

Effects of Fermented Cheese Whey on the Cells of the Immune System of Apparently Healthy Albino Rats

Adebolu TT* and O.B. Olorunfemi

Department of Microbiology, The Federal University of Technology, Akure, Nigeria

*Corresponding author: Adebolu TT, Department of Microbiology, The Federal University of Technology, Akure, Nigeria, E-mail: ttadebolu01@yahoo.com

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Abstract

The effect of fermented cheese whey on the cells of the immune system and the packed cell volume (PCV) of apparently healthy albino rats (AHARs) was investigated in this study. Twenty four AHARs were grouped into six groups of four rats (A, B, C, D, E, F) and each rat in each group was orogastrically administered different volumes of whey fermented at $30 \pm 2^\circ\text{C}$ for 72 h as follows: group A; 0.5 ml, group B; 1.0 ml, group C; 1.5 ml, group D; 2.0 ml, group E; 2.5 ml while the rats in group F were not given whey. The rats in this group (F) served as control. All the rats were fed with basal diet alongside the administered whey except the control group that was given basal diet only. Haematological assays were carried out using standard methods. The study revealed that the administration of the fermented whey to AHARs caused a significant increase ($p < 0.05$) in packed cell volume (PCV) values, lymphocyte and monocyte counts of the groups fed with whey as compared with control and significant decrease ($p < 0.05$) in the eosinophils count. It is therefore conceivable that the consumption of fermented whey by apparently healthy individuals might boost the cells of the immune system responsible for adaptive immunity, increases their PCV and may also play a role in mediating in cases of allergic reactions as a result of reduction in eosinophil counts.

Key words:

Cheese whey; Lymphocytes; Monocytes; PCV

Introduction

Cheese whey is the liquid portion of milk after the coagulation of casein during cheese production. It has been reported to contain excellent quality proteins and various factors such as immunoglobulins, lactoferrin, lactoperoxidase, glycomacropeptides, bovine serum albumin, α -lactalbumin, β -lactoglobulin, cysteine which have health promoting effects [1,2]. Moreover, it has also been found to have growth inhibitory activity against common bacteria that cause diarrhoea in Nigeria [3-5]. In this present study the effect of whey on the cells of the immune system of healthy albino rats was investigated.

Methods

Fresh cheese whey samples were obtained from local cheese manufacturing points in Akure, Ondo State, Nigeria. The fresh samples were collected in separate sterile containers and transported immediately to the Microbiology Laboratory, Federal University of Technology, Akure for the research work. The wistar strain albino rats (aged between 6 and 8 weeks old) used for the investigation were purchased from Biochemistry Department, University of Ilorin, Ilorin, Kwara State, Nigeria. The rats were grouped into six groups of four rats (A, B, C, D, E, F) and each rat in the first five groups (A-E) was orogastrically administered different volumes of whey fermented at $30 \pm 2^\circ\text{C}$ for 72 h as follows: group A; 0.5 ml, group B; 1.0 ml, group C; 1.5 ml, group D; 2.0 ml, group E; 2.5 ml respectively. The rats in group F were not given whey, this group served as control.

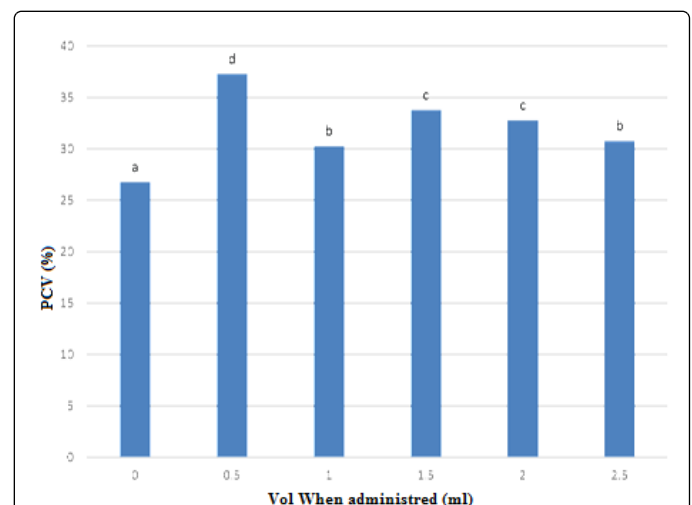


Figure 1: Effect of whey on the PCV*; Key:* =Values are means of four replicates; Values with different alphabets in the figure are significantly different at $p < 0.05$.

All the rats were fed with basal diet (rabbit pellet produced by Livestock Feeds, Adset, Nigeria), allowed free access to potable water alongside the administered whey for 7 d. The rats were bled through cardiopuncture and their blood samples were collected into EDTA bottles for evaluation of their haematological parameters using the methods of Aning et al. [6]. A seven day acclimatization period was first observed before the commencement of the investigation. Data obtained were subjected to one way ANOVA and means separated using Duncan's New multiple range test using SPSS 16.0 window.

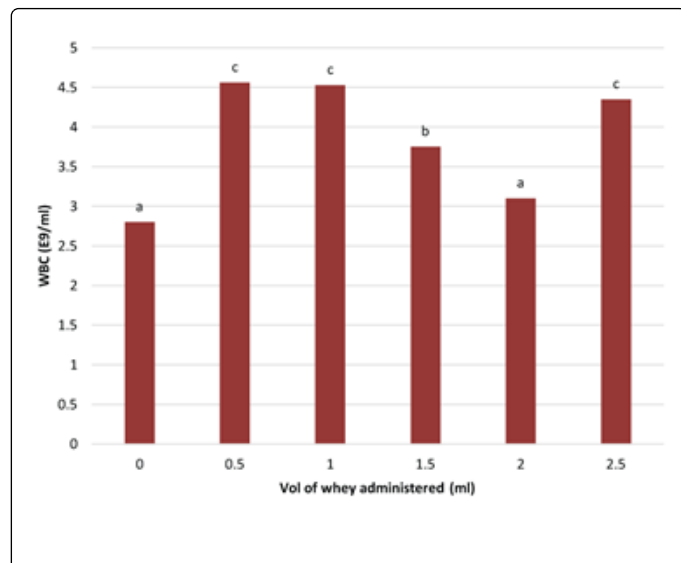


Figure 2: Effect of whey on the WBC*; Key:* =Values are means of four replicates; Values with different alphabets in the figure are significantly different at $p < 0.05$.

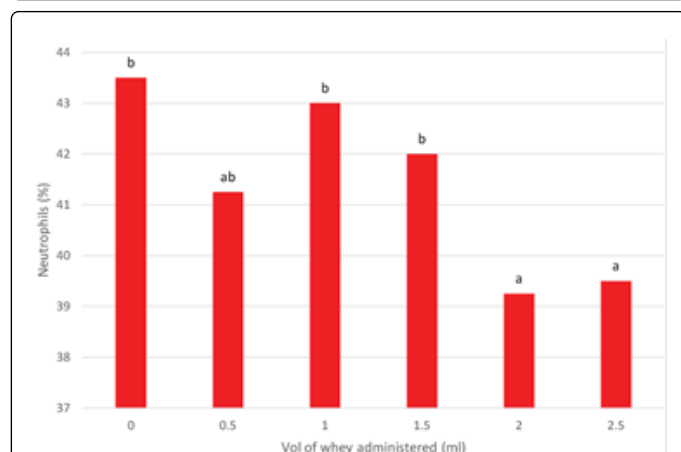


Figure 3: Effect of whey on the Neutrophils*; Key:* =Values are means of four replicates; Values with different alphabets in the figure are significantly different at $p < 0.05$.

Results and Discussion

The results of the haematological studies show that the administration of cheese whey to the rats caused a significant ($p < 0.05$) increase in PCV values, total WBC, lymphocytes and monocytes counts of the rats (Figures 1- 5). Increase in PCV shows that whey has the potential to cause an increase in the population of RBC in cases of anaemia, that is, it can function as a hematinic. Moreover, the increase in lymphocytes count is of great importance in the defense of the body against infections [7]. The lymphocytes counts in the groups fed with 2.5, 2.0, 1.5 and 0.5 ml of fermented whey significantly increased ($p < 0.05$) from $55.50 + 0.39a$ for the control rats to $59.50 + 0.73c$, $59.75 + 0.37c$, $56.75 + 0.20ab$, $57.75 + 0.39b$ %, respectively, after been fed with whey. This result is similar to the result of the findings of

Rutherford-Markwick and Gill [8,9] that IMUCARE, a whey protein concentrate product fed to mice caused an appreciable increase in the number of circulating helper T- cells (CD4+) in their blood. The significant decrease ($p < 0.05$) in eosinophils count on the other hand it's a pointer to the fact that whey has the potential to checkmate the population of this cell type which play significant role in allergic reactions in human system.

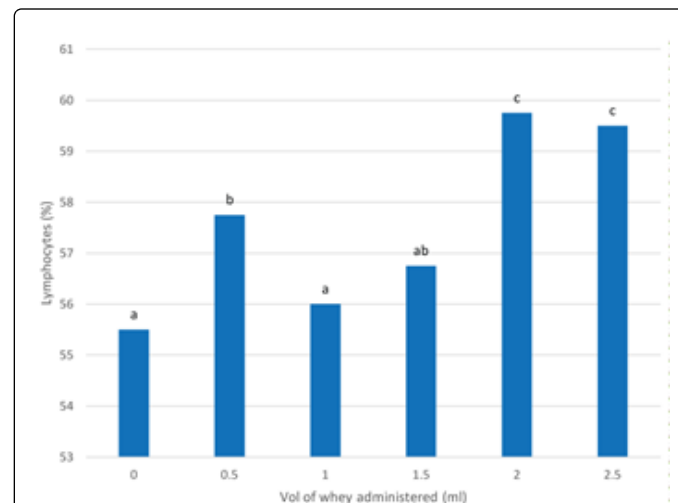


Figure 4: Effect of whey on the Lymphocytes*; Key:* =Values are means of four replicates; Values with different alphabets in the figure are significantly different at $p < 0.05$.

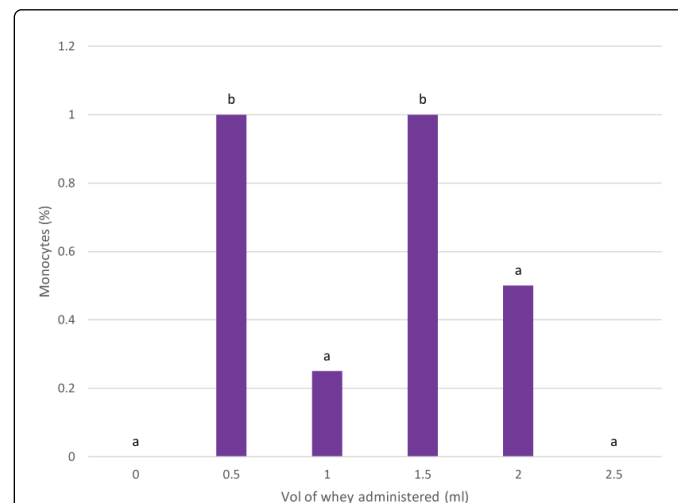


Figure 5: Effect of whey on the Monocytes* Key:* =Values are means of four replicates; Values with different alphabets in the figure are significantly different at $p < 0.05$.

Conclusion

This study has been able to show that cheese whey has immunostimulatory potential and therefore can be exploited in boosting the immune system of healthy individuals. Moreover, it also has hematinic potential which can be exploited to treat or prevent anaemia in humans. Furthermore, it can be used to mediate in cases of

allergic reactions to prevent complications before getting access to conventional therapy.

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