ejpmr, 2019,6(2), 156-160

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

EVALUATION OF LIVER AND HAEMATOLOGICAL VARIABLES AMONG ALCOHOLICS IN JOS METROPOLIS, NORTH CENTRAL NIGERIA

Essien U. C.[1]*, Nyam A. N.[2], Ekwempu A. I.[1], Kopkuk E. D.[1], Idoko E.[1], Sheyin Z.[1,3]

[1]Department of Medical Laboratory Science, University of Jos, Nigeria.
[2]Department of Biochemistry, University of Jos, Nigeria.
[3]School of Medicine and Allied Health Sciences, University of the Gambia, Banjul, Gambia.

***Corresponding Author: Essien U. C.**

Department of Medical Laboratory Science, University of Jos, Nigeria.

Article Received on 10/12/2018 **Article Revised on 01/01/2019** **Article Accepted on 22/01/2019**

ABSTRACT

The association of alcohol consumption with liver and haematopoietic function was recognized more than two centuries. Several studies have reported the effect of alcohol abuse on liver and hematological variables. We conducted this study to assess the changes in liver and Full blood count variables resulting from consumption of alcohol in Jos North, Plateau State, North Central Nigeria. A total of 281 blood samples were collected by venipuncture from participants, out of which 222 individuals were identified as alcoholics (test group) while 59 were non-alcoholics (control group). Samples were processed in the Department of Medical Laboratory Science, University of Jos. All samples were analyzed using standard laboratory procedures. Data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 21. The mean values of total protein, albumin, direct bilirubin, total bilirubin, ALT, AST, ALP and GGT for the alcoholics (test) were 63.92 ± 9.23g/L, 31.58 ±4.93g/L, 6.29 ± 2.94umol/L, 16.60 ± 5.93umol/L, 23.09 ± 5.66 U/L, 20.57 ± 6.42 U/L, 251.71 ± 77.72 U/L and 26.26 ± 8.99 U/L respectively, while those of the control groups include 67.72 ± 7.45g/L, 33.96 ± 3.51g/L, 4.67 ± 2.03umol/L, 12.94 ± 4.34umol/L, 12.69 ± 3.29 U/L, 17.28 ± 3.90 U/L, 233.30 ± 65.97 U/L and 24.84 ±7.22 U/L respectively. A weak negative correlation was observed between PCV, eosinophil (r= -0.060; r= -0.081 respectively) and duration of alcoholism. Conversely, a very weak positive association existed between TWBCC, neutrophil, lymphocytes, monocytes (r= 0.081; r=0.001; r=0.018; r=0.0120 respectively) and duration of alcoholism. Regarding duration of alcoholism, we observed both positive and negative linearity of variables with duration of alcohol abuse. In conclusion, this work suggests that alcohol consumption may exert significant changes in some liver and hematological variables.

KEYWORDS: Haematological, Liver, association, alcoholism.

INTRODUCTION

Alcohol abuse is known to have a wide array of adverse effects on blood cells and liver function (Ballard 1997; Maher, 1997). Various studies have shown that people who abuse alcohol are at risk for numerous alcohol-related complications, including those affecting the blood marrow and liver (Ballard 1997; Maher, 1997). The liver is one of the largest organs of the body and possesses the ability to regenerate itself. Consequently, symptoms of liver damage can only manifest after a severe injury to the liver. However, the liver is particularly prone to alcohol-related damage because it is the primary site for alcohol metabolism. During alcohol metabolism, a number of by-products are generated such as acetaldehydes and free radicals. Acetaldehyde, the first metabolite of ethanol is thought to play a crucial role in the haematological and liver derangements observed in alcoholic patients (Ballard 1997; Maher, 1997).

Alcohol's adverse effects on the haematopoietic system are both direct and indirect; the direct consequences of excessive alcohol consumption include toxic effects on the bone marrow, the blood cell precursors, and the mature red blood cells (RBC's), white blood cells (WBC's), and platelets. The indirect effects of alcohol include nutritional deficiencies that impair the production and function of various blood cells (DePetrillo and McDonough, 2007).

Liver function tests (LFTs) are panel investigations that provides useful tool for diagnosis and monitoring treatment responses in cases of suspected liver diseases. LFTs consists of the following set of investigations; Total protein (TP), albumin (ALB), Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), γ glutamyl transferase (GGT), Bilirubin and Alkaline phosphatase (ALP). In most clinical cases, the interpretation of these LFTs are comprehensive because

LFTs results can be influenced by certain factors e.g age, gender and extra hepatic diseases such as cardiac and muscular diseases (Jang *et al.*, 2012; Walter & Mohammed, 2014).

Although there are many reports on the influence of alcohol on haematopoietic and liver function, the present study summarizes the current information on the consequences of excessive alcohol consumption on haematopoietic and liver function variables among alcoholics in Jos metropolis.

MATERIALS AND METHODS

Study Area/population

This study was conducted in Jos North, a local Government Area in the Capital City of Plateau State, Nigeria. Blood specimens were collected from consenting inhabitants of Jenta, Tudun wada, and Abattoir settlement all in Jos North Local government area of Plateau State. The study consisted of 170 male and 52 female alcoholics of eighteen years and above who were not on any anticoagulant therapy at the time of study, while 59 non-alcoholics served as control group.

Ethical Consideration

Ethical approval was obtained from the management of Jos North Primary Health Care Board. In addition, permission was sought and obtained from the local heads (popularly called "Mai Angwan") of the communities prior to sample collection.

Data collection

Structured self administered questionnaires were used to obtain various demographic data from participants that gave their consent for the study

Sample Collection and Processing

Six (6ml) of blood sample was collected by clean venipuncture from each individual. Four (4ml) was dispensed into a plain specimen bottle and the remaining 2ml was dispensed into EDTA container for haematological analysis. The blood samples were immediately conveyed to the Department of Medical Laboratory Science, University of Jos where they were processed. Specimens meant for liver function test were allowed to clot and the sera were obtained by centrifugation. The sera were analyzed for liver function parameters using Randox reagent (Randox Laboratories Ltd, United Kingdom). The EDTA blood specimens were used to perform full blood count using standard laboratory method.

Statistical Analysis

Data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 21. Pearson's Correlation and Analysis of Variance (ANOVA) were used to compare association between variables and $p< 0.05$ was considered statistically significant.

RESULTS AND DISCUSSIONS

The mean values for liver function tests of test and control groups are presented in table 1. The mean serum total protein, albumin, direct bilirubin, total bilirubin, ALT, AST, ALP and GGT concentrations for alcoholics (test) were: 63.92 ± 9.23g/L, 31.58 ±4.93g/L, 6.29 ± 2.94umol/L, 16.60 ± 5.93umol/L, 23.09 ± 5.66U/L, 20.57 ± 6.42U/L, 251.71 ± 77.72U/L and 26.26 ± 8.99U/L respectively, while those of the control group were: 67.72 ± 7.45g/L, 33.96 ± 3.51g/L, 4.67 ± 2.03umol/L, 12.94 ± 4.34umol/L, 12.69 ± 3.29U/L, 17.28 ± 3.90U/L, 233.30 ± 65.97U/L and 24.84 ±7.22U/L respectively. A statistically significant difference was observed when the total protein, albumin, direct bilirubin, total bilirubin and AST of test group was compared with the control group ($P<0.05$). On the contrary, there was no statistically significant difference in serum ALT, ALP and GGT concentrations ($P>0.05$) between the test group (i.e. the alcoholics) and the non-alcoholics (the control group). Our result is in agreement with the report of Obeagu *et al.*, (2014) and Oyedeji *et al.*, (2013) that male albino rats had a variation in their liver function when exposed to alcohol.

Table 2 shows the distribution of different hematological parameters ie the mean PCV, TWBCC, neutrophils, lymphocytes, eosinophils, basophils and monocytes of alcoholics (test group) as 41.78 ± 4.68, 6.97 ±2.45, 47.13 ± 11.99, 52.42 ± 11.94, 0.30 ± 0.55, 0.00 ± 0.00 and 0.35 ± 0.67 respectively, while those of control group were 38.69 ± 5.79, 7.06 ±2.14, 52.83 ± 11.72, 45.10 ± 12.33, 1.31 ± 1.31, 0.00 ± 0.00 and 0.83 ± 0.83 respectively. A statistically significant difference in PCV, neutrophil, lymphocyte, eosinophil and monocyte was observed between the test and control groups ($P < 0.05$). Conversely, there was no statistically significant difference in TWBC ($P> 0.05$) between the test and control groups.

The change in LFT variables in correlation with duration of alcohol consumption is presented in table 3. Result shows that there was a significant difference between duration of alcohol consumption and liver function test parameters. This may imply that the liver function parameters are influenced by the duration of alcohol consumption. We also observed a weak positive correlation between Total protein, ALT ($r=0.004$; $r=0.0129$ respectively) and the duration of alcohol consumption. On the contrary, a weak negative correlation was observed between albumin, DB, TB, AST, ALP, GGT ($r= -0.066$; $r= -0.055$; $r= -0.041$; $r= -0.031$; $r= -0.008$; $r= -0.055$ respectively) and duration of alcohol consumption. However, our findings is similar to the report of Walter & Mohammed, (2014) who observed a negative correlation between duration of alcohol consumption with liver function tests parameters.

Table 4 reveals the association between FBC parameters and duration of alcohol intake. We observed that there was no statistical significant difference ($P>0.05$) between

FBC parameter and duration of alcohol intake. This may imply that duration of alcohol consumption did not exert any effect on FBC parameter among the participants. A weak negative association was however observed between the PCV, eosinophil (r= -0.060; r= -0.081 respectively) and duration of alcoholism. Conversely, a very weak positive association existed between TWBCC, neutrophil, lymphocytes, monocytes (r= 0.081; r=0.001; r=0.018; r=0.0120 respectively) and duration of alcoholism. This report is similar to the findings of Thoma *et al.*, (2015) who reported some changes on some blood count variables in correlation with duration of alcohol consumption.

Table 1: Distribution of LFT Parameters among Alcoholics (Test Group) and Non-alcoholics (Control Group).

	Frequency (%)	Total Protein (g/L)	Albumin (g/L)	DB (umol/L)	TB (umol/L)	ALT (U/L)	AST (U/L)	ALP (U/L)	GGT (U/L)
Test Group	222(79)	63.92 ± 9.23	31.58 ±4.93	6.29 ± 2.94	16.60 ± 5.93	23.09 ± 5.66	20.57 ± 6.42	251.71 ± 77.72	26.26 ± 8.99
Control Group	59(21)	67.72 ± 7.45	33.96 ± 3.51	4.67 ± 2.03	12.94 ± 4.34	12.69 ± 3.29	17.28 ± 3.90	233.30 ± 65.97	24.84 ±7.22
p. value		0.004	0.001	0.000	0.000	0.308	0.000	0.097	0.262

N = 281

Table 2: Profile of FBC Parameters among Alcoholics (Test Group) and Non-alcoholics (Control Group).

	Frequency (%)	PCV (%)	TWBCC x10^9/L	Neutrophil (%)	Lymphocyte (%)	Eosinophil (%)	Basophil (%)	Monocyte (%)
Test Group	222(79)	41.78 ± 4.68	6.97 ±2.45	47.13 ± 11.99	52.42 ± 11.94	0.30 ± 0.55	0.00 ± 0.00	0.35 ± 0.67
Control Group	59(21)	38.69 ± 5.79	7.06 ±2.14	52.83 ± 11.72	45.10 ± 12.33	1.31 ± 1.31	0.00 ± 0.00	0.83 ± 0.83
t-value		4.280	-0.249	-3.263	4.157	-7.664	-	-4.636
p. value		0.000	0.803	0.001	0.000	0.000	-	0.000

N = 281 TWBCC= Total white blood cell count

Table 3: Relationship between liver function tests and duration of alcohol consumption.

Age (years)	Frequency(%)	Total Protein (g/L)	Albumin (g/L)	DB (umol/L)	TB (umol/L)	ALT (U/L)	AST (U/L)	ALP (U/L)	GGT (U/L)
≤ 10	40 (18)	66.80 ± 9.95	33.23 ± 5.21	6.40 ± 3.25	16.44 ± 5.73	15.54 ± 5.15	21.85 ± 7.33	246.62 ± 68.00	25.47 ± 8.42
11 – 20	82 (37)	62.34 ± 9.17	31.06 ± 4.80	6.36 ± 2.87	16.69 ± 6.01	15.66 ± 5.11	20.46 ± 6.37	264.18 ± 86.14	27.60 ± 9.60
21 – 30	46 (21)	61.68 ± 7.86	30.58 ± 4.08	6.92 ± 2.62	18.66 ±4.83	16.20 ± 4.65	20.39 ± 5.89	248.10 ± 71.07	27.40 ± 8.77
31 – 40	30 (16)	67.42 ± 9.65	32.93 ± 5.36	5.20 ± 2.61	13.70 ± 5.56	68.83 ± 9.48	18.26 ± 5.62	217.55 ± 67.40	23.57 ± 8.97
41 – 50	16 (7)	67.69 ± 7.95	32.56 ± 5.34	5.25 ± 3.88	13.21 ± 6.52	15.09 ± 6.57	19.41 ± 6.21	239.10 ± 81.47	19.98 ± 3.24
≥ 51	8 (3)	57.99 ± 2.85	27.38 ± 2.47	7.60 ± 1.38	22.40 ± 3.09	21.19 ± 1.92	27.24 ±2.81	323.53 ± 15.09	32.57 ± 6.18
F-value		4.134	3.366	2.028	5.679	2.464	3.078	3.243	3.673
p. value		0.001	0.006	0.076	0.000	0.034	0.010	0.008	0.003
Correlation (r)		0.004	-0.066	-0.055	-0.041	0.0129	-0.031	-0.008	-0.055

n=222

Table 4: Relationship between full blood count and duration of alcohol consumption.

Age (years)	Frequency (%)	PCV (%)	TWBCC x10^9/L	Neutrophil (%)	Lymphocyte (%)	Eosinophil (%)	Basophil (%)	Monocyte (%)
≤ 10	40 (18)	43.30 ± 4.79	6.635 ± 2.27	49.05 ± 12.27	49.95 ± 12.03	0.25 ± 0.54	0.00 ± 0.00	0.25 ± 0.44
11 – 20	82 (37)	41.59 ± 4.94	6.885 ± 2.90	46.56 ± 11.98	52.83 ± 12.12	0.34 ± 0.57	0.00 ± 0.00	0.24 ± 0.53
21 – 30	46 (21)	41.00 ± 4.52	7.226 ±2.03	45.13 ± 13.12	55.00 ± 12.22	0.35 ± 0.56	0.00 ± 0.00	0.57 ± 0.78
31 – 40	30 (16)	41.93 ± 3.81	7.013 ± 2.19	47.73 ± 9.72	51.40 ± 10.29	0.27 ± 0.58	0.00 ± 0.00	0.53 ± 0.97
41 – 50	16 (7)	42.00 ± 4.03	7.100 ± 1.80	49.25 ± 10.62	51.50 ± 11.04	0.25 ± 0.45	0.00 ± 0.00	0.25 ± 0.68
≥ 51	8 (3)	39.75 ± 5.52	7.633 ±2.74	48.25 ± 15.43	51.50 ±15.79	0.00 ± 0.00	0.00 ± 0.00	0.25 ±0.46
F-value		1.461	.394	.622	.860	0.753	-	2.163
p. value		0.204	0.853	0.683	0.509	0.584	-	0.059
Correlation (r)		-0.060	0.081	0.001	0.018	-0.081	-	0.0120

n=222 TWBCC= Total white blood cell count

CONCLUSION

This work suggests that there are changes in liver biochemicals and hematological profile of individuals who indulge in excessive alcohol consumption. In addition, this change is related to the duration of alcohol intake with some liver and hematological parameters. However, a weak positive correlation was observed between Total protein, ALT and duration of alcohol intake while weak negative correlation was the case for serum albumin, DB, TB, AST, ALP and GGT in relation to duration of alcoholism. Regarding hematological variables, very weak negative association was observed to exist between PCV and eosinophil and duration of alcoholism. Conversely, a weak positive association existed between TWBCC, neutrophil, lymphocytes, monocytes and duration of alcohol consumption. Based on the findings of our work there is need to set up Community Health Educational program to help enlighten individuals on Public Health issues associated with alcohol abuse.

REFERENCES

1. Ballard, H.S. The Hematological Complications of Alcoholism. *Alcohol health and Research world*, 1997; 21(1): 42-52.
2. DePetrillo, M.D. & McDonough M.Ed Major Pathologies Associated with Acute and Chronic Alcohol Use – a Reference Summary "The Alcohol Withdrawal Treatment Manual", 2007.
3. Jang, E.S., Jeong, S.H., Hwang, S.H., Kim, H.Y., Ahn, S.Y., Lee, J., Lee, S.H., Park, Y.S., Hwang, J.H., Kim, J.W., Kim, N & Lee, D.H. Effects of coffee, smoking, and alcohol on liver function tests: a comprehensive cross-sectional study. *BMC Gastroenterology*, 2012; 12(145): 2-12.
4. Maher, J.J. Exploring Alcohol's Effects on Liver Function. *Alcohol health and Research world*, 1997; 21(1): 5-12.
5. Obeagu, E.I., Omeh, Y.N., Obarezi, T.N., & Eze B.L Some Haematological and Biochemical Parameters of Chronic Alcoholics in Umuahia, Abia State, Nigeria. *Research Journal of Pharmaceutical, Biological and Chemical Sciences (RJPBCS)*, 2014; 5(2).
6. Oyedeji, K.O., Bolarinwa, A.F and Owaduge, D.O. Effect of isolated lupone constituent of Portulaca oleraceaon haematological parameters in albino rats. *International Journal of Pharmaceutical Sciences Review and Research*, 2013; 20(2): 301-305
7. Thoma, E., Bitri., S., Mucaj, K., Tahiri, A. & Pano, I. Changes of Some Blood Count Variables in Correlation with the Time of Alcohol Abuse. *Journal of Addiction Research & Therapy*, 2015; 6(2).
8. Walter, A & Mohammed, A. A study correlating the quantity and duration of alcohol consumption with liver function tests. *Journal of Dental and Medical Sciences.* 2014; 13(1): 70-75.