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Prevalence of Alcohol Consumption and its Associations in Gezira State, Sudan, Results Form 2017-2020 Steps Survey

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Abstract

Background

The WHO say that Alcohol abuse is responsible for 5.9% of all deaths worldwide, or 3.3 million deaths each year. More than 200 illness and injury disorders are caused by alcohol. According to disability-adjusted life years, alcohol is responsible for 5.1% of the worldwide burden of disease and injury (DALYs). Various studies investigated the prevalence and association of alcohol consumption in Sudan, but few studies reported Gezira state.

Objectives

To determine the magnitude of alcohol consumption and its association in Gezira state, Sudan.

Methods

Using the WHO STEPwise approach to chronic disease risk factor surveillance, a population-based, cross-sectional, multi-stage clustered sample survey was conducted in 2017-2020 on 648 participants aged 18–64 years. Socio-demographic and behavioral risk factors, Physical anthropometric measurements, blood pressure, blood cholesterol and glucose levels were collected in 3 steps.

Results and Conclusion

The study showed alcohol consumption prevalence of 3 %. There was an association between drinking alcohol and residing in the locality. Also, the study showed an association between alcohol consumption and gender.

However, the survey showed no association between alcohol consumption and age groups or marriage status.

The study showed an association between alcohol consumption and systolic and diastolic blood pressure. However, there was no significant association between alcohol consumption and blood glucose and cholesterol levels. These data could be useful in the formulation and advocacy of NCD policy and action plans in Gezira.

Keywords: Prevalence, Alcohol, Consumption, Sudan

Background

The main contributors to disease burden globally are non-communicable diseases (NCDs) [1]. The World Health Organization (WHO) estimates that NCDs account for 71% of all fatalities worldwide, with low- and middle-income countries (LMICs) accounting for about 85% of NCD-related premature deaths [2].

NCDs have non-modifiable risk factors such as (age, genes, race, and fetal origins) and modifiable factors that include; behavioral risk factors including smoking, alcohol use, poor diet, and physical inactivity, as well as biological risk factors, including elevated blood pressure (BP), blood glucose, and cholesterol levels, as well as overweight and obesity. More than half of the NCD burden could be avoided through health promotion and prevention initiatives [3]. Furthermore, it has been shown that clustering, or the coexistence of several risk factors in one person, increases the likelihood of NCDs progressing [4]. Other factors include efficient and effective health services and healthy environment, limited access to tobacco, and alcohol which all examples of social determinants of health inequities [2, 5].

The WHO say that Alcohol abuse is responsible for 5.9% of all deaths worldwide, or 3.3 million deaths each year. More than 200 illness and injury disorders are caused by alcohol. According to disability-adjusted life years, alcohol is responsible for 5.1% of the worldwide burden of disease and injury (DALYs) [1, 4]

Early life alcohol drinking results in death and impairment. A quarter of all deaths among those aged 20 to 39 are thought to be related to drinking. Furthermore, A number of mental and behavioral illnesses, other noncommunicable diseases, as well as injuries, are causally related to alcohol abuse. The most recent studies have shown a link between unsafe drinking and the

occurrence of infectious diseases like TB [5, 6].

Manthey *et al*., [7], warns that global alcohol consumption has increased by 70%. The authors caution that this is a risky habit that policymakers need to address. In developing countries, alcohol consumption has increased significantly. The lack of early detection and treatment of alcohol-related problems in women puts them at risk of acquiring NCDs because treatment programs frequently focus on the necessities of men. Therefore, it's not only alcohol consumption but the gender differences, and sometimes gender inequality which can be risk factor for chronic diseases. Distinct patterns of sex inequalities were present in self-reported testing and the prevalence of NCD risk factors in Kerala [8]. Furthermore, Adgoy [5] says that with a higher percentage of illiteracy, women have less access to written information regarding NCDs, risk factors, prevention, and treatment.

In Africa, Alcohol consumption per person and the prevalence of alcohol-related diseases have both increased in Central Africa, but they have stabilized or decreased—although they are still high in other regions [9, 29]. The majority of nations have tax laws in place, some countries with a majority of Muslims have complete alcohol bans, while others have only minor restrictions (like Botswana). Several countries have also tried but they rarely use additional World Health Organization recommendations for affordable alcohol control measures [10, 29]. Alcohol manufacturers have continued their active policy-meddling and marketing campaigns. Some of these efforts have been recognized and, in some cases, opposed by civil society and public health activists, particularly in southern Africa [11].

In Sub-Saharan Africa, Milanzi and Ndasauka [12, 29] observed significant prevalence of alcohol use in Lesotho Madagascar, and Uganda of around (54%), Rwanda (76%), Addiction rates ranged from 0.3% in Madagascar to 30% in Ethiopia and 17.4% in Rwanda. According to the overall data, the rising burden of alcohol consumption in Africa presents a significant challenge, and the lack of efficient policy implementation makes the fight against alcoholism more difficult.

Few studies investigated the prevalence of alcohol consumption in Sudan. The 2016 WHO STEPwise survey say that the prevalence of alcohol consumption among drinkers during the past 30 days was (3.6%) among males (3.6%) as compared to 0.3% among females [13]. Moreover, Gezira state lacks recent representative pooled data on alcohol intake. Limited Available data come from student-university reports, mortality studies, hospital statistics, treatment programs, medical surveys of training programs, and medical societies.

Methodology

Sample Size:

The Poverty Survey was done concurrently with the stepwise survey to collect data. Yet, due to divergent overall objectives, the sample size had been determined differently for each survey. The primary objective of the poverty survey was to compare states, but the current study's focus is on comparing people across age groups and genders. The WHO template was used to determine the sample size [14] (Fig 1):

The formula used for the calculation of the sample size is:

$$n = \frac{z^2 * p(1-p) * deff}{(\epsilon p)^2 (1-r)} * 2 * 6$$

where:

n = the required sample size, (number of HHs, individuals)
z = the value in the normal distribution that gives a level of confidence of 95% (z = 1.96)
p=the prevalence of the most important indicator in the study (0.5).
r = non-response rate (r = 10%)
deff = the design effect, (deff = 1.5)
ϵ = the relative margin of error at 95% confidence (RME=0.10).
2= The number of gender groups.
6= The number of regions.

Substitution in the formula gives:

$$n = \frac{1.96^2 * (0.5)(1-0.5) * 1.5 * 2 * 6}{\{(0.10)(0.5)^2 (1-0.10)} = 7684 \text{ individual} = 7700$$

Accordingly, the total number of clusters in Sudan in the survey will be:

7700/27 = 285 (each cluster is 27 HH)

the total number of clusters in Gezira State in the survey will be:

285/ 12 = 24

Accordingly, the total number of HH in Gezira State in the survey will be 24*27 =648

Fig 1

However, in this survey, p=0.5 is adopted to allow:

1. Getting good estimates for all parameters of interest and,
2. Getting reasonable estimates for all parameters under study for each region considered.

For each region independently, this formula used. All regions share the other values in the formula. According to the size (population) of each region, the sample for that region is determined. The sample size is stated above.

It is also necessary to determine how many clusters there will be and how many homes (HH) will be in each cluster. In order to provide the required overall sample size, one can choose between having more clusters overall but fewer HH in each cluster or fewer clusters overall but more HH in each cluster.

On the other hand, it is expected in this study that all NCD-related characteristics, such as smoking, are nearly identical in HHs grouped together. If we take a large sample from clusters, we won't learn anything new. The idea was to choose 27 HH from each cluster. Of course, this fits with how the poverty survey is set up, where 27 HHs are chosen from each cluster.

Accordingly, the total number of clusters in the survey will be:

7700/27 = 285

This will be distributed proportionally between the 11 selected states.

The following table gives the selected sample distribution of clusters, as urban and rural

Table 1: Selected sample distribution of clusters, as urban and rural

State	N0. HHs	Number of urban clusters	Number of rural clusters	Total
Gezira	648	12	12	24

Figure 2

Modified 27 *24 = 648 (Fig 2)

As for the selection of the HHs, the same 27 HHs in the Poverty Survey will be taken. Then the selection of the individuals within the HH will be done through Kish Method.

Sample Selection:
In this study, the sample design was a three-stage cluster sample:
First Stage: the first stage was the selection of the Primary Sampling Units (PSUs), the selection of the PSUs was through Probability Proportional to Size (PPS).
Second Stage: the second stage was the selection of the Secondary Sampling Units (SSUs), which were the households (HHs). This selection was done using systematic random methods.
Third Stage: the third stage was the selection of the Tertiary Sampling Units (TSUs) using Kish Method, which were individuals aged 18-64.

Data collection:
Data were collected using the WHO stepwise questionnaire for NCDs risk factors with some modifications. Step 1 provides personal data, socioeconomic data, and basic data on behavioral risk factors (nutrition, tobacco use, alcohol use within the last 30 days and physical activities). Step 2 is physical measurements which provide data on height, weight, and blood pressure. Step 3 is composed of biochemical measurements which provide data on sugar and lipids [14]. The data was collected by trained teams; each composed of a medical doctor (as a team leader), a social worker, a health worker, a laboratory technician, and a driver.
The main objective of the STEPwise approach to noncommunicable disease risk factor surveillance (STEPS) is to collect core data on the established risk factors that account for the majority of NCDs' burden [14]. The questionnaire is divided into three steps:

- Step 1: questionnaire step 1 covers the behavioural risk factors for NCDs (i.e., tobacco use, alcohol consumption, diet, and physical inactivity)
- Step 2: physical measurements Step 2 covers measurements for height, weight and blood pressure.
- Step 3: blood and samples covers measures for fasting blood glucose, cholesterol level

Quality and Data Management:
I Pads were used to collect the data. A system for quality assurance was put in place to guarantee that the study is carried out to a high degree monitoring during the study reduced the amount of missing data.

Ethical clearance
The research team obtained in two written informed consent forms, were by the chosen person had the option of participating in the survey or not. Interviews were done in a way that protected participants' privacy and confidentiality. The state ministry of health's ethical committee provided ethical approval.

Fieldwork
The work started on the state's 40 Administrative units. Deployment of teams-Immediately after training, interviewers were divided into 2 teams of 5 each. In each locality, teams worked 8 hours a day. Every supervisor supervised 2 teams and 1 supervisor for each locality.
The questionnaire was filled out by each Team leader/interviewer alongside participants. The team leader/interviewer was also in charge of making sure that the questionnaires, consent paperwork, tests for sugar and lipids. The health professional was in charge of taking physical measurements such as blood pressure, height, weight, measurements and reporting them.

Data analysis:
The data was revised and cleaned from the outliers. Further analysis took place using SPSS version 26.

Table 2: Prevalence of alcohol consumption in Gezira state and localities

Locality	**Alcohol consumption**		**Total**
	Yes	**No**	
Ganoob Gezira	1	53	54
Hasaheisa	3	132	135
Kamleen	0	54	54
Medani	1	107	108
Managil	15	201	216
Sharg Gezira	0	81	81
Total	**20**	**628**	**648**

The prevalence of alcohol consumption in Gezria state is 20/648*100=3 %

Table 3: Alcohol consumption and its association

Association (chi-square Test)	*P.Value*	*Comment*
Alcohol consumption and gender-demographics	.000	Highly Significant
Alcohol consumption and systolic blood pressure	.000	Highly Significant
Alcohol consumption and diastolic blood pressure	.043	Significant
Alcohol consumption and locality residence	0.04	Significant
Alcohol consumption and age groups	.113	Not significant
Alcohol consumption and marriage	.099	Not significant
Alcohol consumption and physical activity	.557	Not significant
Alcohol consumption and measurement of blood pressure	.191	Not significant
Alcohol consumption and history of raised blood pressure	.085	Not significant
Alcohol consumption and measurement of diabetes	.401	Not significant
Alcohol consumption and blood glucose levels	.174	Not significant
Alcohol consumption and total cholesterol levels	.771	Not significant

Discussion
Alcohol is one of the major risk factors for various NCDs like cancer, digestive diseases, cardiovascular diseases (CVD), and mental problems. The risk of mortality and

morbidity from alcohol consumption is significantly higher in low- and middle-income countries and among young people and the elderly [2, 15]. The WHO says that alcohol use accounted for 2% (95% uncertainty interval [UI] 15-30) of age-standardized female fatalities and 6.8% (58-80) of age-standardized male deaths in 2016, ranking eighth globally in terms of risk factors for deaths and DALYs [2, 15].

The prevalence of alcohol consumption in the last 30 days in Gezira is 3 % (table 2). The highest percentage was reported in Managil locality (table 2). Sudan's STEPS survey 2016 showed that males are twelve times more likely than females to have consumed alcohol in the past 30 days, with a prevalence of 3.6% compared to 0.3%. Furthermore, there is an association between drinking alcohol and residing in the locality (Chi-square =.004, d.f =5). Sudan STEPS survey (2016) current alcohol consumption showed different rates around the country [13, 14, 15]. Darfur Region had the largest percentage of current drinkers (4.4%) and Khartoum had the lowest level (0.6%). The Northern Region had the lowest rate of heavy episodic drinking (0.4%), whereas the Darfur Region also showed heavy episodic drinking (4.0%) [13, 14, 15]. The WHO (2) say that gender differences, age categories, ethnic and religious groups, cultures, and levels of socioeconomic development all influence alcohol consumption and drinking habits. Males have a larger burden of disease than females due to alcohol usage. However, the study showed an association between alcohol consumption and gender (Chi-square =.000 d.f =5).In the United States, males still consume more alcohol than females do, and they also sustain and contribute to more alcohol-related injuries and fatalities, but the differences are narrowing. Gaps in alcohol consumption have shrunk among young people and emerging adults, mainly because men's alcohol use has decreased more than women. Alcohol use among adults is rising for women but not for males [17].

Drinking patterns differ significantly between age groups, socioeconomic levels, between ethnic or religious groups and among different cultures [18]. According to surveys, age and sex are the best indicators of alcohol usage.

Furthermore, alcohol dependence, or chronic heavy drinking, all of which have negative health and social effects. Alcohol usage contributes to traumatic outcomes such as injury, disability, and death in addition to chronic diseases that may impact consumers after many years of excessive use. Therefore, alcohol use can have effects that extend beyond the individual to the family, community, and broader social environment [19].

The survey showed no association between alcohol consumption and age groups or marriage (Chi-square =.113 d.f =5 and Chi-square =.99 d.f =5). In a study by Aremu *et al*., (2021), Ibadan, Nigeria, 29.0% of participants said they had ever consumed alcohol, while 13.6% said they had done so during the 30 days before the survey. Gender and income were significantly linked to ever drinking (p 0.000). In all countries, men had higher percentages of high-frequency, heavier-typical quantity, and higher-risk drinking than did women Both marital and parental statuses were inversely associated with acute and chronic excessive alcohol use at most ages, however the magnitude of these associations and gender differences in these associations varied by age. There were greater differences between adults who were married vs. never married and parents vs. not in excessive alcohol use during young adulthood as compared to later adulthood. The association of parental status with acute excessive alcohol use was stronger for women compared to men in young adulthood [18].

Evans-Polce *et al*., [19] say that marital and parental statuses were inversely associated with alcohol use at most ages. However, the strength of these associations and gender differences varied with age. When comparing early adulthood to later adulthood, there were more differences between persons who were married vs. never married. For women in young adulthood compared to men, the relationship between parental status and acute excessive alcohol use was stronger.

Veerbeek *et al*., [20] Dutch study concluded that the prevalence of alcohol consumption was higher in older (55-70 years) than younger groups (6.7% versus 3.8%), whereas alcohol disorder was less prevalent (1.3% versus 3.9%). Heavy alcohol use was associated with higher education levels and in older adults in comparison to younger categories. However, the influence of alcohol on functioning and the use of healthcare services, as well as other problematic alcohol use traits, were not age-group-specific.

The prevalence of heavy harmful alcohol use in Kenya's STEPs survey 2015 was13.8%. Drinkers were young males, less educated, married people, and tobacco users Kendagor *et al*., [22]. However, 2009 Malawi STEPS survey excessive alcohol drinkers were 7.7% while Al-Mawali *et al*., [23] say that Oman's alcohol consumption was 2% in the 2017 STEPwise survey.

The effects of alcohol on overall health, including cholesterol levels, and glucose levels differs from a person to a person. However, the association between alcohol in Gezira and blood glucose and cholesterol levels, showed no significant association (Chi-square =.174, d.f =5 and Chi-square =.520, d.f =5, respectively). According to research on alcohol consumption patterns and the risk of diabetes in the general Danish population, Holst *et al*., 2017 [24] concluded that frequent alcohol consumption increases the chance of getting diabetes. Moreover, Pisinger. *et al*., [25] say that the kind of alcoholic beverage had diverse impacts on the change in HDL-cholesterol concentration while moderate alcohol use was linked to slower HDL-cholesterol declines. Furthermore, Minzer *et al*., [25] showed that regular alcohol intake was significantly associated with hypertriglyceridemia and that the length of drinking was significantly associated with hypercholesterolemia.

According to Hendriks [26], consumption of light to moderate amounts of alcohol (up to 14 g for women and up to 28 g for men) may be related with a lower risk of mortality, primarily due to lower risks for cardiovascular disease and type 2 diabetes. Heavy Alcohol use consumption leads in physical and mental illnesses like dementia, pancreatitis, liver disease, and many types of cancer. The majority of the risk factors for alcohol use disorder are unclear. Regular heavy drinking and alcohol use disorders are harmful to one's health.

Golan *et al*., [27] provided new evidence concerning the various impacts of alcohol consumption. The study suggested that initiating moderate alcohol consumption among well-controlled type 2 diabetics is apparently safe, in regard to changes in heart rate variability and carotid plaque formation.

The study showed an association between alcohol consumption and systolic and diastolic blood pressure (Chi-square =.000 d.f =20 and Chi-square =.043 d.f =20). Similarly, Day and Rudd [28] say that regular alcohol use

raises BP in a dose-dependent manner, with a relative risk for hypertension (systolic or diastolic BP > 140 mm Hg or 90 mm Hg) of 1.7 mm for 50 g ethanol/day and 2.5 at 100 g/day. After as little as one month of alcohol abstinence, a significant drop in blood pressure measurements is predicted. Even in those with normal heart function, binge drinking of a lot of alcohol is linked to the emergence of abrupt cardiac disorders.

Puddey *et al*., [31] concluded that the link between alcohol and blood pressure (BP) is causal. The idea that moderate alcohol use lowers women's blood pressure is becoming less and less tenable. The causal relationship between drinking alcohol and an elevated risk of numerous cardiovascular events includes alcohol-related hypertension. Every patient with higher BP has to get a thorough alcohol history due to the high prevalence of both alcohol use and hypertension. Lower BP and a lower risk of negative cardiovascular consequences are advised by early intervention for excessive alcohol use.

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