2
TAP WATER	
500	2
1000	2
1500	6
1750	2
2500	2
3500	2
Total	1.6
WELL/BORE/RIVER	
75	2
750	4
4750	2

Table 3: Milk & Milk Alternatives Intake of the Respondents

Liquid Milk (ml)	Percentage
250	4.2
300	6
500	2
Total	**5.2**
Milk alternatives	
140	2
250	5.2
300	2
Total	**5.6**
Yoghurt	
70	2.4

140	4
145	2.2
314	7
400	1.2
500	21.4
570	2
800	2
1000	1.0

Table 4: Fruit Juices Intake of the Respondents

Fresh Fruit Juices (ml)	Percentage
300	7.4
600	2
850	8
1000	1.4
Total	**9.8**
Bottled Fruit Juices (With Sugar)	
300	2
850	2
Total	**2.0**
Non Alcoholic Wine	
120	2

Table 5: Mean and Standard Deviation of Beverage Intake of the Respondents

Beverage Type	Mean and Standard Deviation
Sachet water	4769.78±1300.1
Bottled	1781.25±1530.8
Tap water	1718.75±920.4
Well/bore/river water	1581.25±2136.3
Liquid milk	266.0±57.5
Milk alternatives	247.86±23.2
Yoghurt	422.27±274.3
Soft drinks	608.96±274.3
Fresh fruit juice	451.02±274.3
Nonalcoholic wine	120.0
Bottled juice(with sugar)	355±173.9
Tea	253.4±12.9
Chocolate	324.3±195.9
Energy drinks	395.5±54.2
Zobo	523.3±105.9
Malt	330.00±0

Table 6. Correlation between Beverage Intake and Cardiovascular Risks

	Weight	BMI	Waist	Hip	Systolic	Diastolic
Sachet water	0.131**	0.115*	0.097*	0.155**	0.034	0.026
Bottled water	0.187	0.271*	0.100	-0.210	0.067	0.229
Tap water	0.014		0.319	0.236	0.109	-0.334
Well/bore water	0.658	0.259	0.257	0.256	0.632	0.470
Liquid milk	-0.225	-0.094	-0.177	-0.348	-0.206	-0.092
Milk alternatives	-0.066	0.147	0.158	0.233	-0.176	0.049
Soft drink	0.041		-0.82	-0.041	-0.021	-0.118*
Fresh fruit juices	0.209	0.192	0.166	-0.158	0.052	-0.291*
Bottled fruit(with sugar)	0.400	0.527	-0.405	0.253	-0.389	-0.201
Tea	0.024	-0.139	-0.189	-0.128	-0.083	-0.406
Chocolate	0.173	0.091	0.071	-0.113	0.217	0.063
Energy drinks	0.029	0.054	-0.011	-0.063	0.010	-0.070
Zobo drinks	0.069	0.065	0.30	-0.113	0.048	-0.120

DISCUSSION

The present study assessed the beverages consumption and cardiovascular risk factors of risk factors among polytechnic in selected tertiary institution in Ogun State, Southwest Nigeria. The result of the background variables associated with the liquid intake of the respondents. The results indicates that greater than 3700ml water consumption was more prevalent among the participants than bottled water with the value of 5.8%. This corresponds partly to data from the National Health and Nutrition Examination Surveys (NHANES) from 1999–2006 among more than 4000 U.S. adult participants, where the

researchers found that water intake declined with increasing age and higher education was associated with higher water consumption (Kant *et al.*, 2019)

The study also found out that participants are interested in liquid milk, milk &alternatives, yoghurt, soft drinks, fruit juices, bottled fruit juice, hot beverages, chocolate, energy drinks and zobo drink respectively than consuming water ($p<0.05$) . We observed no associations between milk intake and background variables. Canadian data from 35,000 participants in 2004 described that the proportion of adults who reported drinking milk tended to rise with increasing age. The same study also found that juice consumption was associated with younger age groups (Garriguet, 2018).This corresponds to the results from the present study as the odds of juice consumption were significantly lower in the oldest, compared to the youngest, age group. Liquid intake consumption was associated with all factors analyzed in our study; being in the oldest age group, having a normal or low BMI, being interested in a healthy diet, and being a non-smoker. Higher liquid consumption with increasing age was also reported in the aforementioned Canadian study (Garriguet, 2018). A study among almost 6000 university students in Taiwan found that having a higher BMI was a significant predictor of tea drinking (Tseng *et al.*, 2014) which contrasts with our results. De Castro and Taylor describe an association between cigarette smoking and frequent consumption of beverages and tea among 650 U.S. adults (De Castro and Taylor, 2018). This complies with our results for liquid intake of the respondents, but is opposite of our results for tea consumers.

Consumption of sugar-sweetened beverages dropped sharply at older ages in both the present and other studies (Tseng *et al.*, 2014). This finding indicated that participants with university or college education had lower odds of consuming sugar-sweetened beverages. The association between consumption of beverages and lower or no education has also been found in other studies (Rehm *et al.*, 2018). Liu et al. (2015) described that, compared to college educated individuals, the odds of consuming sugar-sweetened beverages were more than three times greater for those with high school education or less. A lower socioeconomic position is associated with higher consumption of sugar-

sweetened beverages is not clear, but it has been argued that the low cost and aggressive marketing in low-income areas could be an explanation (Mullie *et al.,* 2012). It is well documented that low socioeconomic position is associated with a clustering of unhealthy lifestyles, such as smoking, unhealthy dietary patterns, and obesity (Mullie *et al.,* 2010).

Drinking sugar-sweetened beverages regularly can be seen as an unhealthy habit due to the high energy-content and the low nutritional value (Mullie *et al.,* 2012).In a study among almost 2000 military men in Belgium, high BMI and trying to lose weight were found to be positively related to consumption of artificially sweetened beverages (Mullie *et al.,* 2010).This corresponds to our results where participants with a BMI of 18.50 to 24.9 or higher had 74.2% higher odds of consuming artificially sweetened beverages, compared to participants with a normal or low BMI. This may indicate that people being overweight or obese are drinking more artificially sweetened beverages in an attempt to lose weight (Mullie *et al.,* 2010). Intake of beverages remains high in the Africa and is rising in many parts of the world. Based on findings from prospective cohort studies and short-term experimental trials of cardiometabolic risk factors, there is strong evidence for an etiological relationship between intake of SSBs and weight gain and risk of CHD. The evidence for a link with stroke is less clear and warrants further research, including the potential sex difference. Few studies have investigated intake of beverages in relation to cardiovascular risk factors and this may be due to challenges in assessment and controversy about its clinical utility. Beverages are thought to promote weight gain through incomplete compensation for liquid calories at subsequent meals. These beverages may increase T CHD in part through weight gain and independently through metabolic effects of constituent sugars. A mechanistic area that warrants future research is exploring the health effects of sugar consumed in solid form compared to beverages, and further elucidating compensatory effects of liquid vs. solid sugars. With the strength of evidence sufficient to call for reductions in intake of SSB for optimal cardiometabolic health, important research gaps exist regarding suitable alternative beverages, including the long-term health effects of consuming beverages.

While there may be some health benefits associated with modest consumption of beverages, particularly sweetened sugar beverages, it is clear that high intakes of beverages are associated with increased blood pressure and increased risk of CVD and death. Consumption of **s**ugar-sweetened but not artificially sweetened beverages was associated with a significantly increased risk of CHD. Sugar-sweetened beverage intake was also associated with adverse changes in some blood lipids, inflammatory factors, and leptin. These results and those from other observational studies and trials support recommendations to reduce the consumption of sugar-sweetened beverages to prevent CVD.

CONCLUSION

The study showed that the students were not strong drinkers of beverages including water intake ($p>0.05$). There is a need for proper education to the students on the need to stay hydrated to avoid health issues that can arise because of dehydration.

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