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**EFFECT OF LABORATORY PRODUCED PAWPAP WINE ON SOME
HAEMATOLOGICAL PARAMETERS OF RATS**

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ABSTRACT

This study was aimed at investigating the effect of laboratory produced pawpaw wine of different percentage alcoholic content on haematological parameters of albino rat (Wistar strain). The Pack cell volume (PCV), Haemoglobin (Hb), Red blood cell (RBC), Mean cell haemoglobin (MCH), Mean cell volume (MCV), Mean cell haemoglobin concentration (MCHC), Total white blood cell (TWBC), Percentage Lymphocyte (%LYM), percentage Eosinophil (%EOS) and percentage Neutrophil (% NEU) were determined to estimate the toxicological effect of the administered wine. Forty two rats were divided into three groups. Group I received distilled water only (control), while groups II and III received Red wine and pawpaw wine at different alcoholic content respectively for a period of 18 days. Haematological indices determined showed that there was a significant reduction in PCV, RBC and HB when compared with the control ($p < 0.05$). There was little or no different in MCH, MCV and MCHC count in all the rats treated with prepared wine and Red wine at different alcohol content. Similarly, there was a significant reduction in TWBC count in all the rats fed with pawpaw wine produced ($p < 0.005$), while red wine showed significant increase when compared with the control. Also, there was a significant decrease in percentage Neutrophil and increase percentage Lymphocyte in the rats fed with pawpaw wine and red wine at different alcohol content respectfully, while there was significant reduction in percentage Eosinophil in the rats fed with both wine samples. These findings indicate that pawpaw wine compared favourably with imported red wine at the alcoholic

level considered as they pose no threat to the erythrocyte parameters and differential white blood cell count.

Keywords: Haematological Indices, Pawpaw Wine, Red Wine Albino Rats

INTRODUCTION

Wine has been produced and enjoyed by many people, from peasants to kings, for thousands of years [1]. It is an alcoholic beverage made by fermentation of fruit juice of ripe grapes using *Saccharomyces cerevisiae*; other sugar rich fruits can also be used. Wines have been known for their medicinal effect and physicians believe that wine consumption can aid digestion and help relief stress. The consumption of red wine is known to have a remarkable protective effect against oxidative stress in blood plasma [2]. Studies have shown that alcohol may benefit many bodily organs, including the heart and the brain.

However, the benefits are available only when wine is taken in moderation as over consumption of alcohol including wine can cause some diseases including cirrhosis of the liver and alcoholism [3]. However, wine and other alcoholic beverages have also been associated with some negative effects including decreased levels of white blood cell (WBC) which shows an independent association [4], though some have also reported on the highly positive and negative

association of alcohol with other haematological parameters.

Alcohol, a major component of wine, is a drug that depresses the central nervous system [5]. Alcohol has several biochemical effects after consumption, it alters the intracellular NAD⁺/NADH ratio and this affects the equilibrium constant of a number of important metabolic reactions that utilize these two cofactors [6].

This study was aimed at investigating the effect of laboratory produced pawpaw wine of different percentage alcoholic content on haematological parameters of albino rat as compared to imported red wine.

MATERIALS AND METHODS

Wine Samples

Papaw wine was produced in the laboratory of the Department of Microbiology University of Ilorin, Ilorin, Nigeria using *Saccharomyces cerevisiae* as a fermenting organism [7]. Red wine (Carlo Rossi) imported from USA was used as a control for this work.

Animals and Treatments

Animals weighing an average of 160g were bred in the Animal House of the Biological garden of University of Ilorin, Ilorin Nigeria.

They were kept in wire meshed cages and fed with commercial rat chow (Bendel feeds Nigeria ltd) and supply water *ad libitum*. Forty two (42) albino rats (wistar strain) were divided into three groups:

Group I consist of only 6 rats served as the negative control to which only distilled water (no wine) was administered orally.

Group II consist of 18 rats divided into 3 subgroups A, B, C received 6.25 ml/kg body weight of 5%, 7.5% and 10% alcohol content of the Red wine (positive control) respectively for eighteen days.

Group III consist of 18 rats divided into 3 sub groups A, B, C received 6.25 ml/kg body weight of 5%, 7.5% and 10% alcohol content of the Pineapple wine respectively for eighteen days.

The animals were sacrificed 24 hours after the last treatment.

Collection of Blood Samples for Haematological Determination

The rats were sacrificed by cervical dislocation. Blood samples were collected by ocular punctures into EDTA bottles for haematological determination

Determination of Haematological Parameters

The red blood cells (RBC) were determined by the improved Neubauer's counting chamber. The Haemoglobin (Hb)

concentration was determined using the cyanomethaemoglobin method [8]. The packed cell volume (PVC) was determined by the microhaematocrit method [9].

Other red blood cell indices

Other red blood cell indices (MCV, MCH & MCHC) were calculated as per [8].

Determination of Total White Blood Cell (WBC) and Differential Leucocytes (DLC) Count

The total white blood cell count and Differential Leucocytes Counts were determined as per [9].

Statistical Analysis

The data were analyzed using standard computerization Statistical Package for Social Sciences (SPSS) version 11. ANOVA, post-hoc test for comparison between control and treated rats in all groups were carried out and value expressed as mean \pm SEM. P values less than 0.05 were considered statistically significant.

RESULTS

Table 1 shows the effect of different wines of varying alcoholic contents on Red Blood Cell indices, From the result it can be seen that there was a significant reduction in PCV, RBC and HB when compared with the control ($p < 0.05$). There was little or no different in MCH, MCV and MCHC count in all the rats treated with prepared wine and Red wine at

different alcohol content, while the effect of different wines of varying alcoholic contents on Differential White Blood Cell Count was presented in **Table 2**. Similarly, there was a significant reduction in TWBC count in all the rats fed with pawpaw wine produced ($p < 0.005$), while red wine showed significant increase when compared with the control. Also, there was a significant decrease in percentage Neutrophil and increase percentage Lymphocyte in the rats fed with pawpaw wine and red wine at different alcohol content respectfully, while there was significant reduction in percentage Eosinophil in the rats fed with both wine samples.

DISCUSSION

The value obtained for RBC showed significant reduction after treatment of rats with pawpaw and red wine when compared with the control this is an indication that there was destruction of red blood cells and change in the production of RBC. This probably indicates that there was reduction in the oxygen-carrying capacity of the blood and the amount of oxygen delivered to the tissues since RBC and Hb are very important in the transferring of respiratory gases [10]. Reduction in the amount of Hb below the normal level give rise to a state of mild anemia which may or may not be due to reduction in the RBC population and /or PCV

value [11]. As previously reported, the reductions in RBC count in both wine treated group suggests a depression of haematopoietic process [12]. Since PCV levels reflect the extent and efficiency of oxygen uptake and transfer to tissue, the low values in the rats treated with wine may reflect low oxygen uptake and transfer to tissues, signifying a reduction in the body's metabolic activity [13].

Non significant changes in the MCV, MCH and MCHC values could be an indication of absence of macrotic anaemia and absence of hereditary spherocytosis respectively since increases in the value of MCV and MCH are known to be indicative of macrocytic anaemia while MCHC are known to be elevated in hereditary spherocytosis.

The significant decrease in TWBC count and percentage Neutrophil caused by pawpaw wine suggests that the immune system has not been compromised as compared with red wine. The significant reduction in percentage Eosinophil in the rats fed with both wine samples probably indicates that the anti-allergic and parasitic infectious response of the body have not been compromised by the wines, while the increase percentage Lymphocyte in the rats fed with pawpaw wine and red wine at different alcohol content

indicates that the acquired immune responses of the body has not been compromised

CONCLUSION

It can be concluded from the haematological studies that pawpaw wine compared favourably with imported red wine at the alcoholic level considered as they pose no threat to the erythrocyte parameters and differential white blood cell count.

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Table 1: Effects of Wine Samples Administration on Red Blood Cell Indices

% alcohol in wine samples	Red Blood Cell indices											
	PCV (%)		RBC (X10 ¹² /L)		HB (g/dl)		MCH(pg)		MCV (fl)		MCHC(g/dl)	
	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine
0.0 (CT)	39.00 ± 0.70	39.00 ± 0.70	4.94 ± 0.10	4.94 ± 0.10	13.46 ± 0.25	13.46 ± 0.25	27.33 ± 0.25	27.33 ± 0.25	79.00 ± 0.00	79.00 ± 0.00	34.66 ± 0.47	34.66 ± 0.47
5.0	36.30 ± 0.47*	38.33 ± 0.94*	4.57 ± 0.06	4.75 ± 0.14*	12.53 ± 0.18*	13.23 ± 0.30*	27.33 ± 0.23	27.66 ± 0.23	79.00 ± 0.00	80.00 ± 0.70	34.66 ± 0.23	34.66 ± 1.17
7.5	37.00 ± 0.07*	38.66 ± 0.23	4.69 ± 0.07	4.85 ± 0.02*	12.76 ± 0.25*	13.33 ± 0.04*	27.33 ± 0.23	27.23 ± 0.23	78.66 ± 0.47	79.66 ± 0.23	34.66 ± 0.47	34.33 ± 0.94
10.0	37.00 ± 2.12*	38.33 ± 1.17*	4.67 ± 0.22	4.93 ± 0.11	12.76 ± 0.73*	13.56 ± 0.37*	27.33 ± 0.47	27.66 ± 0.23	79.00 ± 0.70	80.00 ± 0.70	34.66 ± 0.23	34.33 ± 0.47

VALUES ARE MEAN ± SEM (N = 6), * = (P>0.05) vs control; KEY: PCV- Pack cell volume, MCH - Mean cell haemoglobin, HB - Haemoglobin, RBC- Red blood cell, MCV - Mean cell volume, MCHC- Mean cell haemoglobin concentration , CT - Control

Table 2: Effects of Wine Samples Administration on Differential White Blood Cell Count

% alcohol in wine samples	Differential White Blood Cell Count							
	TWBC (x 10 ⁹ /l)		NEU (%)		EOS (%)		LYM (%)	
	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine	Red wine	Pawpaw wine
0.0 (CT)	8.50 ± 0.56	8.50 ± 0.56	29.66 ± 1.03	29.66 ± 1.03	3.66 ± 3.06	3.66 ± 3.06	66.66 ± 1.07	66.66 ± 1.07
5.0	10.95 ± 2.16*	7.20 ± 0.21*	27.33 ± 1.35*	29.33 ± 2.59	2.33 ± 1.64*	0.33 ± 0.23*	78.33 ± 2.24*	65.33 ± 2.35
7.5	10.23 ± 1.17*	7.56 ± 0.54*	28.66 ± 0.47	26.33 ± 1.64*	1.33 ± 0.47*	0.33 ± 2.128*	73.33 ± 4.71*	62.66 ± 3.77*
10.0	10.6 ± 0.84*	7.76 ± 0.37*	27.33 ± 4.00*	26.33 ± 2.59*	2.66 ± 1.64*	3.33 ± 0.23*	82.00 ± 2.82*	53.33 ± 2.35*

VALUES ARE MEAN ± SEM (N = 6), * = (P>0.05) vs control; KEY: LYM -Lymphocyte EOS - Eosinophil, NEU - Neutrophil TWBC - Total white blood cell ,CT - Control