

Research Paper

Effect of Alcohol consumption on some haematological and haemostatic parameters among consumers in Birnin Kebbi, Kebbi State, Nigeria

Abstract

Problem Statement: Alcoholism is a global public health problem with a significant socioeconomic implications. This prospective case-control study included one hundred adults alcoholics (≥ 18 years), aged range (18-60) and mean age (38.46 ± 13.26). Fifty gender and age matched non-alcoholics were monitored as controls. The aim was to investigate the effect of alcoholism on the haematological and haemostatic parameters of consecutively recruited alcoholics in Birnin Kebbi, Kebbi State, North Western Nigeria.

Result: Subjects were classified into two groups (50 chronic and 50 moderate alcoholics) Platelet count of non-alcoholics, moderate and chronic alcoholics was; 260.7 ± 48.17 , 253.3 ± 43.16 and 130.6 ± 6.79 respectively. Platelet count was significantly lower among chronic alcoholics compared to non-alcoholics ($p=0.0001$). Although marginally higher, there was no statistically significant difference in the platelet count of moderate alcoholics and non-alcoholics ($p= 0.10$). We observed a negative correlation between platelet count and duration of alcoholism ($r= -0.62$). The mean PT and APTT values of non-alcoholics, moderate alcoholics and chronic alcoholics was; (14.46 ± 0.97 and 34.82 ± 13.71), (15.74 ± 1.26 and 35.78 ± 3.50) and (19.46 ± 0.93 and 43.42 ± 5.13) respectively. PT and APTT values were significantly lower among chronic alcoholics compared to non-alcoholics ($p=0.0001$). PT and APTT were marginally higher among moderate alcoholics compared to non- alcoholics. The difference however was not statistically significant ($p= 0.08$ and 0.62 respectively). We observed a positive correlation between duration of alcoholism and PT and APTT and ($r= 0.46$ and 0.55 respectively). The examination of peripheral blood smears indicated a high prevalence of macrocytosis, target cells and stomatocytes among alcoholics compared to non-alcoholics.

Conclusion: Our study has shown that chronic alcoholism produces a significant adverse effect on some haematological and haemostatic parameters. Evidenced data generated from this study can facilitate the development of a policy on the effective management of haematological and haemostatic complications associated with alcoholism. There is need to enact laws that regulate the production, sales and consumption of various alcoholic beverages to prevent abuse and protect the health of citizens.

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Key words: Haematology, haemostasis, alcoholism, Kebbi State, Nigeria.

Introduction

Alcoholism has been defined as an individual's dependence on alcohol, alcohol misuse or uncontrolled drinking habit, which adversely interferes with his biological, social and mental well-being¹⁻³. The WHO estimates that there are 140 million people with history of alcoholism worldwide⁴. Alcohol is the most available and widely abused substance. Beer alone is the world's most widely consumed⁵ alcoholic beverage and it is the third-most popular drink overall, after water and tea⁶.

Alcoholism is a worldwide social problem, with severe effects on public health. It accounts for about 10%-15% of all patients admitted into general hospital⁷. Alcoholism is one of the numerous wide spread non-communicable diseases that is ravaging the human race, and poses serious threat to the global health sector particularly due to its associated rising morbidity and mortality rate⁸. In Western countries about 10% of the general public of age not less than 15years are affected by alcoholism giving rise to poor job performance, legal problems, social and inter-personal problems⁹. Alcoholism is associated with negative consequences from drinking such as significant financial burden, unemployment, loss of family, accidental injury, or death. In the United States about 63718 deaths in 2000 were attributed to harmful drinking¹¹. In Nigeria and other developing countries in the world so many alcohol - related accidents and mortality may have occurred without reliable documentation. Chronic alcoholism is the third leading cause of mortality even though many alcohol related death go unrecorded particularly in developing countries¹². Chronic alcoholism has significant serious consequences on the haematopoietic systems involving the various blood cells, their

progenitors in the bone marrow and clotting components¹³. However, there is paucity of data on the effect of alcohol on haematological and haemostatic parameters of alcoholics in Kebbi State in North Western Nigeria. There is paucity of reports on the effect of alcoholism on haematological and haemostatic parameters from developing countries. History of a consumption of a locally brewed alcoholic beverage (Burukutu) is high in Kebbi State. The aim of this study is to investigate the effects of alcoholism on some haematological and haemostatic parameters. Evidenced data generated can facilitate the development of a policy on the effective management of haematological and haemostatic complications associated with alcoholism.

70

71 **Materials and methods**

72 **Subjects**

73 This prospective case-control study included one hundred adults (≥ 18 years) aged
74 range (18-60 years) and mean age (45.25 ± 11.50) who were alcohol dependent
75 (subjects) and fifty age and gender -matched non-alcoholics (controls). Alcoholics were
76 classifies into 2 groups; chronic (50 participants) and moderate alcoholics (50
77 participants). The aim of this study was to investigate the effect of chronic alcoholism
78 on some haematological and haemostatic indices of chronic alcoholics and the non-
79 alcoholics. The haematological and haemostatic values of subjects and control
80 participants were compared statistically. Confirmation of alcoholism was established on
81 the basis of the Short Michigan Alcoholism Screening Test (SMAST)¹⁴. The SMAST is a
82 13-item, self-reporting and effective diagnostic instrument developed from the
83 Michigan Alcoholism Screening Test (MAST) questionnaire. It gives a better sensitivity
84 and diagnostic accuracy on chronic alcohol consumption, and thus does not have the
85 tendency for false positive as does the MAST¹⁵. Subjects for this cross-sectional study
86 were all outpatients selected based on a random-cluster sample of different suburban
87 drinking bars in Birinin Kebbi where subjects meet to drink a locally brewed alcoholic
88 beverage (Burukutu). Burukutu is a popular alcoholic drink among indigenes of the
89 Northern region of Nigeria. It is a local brew made from fermented sorghum and other
90 protein enriched grains. The age long drink serves as an affordable source of alcohol for
91 those who lack the financial means to patronize refined brew like beer and other foreign

or imported alcoholic drinks ¹⁶⁻¹⁷. For the purpose of this study, a moderate alcoholic was defined based on USDA/DHHS Dietary guidelines as one with not more than one unit of alcoholic drink per day for women and no more than two alcoholic drinks per day for men ¹⁸. A chronic alcoholic is someone who regularly drinks more than 3-4 units of alcohol a day for men and 2-3 units for women. Chronic alcoholism is a disease that is often progressive and fatal. It is characterized by impaired control over drinking, preoccupation with the drug alcohol, use of alcohol despite adverse consequences, and distortions in thinking, most notably denial ¹⁹.

Ethical approval was obtained from the research and ethics committee in the Faculty of Medical Laboratory Science of the Usmanu Danfodiyo University Sokoto, North Western Nigeria. Inclusion criteria included; age ≥ 18 years, no history of present or past 2 weeks medication use prior to the collection of samples and willingness to give a written informed consent after counseling. Exclusion criteria included; pregnancy, age < 18 years, history of haematological diseases, malignancies or infections, chronic illnesses such as tuberculosis and diabetes mellitus. Duration of alcohol intake among the subjects ranged from 2- 25 years. Controls included age and gender- matched non-alcoholics with neither current nor past history of regular alcohol drinking.

Study Area

Birnin Kebbi, town and capital of Kebbi state, Northwestern Nigeria. It lies along the Sokoto (Kebbi) River at the intersection of roads from Argungu, Jega, and Bunza. An early settlement of the Kebbawa, a subgroup of the Hausa. It was captured about 1516 by Muhammadu Kanta, founder of the Kebbi kingdom; subsequently, it was incorporated into Kebbi, one of the banza bakwai (the seven illegitimate Hausa states), which extended over what is now Northwestern Nigeria and Southwestern Niger. Although Birnin Kebbi has declined as a river port because of silting as well as political conditions, it now serves as a collecting point for tobacco, peanuts (groundnuts), and rice and as a major local market center in millet, sorghum, rice, fish, goats, cattle, skins, and cotton. It is the site of a federal university, state polytechnic college and a government rice-research station. As of 2007 the city has an estimated population of 125,594 (National Population Commission (NPC) ²⁰.

123 **Methods**

124 Six milliliters of blood sample was drawn aseptically using the S-Monovette vacutainer
 125 blood collection system (Sarstedt, Nümbrecht, Germany) from the median antecubital
 126 vein for all the subjects and control participants. Three milliliters of blood was collected
 127 into a citrate bottle, and centrifuged for 5 minutes at 1000 rpm to obtain the citrated
 128 plasma. Citrated plasma was used to determine PT and APTT using standard manual
 129 laboratory methods within 4 hours of sample collection. PT and APTT reagent
 130 manufactured by Diagen, (UK) was testing for PT and APTT. Test procedures were
 131 conducted according to the instructions in the manufacturer's standard operating
 132 manual. Three milliliters of blood sample was drawn aseptically with disposable plastic
 133 syringe from the median antecubital vein for all the subjects into Di-potassium
 134 ethylenediamine tetracetic acid (K_2EDTA) blood containers. The EDTA anticoagulated
 135 blood was used for platelet count and blood film determination. Blood film was made by
 136 the push wedged method, dried and stained using a Rowmanowsky stain (Leishman
 137 stain).

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139 **Statistical analysis**

140 Data were entered and analyzed using statistical package SPSS version 9 (SPSS Inc.,
 141 Chicago, IL). Statistical analysis included descriptive analysis of mean, standard
 142 deviation and Chi-square analysis. A p- value of > 0.05 was considered to be statistically
 143 significant in all statistical analyses. Correlation was compared using a version of linear
 144 regression analysis.

145 **Result.**

146 Subjects were classified into two groups (50 chronic and 50 moderate alcoholics)
 147 Platelet count for the non-alcoholics, moderate and chronic alcoholics was; $260.7 \pm$
 148 48.17 , 253.3 ± 43.16 and 130.6 ± 6.79 respectively. Platelet count was significantly
 149 lower among chronic alcoholics compared to non-alcoholics ($p=0.0001$). Although
 150 marginally higher, there was no statistically significant difference in the platelet count
 151 of moderate alcoholics and non-alcoholics ($p= 0.10$). We observed a negative
 152 correlation between platelet count and duration of alcoholism ($r= -0.62$). The mean PT

and APTT values of non-alcoholics, moderate alcoholics and chronic alcoholics was; (14.46 ± 0.97 and 34.82 ± 13.71), (15.74 ± 1.26 and 35.78 ± 3.50) and (19.46 ± 0.93 and 43.42 ± 5.13) respectively. PT and APTT values were significantly lower among chronic alcoholics compared to non-alcoholics (p=0.0001). PT and APTT were marginally higher among moderate alcoholics compared to non- alcoholics. This difference however was not statistically significant (p= 0.08 and 0.62 respectively). We observed a positive correlation between duration of alcoholism and PT and APTT and (r= 0.46 and 0.55 respectively). The examination of peripheral blood smears indicated a high prevalence of macrocytosis, target cells and stomatocytes among alcoholics compared to non-alcoholics.

Table 1: Mean and standard deviation of PT, PTTK and PLC for the chronic alcoholics and non- alcoholics

Parameters	Chronic alcoholics	Non-Alcoholic	t-value	p-value
PLC (x10 ⁹ /L)	130.6 ± 6.79	260.7 ± 48.17	19.01	0.0001
PT (Seconds)	19.46 ± 0.93	14.46 ± 0.97	25.00	0.0001
APTT (Seconds)	43.42 ± 5.13	34.82 ± 13.71	10.96	0.001

Key

PLC= Platelet count

PT= Prothrombin Time

APTT=Activated Partial Thromboplastin Time

171 **Table 2: Mean and standard deviation of PT, PTTK and PLC for the moderate**
 172 **alcoholics and non-alcoholics.**

Parameters	Moderate alcoholics	Non- Alcoholic	t-value	p-value
PLC (x10 ⁹ /L)	253.3 ± 43.16	260.7 ± 48.17	1.66	0.10
PT (Seconds)	15.74 ± 1.26	14.46 ± 0.97	1.46	0.08
APTT (Seconds)	35.78 ± 3.50	34.82 ± 13.71	0.50	0.62

173 **Key**

174 PLC= Platelet count

175 PT= Prothrombin Time

176 APTT=Activated Partial Thromboplastin Time

177 **Table 3: Mean and standard deviation of PT, PTTK and PLC for chronic alcoholics**
 178 **drinkers and moderate alcoholics**

Parameters	Chronic Alcoholics	Moderate alcoholics	t-value	p-value
PLC (x10 ⁹ /L)	130.6 ± 6.79	253.3 ± 43.16	17.2	0.0001
PT (Seconds)	19.46 ± 0.93	15.74 ± 1.26	23.16	0.0001
APTT (Seconds)	43.42 ± 5.13	35.78 ± 3.50	11.54	0.0001

179 **Key**

180 PLC= Platelet count

181 PT= Prothrombin Time

182 APTT=Activated Partial Thromboplastin Time

183 **Discussion**

184 Alcoholism has been a major menace and cause of morbidity and mortality in Nigeria ²¹.
 185 Its perception as a disease and its effects particularly on the haemopoietic system has
 186 not been fully elucidated particularly in Kebbi State in North Western Nigeria. In this
 187 present study, we observed that history of chronic alcoholism has a significant effect on
 188 the platelet count. The platelet counts of chronic alcoholics was significantly higher than
 189 those of non-alcoholics. Our finding is consistent with previous reports ²²⁻²⁴ which
 190 indicated that heavy drinking have a significant effect on haematological parameters.
 191 Alcohol consumption is believed to cause hypocellularity (decreased production of the
 192 erythrocytes, leucocytes and thrombocytes). These lead to anaemia, leucopenia,
 193 thrombocytopenia and their relative sequelae ²⁵. Chronic alcoholism has been linked to
 194 insufficient availability of iron and other vital micronutrients such as vitamin B12 and
 195 folate for erythropoietic activities ²⁶. This is probably due to the inability of the ethanol
 196 irritated sticky intestinal mucosa to absorb these essential blood forming
 197 micronutrients, which eventually result in impaired haemopoiesis. We observed a
 198 significant negative correlation between history of alcoholism and platelet count.
 199 Decrease in the number and abnormal platelets function seems associated with chronic
 200 alcoholism. Previous reports has shown that when blood ethanol concentration rises to
 201 0.10%, platelet production, number and function may be affected ²⁵⁻²⁷

202 The examination of peripheral blood smears usually provides excellent clues to the
 203 aetiology of diseases. We observed that macrocytosis, target cell and stomatocytes was
 204 significantly higher among chronic and moderate alcoholics compared to non -
 205 alcoholics. Our finding is consistent with a previous report which indicated that
 206 peripheral blood pictures from alcoholic patients typically divulged round macrocytes
 207 and stomatocytes ²⁵. Laboratory test play a major role in the health monitoring of
 208 alcoholics ²⁸. Previous report suggest that in other to get the most accurate picture of
 209 the effect of drinking on laboratory parameters, regular follow up test including liver
 210 enzymes and blood count is important ²⁹. The frequency measure, number of drinking
 211 days, gave consistently higher correlations with the laboratory markers than the
 212 measure of drinking amount, average daily alcohol intake. Laboratory markers are well
 213 suited for outcome evaluation of drinking behavior of alcoholics after inpatient
 214 treatment for alcoholism or other comparative periods of abstinence ³⁰.

We observed that haemostatic parameters of PT and APTT were significantly higher among chronic alcoholics compared to non-alcoholics. We observed a significant positive correlation between duration of alcoholism and deranged PT and APTT. Alcohol consumption seems to have a negative effect on the liver with attendant negative impact on the synthesis of coagulation factors. Our finding is in agreement with previous report which indicated that alcoholic hepatitis and alcohol-associated liver cirrhosis are the eminent causes of decreased production of blood clotting factors ³¹⁻³³. Chronic alcoholism seems to have a number of effects on haemostasis, affecting coagulation factors, and the fibrinolytic system ³⁴. There is significant evidence that links alcoholism to decreased levels of fibrinogen and selected other coagulation factors, and increased fibrinolysis. A recent report indicates that consumption of commonly ingested quantities of alcohol correlated with the development of a hypocoagulable state in men ³⁵. Similarly, a previous report indicates that ethanol has multiple effects on haemostasis, affecting platelets, coagulation factors, and the fibrinolytic system. Although conflicting results exist in the literature, growing evidence is pointing to the following effects of ethanol or its metabolites causes a partial platelet activation generating poorly functioning platelets, decreased levels of fibrinogen and selected other factors, and increased fibrinolysis ³⁶.

Conclusion

This report indicates has shown that alcoholism has multiple negative effects on haemostasis, blood film and platelets. Evidenced data generated can facilitate the development of a policy on the effective manage There is need to enact laws that regulate the production, sales and consumption of various alcoholic beverages to prevent abuse and protect the health of citizens.

Conflict of interest

The authors declare that they are not aware of any conflict of interests pertaining to this paper.

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