

**Coronary Heart Disease Risk Profiles in Blood Donors at the National Blood Services, Zimbabwe****Tinashe J Masuka<sup>1</sup>, Rudo Muswe<sup>2</sup>, Princess Marange<sup>1</sup>, Danai Tavonga Zhou<sup>1,3\*</sup>**<sup>1</sup>University of Zimbabwe College of Health Sciences, Department of Medical Laboratory Sciences, P.O. Box AV 178, Avondale, Harare, Zimbabwe<sup>2</sup>University of Zimbabwe College of Health Sciences, Department of Chemical Pathology, P.O. Box AV 178, Avondale, Harare, Zimbabwe<sup>3</sup>Africa University, P.O Box 1320, Mutare, Zimbabwe**\*Corresponding author**  
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**Abstract:** Regular blood donation has been reported to lower coronary heart disease risk by improving lipid profiles in past studies. Traditionally, lipid profile estimation assesses an individual's risk of developing coronary heart disease. This study sought to determine coronary heart disease risk profiles in blood donors, using lipids and to compare risk profiles of first time donors and active donors. Eighty-eight participants were enrolled into the study, 37 (42%) were regular blood donors. Regular blood donors were generally older than first time donors and there was significant difference in LDL levels between the two groups. Differences in both mean age and mean LDL levels of regular blood donors and first time donors could increase risk of coronary heart disease in regular blood donors. Surprisingly, this study was in contrast to earlier studies which reported a decrease in coronary heart disease risk in blood donors and this requires further inquiry.**Keywords:** Blood donors, coronary heart disease, lipid, Zimbabwe**INTRODUCTION**

The National Blood Services Zimbabwe (NBSZ) has made numerous campaigns to get voluntary blood donation throughout Zimbabwe. Despite all these efforts the country always faces acute blood shortages especially in large cities where the supply is below 50% of requirements [1]. The general public usually considers blood donation practice as beneficial only to the recipient, the possibility that it can contribute positively to donor health could greatly increase the number of voluntary donors [1, 2].

Regular donation is reported to have numerous health benefits including reduced risk of coronary heart disease (CHD) [2, 4, 5, 8, 9]. Moreover, blood donation is thought to increase the serum high density lipoprotein cholesterol (HDL) concentration which is responsible for carrying excess cholesterol from the blood to the liver [2]. In this study we used lipid profiles to predict and compare risk of CHD in both regular blood donors and first time donors. Serum lipid profiles comprising total cholesterol (TC), low density lipoprotein (LDL) and HDL were used, because risk of CHD is high in people with elevated TC, LDL and low in those with elevated HDL [10-14].

Though documented reports clearly describing effect of regular blood donation on serum lipid profile are few, decrease in TC has been associated with repeated donations; whilst LDL in regular donors was reported to be lower in regular donors than in first time donors [1,15-17]. Reports from many different studies show that there is favourable alteration in lipid parameters in regular blood donors [1, 18-21]. Studies among the Zimbabwean population are currently non-existent, hence this study sought to determine the lipid profiles of regular blood donors and compare them with lipid profiles of first time donors in the Zimbabwean population.

**METHODS AND MATERIALS****Ethical Consideration**

The study was ethically cleared by the Joint Research Ethics Committee (JREC) of the University of Zimbabwe, College of Health Sciences and the Parirenyatwa Group of Hospitals, Zimbabwe, while permission to use blood donor samples was obtained from the National Blood Service Zimbabwe (NBSZ).

**Study Design and Study Site**

Cross sectional study carried out at the National Blood Service Zimbabwe, in Harare.

### **Inclusion Criteria**

Adult male and female voluntary donors aged 16 to 55 years, who were pre-screened and cleared for HIV, hepatitis B and C and syphilis and could donate blood.

### **Data and Sample Collection**

Demographic data such as: sex, age, health history and history of donation were obtained from the NBSZ client records.

### **Laboratory Analysis**

Serum samples were thawed to room temperature and analysed for TC, LDL and HDL using commercial kits supplied by Mindray® International Limited, China on the Mindray® BS 120 analyser in the Department of Medical Laboratory Sciences.

### **Statistical Analysis**

Normally distributed variables were summarised using mean, standard deviation and 95% confidence interval. Skewed distributed variables were summarised using median and interquartile ranges.

## **RESULTS AND DISCUSSION**

Eighty-eight (88) blood donors were enrolled into the study; 40.7% (n=35) of those enrolled were regular blood donors and 52.3% were males. Most of the blood donors were young adults, mean age  $17.4 \pm 2.8$  years. Regular donors were older (mean age of  $18.2 \pm 4.03$  years) than first time donors ( $16.8 \pm 0.91$  years),  $P=0.01$ . The average number of donations for male regular blood donors was  $3.06 \pm 3.70$  and for females was  $2.02 \pm 1.70$ ,  $P=0.3308$ . The average TC for regular blood donors ( $4.12 \pm 0.17$  mmol/L) and first time donors ( $3.73 \pm 0.12$  mmol/L) were both below the optimal reference range of 5.1 mmol/L (Table 1). There was some difference in TC levels between the two groups,  $P=0.0604$ , although the difference failed to reach statistical significance. Both LDL average values for regular donors ( $2.44 \pm 0.12$  mmol/L) and first time donors ( $2.09 \pm 0.08$  mmol/L) were below 2.6 mmol/L the optimal reference range. However there was a significant difference between the two groups  $p=0.0187$  (Table 2). The average HDL value for regular donors was  $1.08 \pm 0.05$  mmol/L (Table 6) which was within normal range but for first time donors was  $1.01 \pm 0.03$  mmol/L which was below the 1.03 mmol/L minimum reference value (Table 3).

The composition of participants is in contrast to a Nigerian study in which majority (63%) were regular blood donors [1]. In our current Zimbabwean study, most first time donors were under the age of 20 while regular blood donors were on average aged  $18.2 \pm 4.03$ ,  $P=0.01$ . According to the selection criteria of the NBSZ all donors who qualify to donate usually have none of the predisposing factors to CHD because they are generally healthy. This might have been confirmed in this study by average lipid levels within normal range.

Based on findings from several studies, regular blood donors have been identified as a protected group with lower risk of CHD compared to first time donors, when lipid profiles are used [1,4,8,16]. In contrast to the above reports, the findings of our study suggested that there was no difference in TC and HDL of the participants and almost all the lipid profile values were within the range which indicates reduced risk. There was however an unexpected result with regular blood donors having a significantly higher average level of LDL than first time donors. The difference in LDL might be attributed to difference in age of donors. First time donors are by their nature younger than active donors in Zimbabwe due to the criteria used for selecting donors. In general, young school-going adults are first time blood donors and have inherent reduced risk of cardiovascular events than older people [23] due to their age and life-style. Age differences in the populations studied may help explain differences in results such as the reported lower mean TC in regular blood donors than that of first time donors in a Nigerian population [1] and in a stratified analysis by Bharadwaj which showed that mean TC was significantly lower in regular blood donors older than 29 years compared to first time donors [16].

We conclude that there was no difference in TC, HDL levels, LDL/HDL ratio and TC/HDL ratio of regular blood donors and first time donors, but there was an unexpected difference in LDL levels. This might be explained by age difference of regular blood donors and first time donors but needs further inquiry as result differs somewhat from many other studies [23, 24].

## **REFERENCES**

1. Adediran, A., Adeyemo, T. A., & Akanmu, A. S. (2013). Lipid profiles of regular blood donor. *Journal of blood medicine*, 4, 39-42.
2. Hollan, S. R., Leikola, J., & Lothe, F. (2009). Management of blood transfusion services. *World Health Organisation, Geneva*; 2009.

3. Kouretas, D., & Mylonas, C. (1999). Lipid peroxidation and tissue damage in vivo. *In Vivo*, 13(3), 295-309.
4. Finch, C. A., Cook, J. D., & Labbe, R. F. (1977). Effect of blood donation on iron stores as evaluated by serum ferritin. *Blood*, 50, 441-7.
5. Sullivan, J. L. (1981). Iron and the sex difference in heart diseases risk. *Lancet*, 1, 1293-4.
6. British Heart Foundation booklet. (2013). Reducing your body cholesterol, Available @ <https://www.bhf.org.uk/publications/large-print/reducing-your-blood-cholesterol>
7. Ronsenson, R. S. (1993). Myocardial injury: the acute phase response and lipoprotein metabolism. *Journal of American Coll Cardiol*, 22, 933.
8. Salonen, J. T., Tuomainen, T. P., & Salonen, R. (1993). Donation of blood is associated with reduced risk of Myocardial Infarction. *American Journal of Epidemiology*, 148 (5), 445-51.
9. Bonomini, F., Tengattini, S., & Fabiano, A. (2008). Atherosclerosis and oxidative stress. *Histol Histopathol*, 2008; 23(3), 381-90.
10. Hassen, K., Shibr, B., & Awol, M. (2012). Coronary risk, lipid and lipoprotein profile of staff members of Jimma University. *Online Journal of Medicine and Medical Sciences Research*, (1), 76-87
11. Homoud, M. K. (2002). Coronary Artery Diseases. *Journal of Medical Association*, 287, 356-359.
12. Dzau, V. J. (1990). Atherosclerosis and hypertension: mechanisms and interrelationships. *J Cardiovasc Pharmacol*, 15 Suppl 5, S59-64.
13. Wiklund, O. (2001). Treating lipids in cardiovascular diseases; new directions. *Europe Heart Journal Supplement B*, 13, B27-B31.
14. Glew, R. H., Kassam, H. A., & Banji, R. A. (2002). Serum Lipid Profiles and Risk of Cardiovascular Diseases in three different male population in Northern Nigeria. *Journal of Population Health and Nutrition*, 20(2), 166-174.
15. Henriksen, T., Mahoney, E. M., & Steinberg, D. (1983). Enhanced macrophage degradation of biologically modified low density lipoprotein. *Arteriosclerosis*, 3(2), 149-159.
16. Bharadwaj, R. S. (2005). A study of lipid profiles among male voluntary blood donors in Chennai City India. *Journal of Community Medicine*, 30 (1).
17. Rosa-Bray, M., Wisdom, C., Wada, S., Johnson, B., Grifols-Roura, V., & Grifols-Lucas, V. (2013). Prospective multicentre study of the effect of voluntary plasmapheresis on plasma cholesterol levels in donors. *Vox Sanguinis*, 105(2), 108-115.
18. Panagiotakos, D. B., Pitsavos, C., & Skoumas, J. (2003). Importance of LDL/HDL cholesterol ratio as a predictor for coronary events in patients with heterozygous familial hypercholesterolemia: a 15 year follow up (1987-2002). *Curr Med Opin*, 19(2), 89-94.
19. Van Jaarsveld, H., & Pool, G. F. (2002). Beneficial effects of blood donation on high density lipoprotein concentration and the oxidative potential of low density lipoprotein. *Atherosclerosis*, 161 (2), 395-402.
20. Meyers, D. G., Strickland, D., & Maloley, P. A. (1997). Possible association of a reduction in cardiovascular events with donation. *Heart*, 78(2), 188-193.
21. Sloop, G. D. (1989). Possible association of a reduction in cardiovascular events with blood donation. *Heart*, 79(4), 422.
22. Ascherio, A., Rimm, E. B., & Giovannucci, E. (2001). Blood Donations and Risk of Coronary Heart Disease in Men. *Circulation*, 103, 52-57.
23. Deepti, G. I., Sukanya, S., & Ashalalatha, V. R. (2014). Age related difference in lipid profile in normal healthy women. *Nitte University Journal of Health Sciences*, 4(2).
24. Teddy, C. A., Igwilo, A. C., & Jeremiah, Z. A. (2012). Repeat whole blood donation correlates significantly with reductions in BMI and lipid profiles and increased gamma glutamic transferase activity among Nigerian blood donors. *Open Journal of Blood Disease*, 2, 90-94.