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COMPARISM OF THE SERUM FERRITIN LEVELS OF BLOOD DONORS AND NON-BLOOD DONORS IN ORLU

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ABSTRACT

The objective of this study was to determine the serum ferritin levels of three groups of individuals and to determine the relationship between frequency of blood donation and serum ferritin level. These groups were: (a) individuals with no history of donation (Group A), (b) individuals with a history of 1-3 donations (Group B), and (c) individuals with a history of 4-7 donations in the last one year (Group C). The mean serum ferritin levels of group A was 84.14±45.10 ng/ml, group B 68.35±35.06 ng/ml and group C 7.79±9.24 ng/ml. The WHO reference range for the parameter was obtained as Serum – ferritin (males) = 21-385 ng/ml. The serum fenitin levels were found to be significantly decreased ($P<0.05$) among the group C when compared to ggroup A and group B. Sixty percent of donors in group C had their iron stores (serum ferritin <4 ng/ml) completely depleted and had developed iron deficiency anaemia (Hb<l3.5g/dl). The serum ferritin level decreased according to the number of donations.

KEYWORDS: serum fenitin levels, deficiency anaemia.

INTRODUCTION

Iron deficiency is the commonest cause of anaemia worldwide and healthy blood donors are estimated to lose about 225mg of iron with each donation (Norashikin *et al.,* 2006). Iron is an essential component in the synthesis of haemoglobin, myoglobin, and several haem and metalloflavoproteins and its turnover *in* the human body is dominated by the synthesis and breakdown of haemoglobin (Mcphee *et al., 2007),* Every day about 30mg of iron is used to make .new haemoglobin, and roost of this is obtained from the breakdown of old red blood cells (Hillman *et al.,* 2006). Approximately 1 00-1000 mg of iron is stored in form of ferritin and haemosiderin in the liver, spleen, and bone marrow (Lewis *et al.,* 2006). The physiological importance of the storage iron is that it provides a rapidly available supply of iron in the event of blood loss (Finch, 2004). Serum ferritin is an indicator of mobilizable body iron stores. A small fraction of body ferritin circulates in the serum, the concentration correlates with total-body iron stores. Each nanogram per milliliter of serum ferritin correlates to 8-10nig of iron stores (Hillman *et al.,2006).*

Blood is the most donated tissue and is a veritable tool in many life-saving situations if used appropriately and judiciously. No transfusion center can survive without the blood donors. On any given day, approximately 32,000 units of red blood cells are needed for blood transfusion (AABB, 2007). The process of blood donor selection is established to protect both the donor and recipient.

A donor generally donates approximately 450ml of blood at the time of donation. One gram of haemoglobin contains 3.4mg of iron (Hiliman *et al., 2006).* in a normal individual with I5g of haemoglobin per dl, 100 ml of blood contains approximately 50 *mg of* iron. Thus removal of only 2 ml of blood results in *the loss* of 1 mg of iron (Ranney *et al.,* 1991). If 450 ml of blood is taken in a donation, approximately 225 mg of iron will be lost. If the donor has no iron deficiency, the erythrocytes and the haemoglobin level will generally return to normal within 3-4 weeks. Acceptable frequency of donation is normally two or three times a year (NETS. 2007). This enables a donor replenish his iron store and prevent the development of iron deficiency anaemia. Hence, adequate iron store are very important in maintenance of donors' health.

MATERIALS AND METHOD

The study was conducted at Imo State University Teaching Hospital Umuna in Orlu Local Government Area in Imo State, Nigeria. A total of 60 populations (all males) aged 18-40 years were used for this study. These populations were divided into three groups of study (group A, group B and group C). The first group consists of 20 individuals with no history of blood

donation, (non-blood donors) whom were used as the control group. The second group consists of 20 voluntary blood donors who have donated blood 1 -3 times in the last one year. The third group consists of 20 commercial blood donors, who have donated blood 4-7 times in the last one year. The samples for study (commercial and voluntary blood donors) were collected from blood donors in Blood Transfusion unit of lino State Teaching Hospital (IMSUTH), Orlu, while the non-blood donor's samples were collected from individuals in Orlu. Their medical histories were noted and those who were healthy were used for the study.

SAMPLE COLLECTION AND PREPARATION

Using a 10ml sterile syringe, 5ml of fresh venous blood was drawn from each subjects by a clean vein puncture from the antecubital vein and delivered into an iron free dried plain tube. The samples were allowed to clot at room temperature and centrifuged to separate the serum. The serum was transferred into clean test tubes for the determination of serum ferritin. The serum ferritin was estimated by Enzyme-Immunoassay method.

RESULTS AND DISCUSSION

Table 1 Mean and standard deviation of serum ferritin of the non-donors (control), voluntary and commercial donors.

Group	Total Number tested	Number of Donation in the last one year	Serum Ferritin (ng/ml)
A	20	0	84.14 ±45.10
B	20	1-3	68.35 ±34.06
C	20	1-7	7.79 ±9.24

Table 1 shows the mean ±S.D values for serum ferritin level of group A, B, and C. In group A, the mean ±S.D values of serum ferritin was 84.14 ±45.10, in group B, the mean ±S.D of serum ferritin was 68.35 ±34.06, and the mean ±S.D of serum ferritin of group C was 7.79 ±9.24.

From the result obtained, there was a significant decrease in serum ferritin levels of the group C (7.79 ±9.24) when compared to the serum ferritin level of group A (84.14 ±45.10). There was no significant difference between the serum ferritin level, of group A and group B (68.35 ±34.06). The result indicated that the serum ferritin level of the donors who have made up to 4-7 times donation in the last one year were the lowest. Depleted iron store were found in 60% of the commercial donors (group C). The value of serum ferritin obtained from the voluntary donors (group B) shows that at normal donation interval (2-3 times per year) the iron stores remained within normal range. However, the result from this study indicated that there was a significant

relationship between the frequency of donation and the serum ferritin level. After a single donation, a person needs approximately 3 months to replenish iron stores (Skikne *et al.*, 1998). With continued bleeding below the 3 months interval, an individual either reaches equilibrium at a lower level of iron stores or becomes anaemic. It is not surprising therefore; that the value of serum ferritin obtained from group C in this study was far less than what was obtained from their counterpart in Group B. The values could not even be compared with those of Group A. The values obtained from this study gives a confirmatory high loss of body's iron stores through regular blood donation.

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