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Research Article

Effect of Pecuniary Benefit on Some Haematological and Iron-related Parameters of Blood Donations: A Study at the University of Calabar Teaching Hospital Blood Donor Clinic, Calabar, Nigeria

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Abstract

Background and Objective: In many countries, there are cultural attitudes that limit acceptance to blood donation activities, governments and other institutions do little to counteract these attitudes. Therefore, the aim of this study was to determine demography, some haematological and iron-related parameters of 184 male frequent paid and not paid blood donors in University of Calabar Teaching Hospital. **Materials and Methods:** About 184 subjects comprising five groups were recruited into this study, that is, 35 (19.0%) control group (donors donating for the 1st time), 32 (17.4%) of first (donors donating for the 2nd time), 35 (19.0%) of second (donors donating for the 3rd time), 41 (22.3%) of third (donors donating for the 4th time) and 41 (22.3%) of fourth (donors donating for the 5th time) time blood donors. The donors were within the range of 18-49 years of age. A prospective cross-sectional study was conducted using systematic random sampling method for selection of the male blood donors by filling the questionnaire form after giving their consent. Their haemoglobin concentration was evaluated using complete automated cell counter (ERMA INC. Tokyo PCE-210, 5.10 version). Photometric/colorimetric and ELISA method was used to estimate the biochemical iron-related parameters (TS, SF, STfR and STfR/SF ratio). **Results:** Students (42.4%) comprised the highest percentage of donors followed by artisans (19%). The smallest occupational group was made up of bankers, politicians, businessmen). Most (63.4%) of the donors were commercial blood donors while 37.5% were not paid at the time of donation. There was a significant decrease in 184 paid blood donors in Hb, Hct, TS, SF and significant increase in STfR and STfR/SF ratio when compared with not paid ones There was also a progressive significant fall in average Hb, TS, SF and rise in STfR, STfR/SF ratio in the repeat paid blood donors of more than 3 times. There was also general impairment of haematological and biochemical iron-related parameters in paid and Not paid blood donors. **Conclusion:** Most repeated blood donors in this study were young persons between the ages of 18-35 years and most of them donated blood for pecuniary benefit. It is, therefore, necessary to inculcate motivational campaign and also educate the blood donors to devote in donating willingly without being remunerated. The Nigerian government should also rely on these findings to legislate on how to regulate blood donation abuse especially for those that do it for pecuniary benefit.

Key words: Blood donors, paid, not paid, serum transferrin receptor, serum ferritin, haemoglobin concentration, Calabar

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

A blood donor can be defined as one who donates blood for transfusion purposes and is grouped into voluntary donors, replacement donors and paid donors. The safest of these is the voluntary donor blood. A process in who voluntarily gives his or her blood which is provided to another needy person. Blood donation is dependent on many factors like, belief, attitude and motivation. An adult who is in good health had no ailment or has not given blood lately is fit as a donor. In-depth rules which adjust widespread statement for every transfusion services are designed for both protection of donor or recipient[1]. Precise rules have been put in place in some countries for the selection of blood donors that integrate benchmark to save both subjects giving and taking blood from harm[2]. The donation of blood is accepted commonly two or three times in 12 months and the loss is excess in expectant age female than male[3]. In developing countries, blood donation is mainly involuntary and relatives, friends and workmates of the patients are the main donors. Therefore the problem to solve the issue of blood donation still persists[4]. Understanding of paid versus unpaid donors varies among countries[5]. There are modus operandi utilize which are now reliant on in the developed country for donors that are willing to donate blood.

In developing countries like Nigeria, there is a dependency on family replacement and remunerated donors[6,7]. A voluntary without stipend blood donation is unpaid or element blood by somebody of his/her free will and without obtaining the benefit which could be taken as additional cash[8]. Voluntary blood donation accounts for less than 5% of blood procured in most of our blood banks[9]. The World Health Organization advocates that members should operate non-remunerable voluntary blood donation services in their centers[9]. Despite the establishment of National Blood Transfusion Service (NBTS) in Nigeria, very little progress has been made in the direction of providing sufficient blood for our teaming populace[6]. Blood banks are mandated to provide adequate and safe blood to the community. Generally, prudent donors are autologous and somebody that gives voluntarily is mindful of their unsuitability to be a giver of blood to avoid causing health damage for blood recipients[6,10,11]. As a way of attaining this goal, voluntary non-remunerated blood donation is encouraged and World Health Organization has set a target of attaining whole hearted voluntary non-remunerated donation[12] by 2020. Nigeria as a member nation of WHO, has made little progress with voluntary blood donor recruitment. Only about 5% of donor blood used in Nigeria come from voluntary donors, family replacements and paid donors are still the major sources of donor blood procurement[13,14]. Several studies have reported anaemia in blood donors, with higher frequencies in Africa than in Western countries[15,16]. Erhabor *et al.*[17] in a similar study reported that haemoglobin values are lesser in remunerated blood donors when equated with replacement donors in Nigeria. Anaemia is the most common reason for donor ineligibility[18]. When donors were offered money as a donor motivating tool might be high paying donors for their service is usually appealing to influence people living in desperate straits. There are various factors that manipulate the people's motivation towards blood donation and these factors include the organizational, psychological, physiological and demographic factors. Many incentives have been offered to the donors that are the medical tests like cholesterol and Prostate-Specific Antigen (PSA) screening[19] and economic incentives that include lottery or raffle tickets and tickets to events[20]. Another Nigerian study informed that 41% of donors are encouraged by certificates[21]. A lot of information given above refers to the Caucasians who generally have on the average, higher normal blood values than the Africans and keep to the regulation of donating blood once or twice within a year. In Nigeria, blood donation is abused. For instance, various abnormalities that are associated with frequent or repeated blood donation have not been documented for Nigerians. These abnormalities include, lack of organization, environment, donors gift and iron deficiency, etc. If these are documented, perhaps, the Nigerian government can rely on these findings to legislate on the control of blood donation. This may prevent some of the high mortality rates among Nigerians that may be caused by repeated blood donation because several donors donate blood as many as 5 times in a year for pecuniary benefits. Blood Transfusion policy in our locality states that the service is an important component of Healthcare but for the system to achieve its desired objectives, all components of the system must work in synchrony. Undoubtedly, blood transfusion is beneficial as a medical therapy but voluntary non-remunerated donations are in limited supply. The cost of producing a unit of blood safe for transfusion is high, this has jeopardized the system which hitherto is underfunded. The followings rules must be followed, making all emergency requests to pay a fixed non-refundable amount, placing the extra charge on all blood users (e.g., 10% of service charge, payment of refundable deposits in lieu of the donation. (Presently operational), mandatory donations by all surgical patient and antenatal patients (operational but not working or enforceable for now), formation of blood donors club sponsored by the hospital management, hospital management providing a fixed fund for

voluntary blood donation to buffer blood consumption during emergency service. The fund may be (1) As a monthly imprest. (2) Recycled, autologous blood donation by elective surgery patients (operational but not be working because of high frequency of rescheduling operational due to lack of gas and other consumables)[22].

Several policies which have been abused because there is no proper regulation and monetary on how the rules are been abide by and carried out and it seems everyone is doing what they feel like doing, which makes the policy to still be ongoing in the facility.

MATERIALS AND METHODS

This was a perspective cross-sectional study conducted at the University of Calabar Teaching Hospital Blood Donor Bay and approval was given by the Health Research Ethical Committee (HREC) of the Hospital before the collection of samples commenced. Permission was gotten using informed consent from the donors, bio-data along with medical history was obtained using questionnaire before donation from the blood donors. A systematic random sampling method was used for the selection of the male blood donors. There were 120 or more blood donors coming to the bleeding bay in a month and considering 5 months as a period for gathering samples, after selection and collection of first samples among 10 initial donors (for quality control), the remaining samples were chosen at 5 interval and finally a total of 184 subjects comprising 5 groups were recruited into this study, that is, 35 (19.0%) control group (donors donating for the 1st time), 32 (17.4%) of first (donors donating for the 2nd time), 35 (19.0%) of second (donors donating for the 3rd time), 41 (22.3%) of third (donors donating for the 4th time) and 41 (22.3%) of fourth (donors donating for the 5th time) time blood donor. They all donated blood within the period of 2-3 months (September-November) of collecting samples in the year 2012. After selection of donors using questionnaire, 184 male blood donors samples were analyzed. The donors were within the range of 18-49 years of age.

The reason of using 1st timers as our control is because several works carried out in Nigeria and in this locality[23] has shown that there is no difference in the parameters of people who have not donated blood before and people donating blood for the 1st time.

The inclusion criteria was as follows, donors must have the packed cell volume of >0.400 L L^{-1} donated blood in a previous period of fewer than 2 months, seronegative for HIV 1 and 2, hepatitis B and C then *Trepanoma pallidium*. The exclusion criteria was those taking an iron supplement or had gone through major surgery in the past 3 years and those that had a history of recent blood transfusion in the past 2 years.

Collection of sample: Blood and sera were collected from each male blood donors after blood donation. The sample was used for haemoglobin concentration and haematocrit using complete automated cell counter and (ERMA INC. Tokyo PCE-210, 5.10 version). The TS was determined by computation of SI and TIBC (TECO diagnostic U.S.A, Lot number 1592). The SF (HUMAN FERRITIN: Catalog number: BC-1025) and STfR (BioVendor-Laboratoni medicina a.s. Cat. Number: RD194011100 Czech Republic) were determined using ELISA method while STfR/SF ratio was determined and is a way of combining STfR and ferritin results. This ratio will provide an outstanding parameter for the identification of patients with depleted iron stores.

Data analysis: The SPSS software (version 18) and Microsoft Excel was utilized for the statistical tools that are an articulated average±standard error. Significant was expressed $p<0.05$ up to 0.01 in the compared statistic.

RESULTS

The mean ages were 25±0.89, 27±1.04, 27±0.78, 28±0.92 and 27±0.66 years for control, 1st, 2nd, 3rd and 4th time blood donors, respectively. The result also showed that 25 (13.6%), 32 (17.4%), 78 (42.4%), 35 (19.0%) and 14(7.6%) of 184 donors were applicants, civil/public servants, students, artisans and others, respectively. The students showed the greatest number of occupation and were observed to be significantly higher with other groups (Fig. 1).

Figure 2 shows the percentages of donors (from the control group to 4th time) who were paid or not paid time blood was donated. It shows most control group and 1st time blood donors were not paid. However, those that gave more frequently, that is, from 2nd-4th time were paid for blood donation. It showed that 62.5% of 184 blood donors were paid while 37.5% were not paid at the time of donation (Fig. 3).

Figure 4 shows the percentages of donors (from the control group to 4th time) who donate blood elsewhere other than UCTH. It shows that most of the 1st, 2nd, 3rd and 4th time blood donors donate blood elsewhere. However, those that had not donated blood elsewhere where the control group male blood donors. It showed that 26.6% of 184 blood donors donated elsewhere other than UCTH while 73.4% donated in UCTH (Fig. 5).

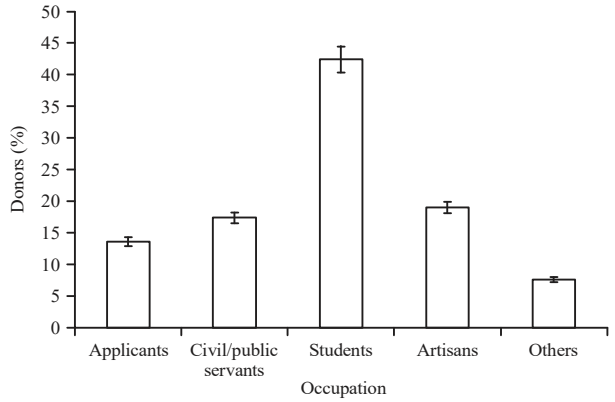

Fig. 1: Percentage of 184 male blood donors according to occupation

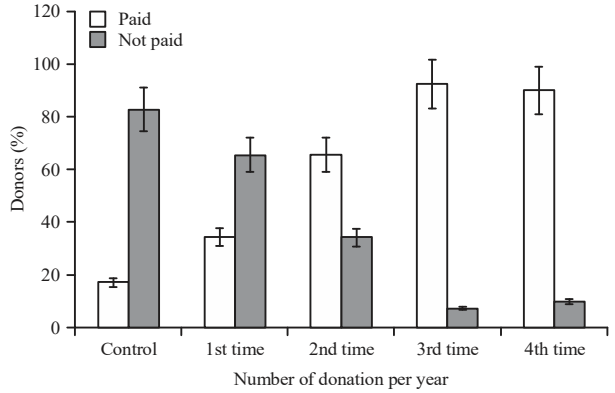

Fig. 2: Percentage of donors who were paid or not paid at time of donation

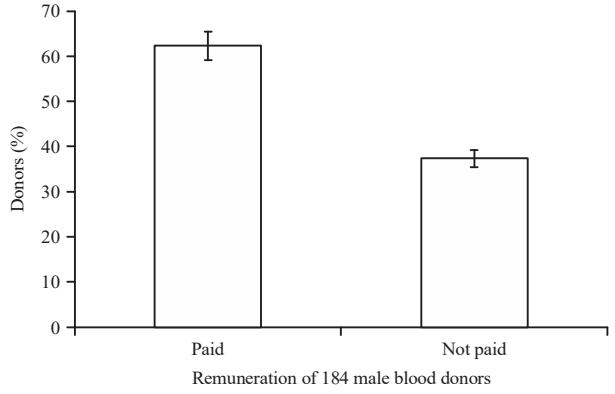

Fig. 3: Percentage of 184 male blood donors who were paid or not paid at time of donation

Table 1-3 shows the mean of some haemoglobin and biochemical iron-related parameters obtained when comparing paid and not paid control, 1st, 2nd, 3rd, 4th and 184 male blood donors in Calabar. It shows no significant

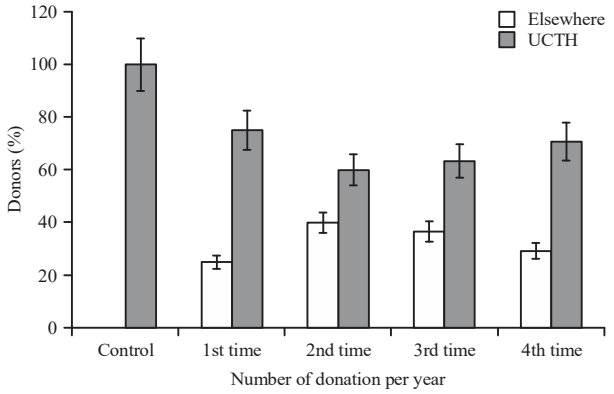

Fig. 4: Percentage of donors who donate blood elsewhere other than UCTH
UCTH: University of Calabar Teaching Hospital

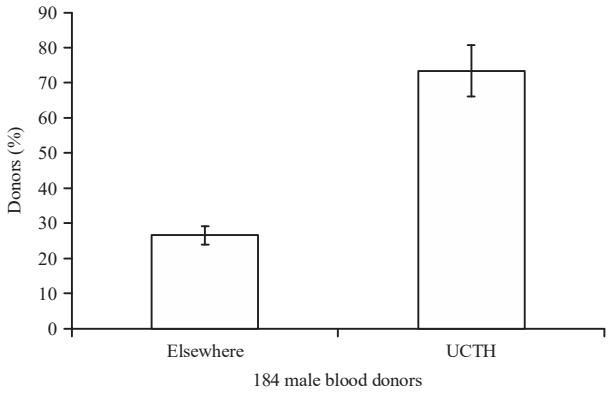

Fig. 5: Percentage of 184 male blood donors who donated blood elsewhere other than UCTH
UCTH: University of Calabar Teaching Hospital

difference with 1st time mean Hct values. Moreover, there was a significant increase ($p<0.05$) in STfR and ratio of paid (5.4 ± 1.34 μg mL^{-1} and 3.3 ± 1.06 μg ng^{-1}, respectively) when compared with not paid blood donors (2.8 ± 0.54 μg mL^{-1} and 1.4 ± 0.27 μg ng^{-1}, respectively). In Table 2, the mean STfR and ratio that were 7.5 ± 0.84 μg mL^{-1} and 5.5 ± 0.62 μg ng^{-1}, respectively in paid donors show significant raised ($p<0.05$) values in 2nd timers when compared with not paid donors (5.1 ± 1.08 μg mL^{-1} and 3.6 ± 1.02 μg ng^{-1}, respectively). There was a significant decrease in TS and SF between 4th time paid and not paid donors while mean ratio values increase significantly ($p<0.05$). Meanwhile, in 184 male blood donors, the mean Hb, Hct, TS and SF were significantly decreased ($p<0.05$) while STfR and ratio were significantly increased ($p<0.05$) in paid when compared with not paid donors.

Table 4 and 5 shows the values of some haematological and biochemical iron-related parameters observed in the paid and not paid groups based on a number of donations.

Table 1: Some haematological and biochemical iron-related parameters of paid and not paid 1st and 2nd-time male blood donors

	Control (1st time) blood donors			First (2nd time) blood donors		
Parameters	Paid (n = 6)	Not paid (n = 29)	p-value	Paid (n = 11)	Not paid (n = 21)	p-value
Hb (g L^{-1})	146.0±3.21	153.0±2.07	P >0.05	139.0±4.34	143.0±2.11	p>0.05
Hct (%)	41.8±1.24	44.3±0.59	P<0.05	41.1±1.21	42.4±0.78	p>0.05
TS (%)	38.8±3.97	34.7±1.52	P >0.05	33.5±3.34	37.7±1.77	p>0.05
SF (ng mL^{-1})	104.0±17.9	101.2±10.0	P >0.05	97.5±26.1	108.8±15.7	p>0.05
STfR (µg mL^{-1})	3.3±0.90	2.6±0.32	P >0.05	5.4±1.34	2.8±0.54	p<0.05
Ratio (µg ng^{-1})	1.7±0.52	1.3±0.17	P >0.05	3.3±1.06	1.4±0.27	p<0.05

Hb: Hemoglobin, Hct: Hematocrit saturation, TS: Transferrin saturation, SF: Serum ferritin, STFR: Soluble transferrin receptor

Table 2: Some haematological and biochemical iron-related parameters of paid and not paid 3rd and 4th-time male blood donors

	Second (3rd time) blood donors			Third (4th time) blood donors		
Parameters	Paid (n = 22)	Not paid (n = 13)	p-value	Paid (n = 38)	Not paid (n = 3)	p-value
Hb (g L^{-1})	123.0±2.26	127.0±3.03	p>0.05	115.0±4.55	118.0±7.37	p>0.05
Hct (%)	39.7±0.61	40.8±0.71	p>0.05	38.9±0.57	40.3±1.87	p>0.05
TS (%)	25.0±2.09	28.8±3.04	p>0.05	17.4±1.31	19.0±9.23	p>0.05
SF (ng mL^{-1})	33.3±4.71	78.7±23.3	p<0.05	34.9±6.58	16.0±6.60	p<0.05
STfR (µg mL^{-1})	7.5±0.84	5.1±1.08	p<0.05	8.3±0.74	7.5±3.77	p>0.05
Ratio (µg ng^{-1})	5.5±0.62	3.6±1.02	p<0.05	8.1±1.16	7.2±4.09	p>0.05

Hb: Hemoglobin, Hct: Hematocrit saturation, TS: Transferrin saturation, SF: Serum ferritin, STFR: Soluble transferrin receptor

Table 3: Some haematological and biochemical iron-related parameters of paid and not paid 5th time and 184 (ALL) male blood donors

	Fourth (5th time) male blood donors			184 male blood donors		
Parameters	Paid (n = 37)	Not paid (n=4)	p-value	Paid (n = 114)	Not paid (n = 70)	p-value
Hb (g L^{-1})	102.0±3.65	116.0±11.6	p>0.05	116.0±2.35	141.0±2.02	p<0.05
Hct (%)	33.3±0.59	33.9±1.94	p>0.05	37.6±0.43	42.3±0.48	p<0.05
TS (%)	13.3±0.78	19.3±6.33	p<0.05	20.2±1.02	32.9±1.27	p<0.05
SF (ng mL^{-1})	12.3±2.46	104.7±87.9	p<0.05	36.9±4.44	95.8±8.98	p<0.05
STfR (µg mL^{-1})	11.2±0.84	8.3±3.44	p>0.05	8.6±0.47	3.6±0.41	p<0.05
Ratio (µg ng^{-1})	15.1±4.79	5.8±2.35	p<0.05	9.1±1.65	2.3±0.34	p<0.05

Hb: Hemoglobin, Hct: Hematocrit saturation, TS: Transferrin saturation, SF: Serum ferritin, STFR: Soluble transferrin receptor

Table 4: Comparison of some haematological and biochemical iron-related parameters of paid male blood donors with their number of donations

	Control donors	1st time donors	2nd time donors	3rd time donors	4th time donors	
Parameters	(n = 6)	(n = 11)	(n = 22)	(n = 38)	(n = 37)	p-value
Hb (g L^{-1})	146.0±3.21	139.0±4.24	123.3±2.26	115.0±4.56*[a]	102.1±3.65*[a,b]	p<0.05
Hct (%)	41.8±1.24	41.1±1.21	39.7±0.61	38.9±0.57	33.3±0.59*[a,b,c]	p<0.05
TS (%)	38.8±3.97	33.5±3.34	25.0±2.09*[a]	17.4±1.31*[a,b]	13.3±0.78*[a,b,c]	p<0.05
SF (ng mL^{-1})	104.0±17.9	97.5±26.1	33.3±4.71*[a]	34.9±6.59*[a]	12.3±2.46*[a,c]	p<0.05
STfR (µg mL^{-1})	3.3±0.90	5.4±1.34	7.5±0.84	8.3±0.74*	11.2±0.84*[a,b,c]	p<0.05
Ratio (µg ng^{-1})	1.7±9.52	3.3±1.06	5.5±0.62	8.1±1.16	15.1±4.79	p>0.05

Hb: Hemoglobin, Hct: Hematocrit saturation, TS: Transferrin saturation, SF: Serum ferritin, STFR: Soluble transferrin receptor, *: p<0.05

Table 5: Comparison of some haematological and biochemical iron-related parameters of not paid male blood donors with their number of donations

	Control donors	1st time donors	2nd time donors	3rd time donors	4th time donors	
Parameters	(n = 6)	(n = 11)	(n = 22)	(n = 38)	(n = 37)	p-value
Hb (g L^{-1})	153.3±2.07	142.0±2.11*	127.0±3.03*[a]	118.0±7.37*[a]	116.0±11.6*[a]	p<0.05
Hct (%)	44.3±0.59	42.4±0.78	40.8±0.71*	40.3±1.87	33.9±1.94*[a,b,c]	p<0.05
TS (%)	34.7±1.52	37.7±1.77	28.8±3.04[a]	19.0±9.24*[a]	19.3±6.24*[a]	p<0.05
SF (ng mL^{-1})	101.0±10.04	109.0±15.7	78.7±23.3	16.0±6.6	105.0±87.9	p>0.05
STfR (µg mL^{-1})	2.6±0.32	2.9±0.58	5.1±1.08	7.5±3.77*	8.3±3.44*[a]	p<0.05
Ratio (µg ng^{-1})	1.3±0.17	1.4±0.27	3.6±1.02*	7.2±4.09*[a]	5.8±2.35*[a]	p<0.05

Hb: Hemoglobin, Hct: Hematocrit saturation, TS: Transferrin saturation, SF: Serum ferritin, STFR: Soluble transferrin receptor, *: p<0.05

The 1st timers were used as a control group and the parameters were compared with 2nd, 3rd, 4th and 5th time male blood donors. The mean values of Hb, Hct, TS and SF (146±3.21 g L^{-1}, 41.8±1.24, 38.8±3.97% and 104±17.9 ng mL^{-1}, respectively) in paid groups were found to decrease progressively and significantly ($p<0.05$) as donations increased while STfR and ratio (3.3±0.90 µg mL^{-1} and 1.7 ng $µg^{-1}$) were observed to be elevated but significant only in STfR as the number of donations increased. There was a progressive decreased in Hb with a 3rd and 4th donation which was found between 3rd vs. control and 1st donations, 4th vs. control, 1st and 2nd

donations. The Hct and TS values of 4th donation also showed a significant decrease with 4th vs. control, 1st, 2nd and 3rd. The TS and SF difference in mean value were between 2nd vs. control and 2nd, 3rd vs. control, 1st and 2nd, the 4th donation with SF was between 4th vs. control, 1st and 3rd. There was also progressive increased in STfR with 3rd vs control, 4th vs. control, 1st, 2nd and 3rd. The mean values of the parameters are not paid groups were also found to decreased (Hb, Hct and TS) and increased (STfR and ratio) progressively and significantly as the number of donation increased ($p<0.05$). There was no significant difference found in ratio mean values ($p>0.05$). The difference was observed mostly with the 4th donation between 2nd vs control or 1st, 3rd vs. control and 1st, 4th vs. control and 1st.

DISCUSSION

Among the 184 male donors utilized in this study, it was observed that the students donated blood more frequently followed by artisans, civil/public servants, applicants and others (Fig. 1). While students donated more frequently as the control group, first and second timers, artisans donated more as third and fourth timers. The reason students donated more in control group, first and second time could be because there is always a strong voluntary blood donation drive targeted at students while the artisans do it for the pecuniary benefit (commercial donors). Jeremiah *et al.*[24] reported that in the sub-saharan African region, selection of non-remuneration, first time/family replacement donors has been a task owing to commercial blood donors that camouflaged as family replacement donors. So, repeated and voluntary blood donation was also a challenge in this study.

It was also interesting to observe that most of the donors (70%) restricted their donation to UCTH. Only 30% had donated blood elsewhere and also UCTH to make up their number of donations (Fig. 5). Almost all the control groups (donors donating for the 1st time) restricted their donation to UCTH. The percentages of blood donors decreased as they continued to donate (Fig. 4). Among the control group and 1st time blood donors, those that were not paid were more than those that were paid. However, from 2nd-4th time blood donation, those that were paid were more than those not paid (Fig. 2). The reason for this is probably that the control group and 1st timers were not mainly commercial blood donors as those after the first time blood was donated. They probably did it once and twice then stopped avoiding risk linked with a frequent donation. The third and fourth were mostly commercial donors who probably did not care about their health status but cared more for money. It was also observed that donors in UCTH were mainly commercial donors since more than 60% of all the donors were paid (Fig. 3). It was also interesting to observe that most of the donors (70%) restricted their donation to UCTH. Only 30% had donated blood elsewhere and also UCTH to make up their number of donations (Fig. 5). Almost all the control groups (donors donating for the 1st time) restricted their donation to UCTH. The percentages of blood donors decreased as they continued to donate (Fig. 4). Nwogoh *et al.*[6] reported that commercial blood donation account for 95.3% compared to 4.7% from replacement and volunteer donors in Benin city, Nigeria, this obviously places recipients/patients in some forms of potential health risks[6]. In 1997, the World Health Organization (WHO) set a goal of achieving 100% voluntary donation by the year 2020. As at the year 2010, only 57 of 126 countries surveyed had established this standard, regrettably, many African nations were not part of the successful ones[25].

The haematological and biochemical iron-related parameters studied were HB, Hct, TS, SF, STfR and STfR/SF ratio Table 1-5. There was a significant decrease in 184 paid blood donors in Hb, Hct, TS, SF and a significant increase in STfR and StFR/SF ratio when compared with not paid ones (Table 3). There was also general impairment of haematological and biochemical iron-related parameters in paid and not paid blood donors (Table 4, 5). These differences were observed mostly in paid blood donors donating 3-5 times within a year which indicated that anaemia is likely to set up at those times. These results showed that donors donating blood for pecuniary benefit do not observe the 3 months interval after their initial donation. Since the gap claimed by the donors between one donation and another was about 2 month, which in turn does not give sufficient time for erythropoiesis to compensate in avoiding the decline of these parameters. Meanwhile, the reduction in Hb and Hct suggested that anaemia is likely to occur from the 2nd time blood is donated among the repeated paid blood donors. The reason for this could be that the pre-donation PCV may not have been carried out properly and due to the type of donors (touts) that have a way of bursting their plasma because of what they take when coming to donate blood which may account for the sudden drop found in 3rd, 4th and 5th time paid blood donors. The reasons for the lower haematological indices can also be reported to be genetic and dietary. For instance, foods rich in thermally oxidized palm oil reduce red cell count in the rat[26]. So, the consequences of frequent blood donation may be more severe in the African than the Caucasians. Usanga[23] and Benedict *et al.*[27] reported that although blood donors can regulate their iron demand by physiological means, low serum ferritin levels at the time of donation can lead to depletion of

their iron reserves. Due to this, a minimum of 4-5 month should be given as interval to allow enough time for restoration of these parameters. It was also observed that the progressively significant decrease and increased in TS, SF, STfR and STfR/SF ratio, respectively which indicated the presence of iron deficiency. The iron deficiency may be caused by frequent blood donation at a short interval which sometimes was acquired from donating blood elsewhere in an attempt to earn more money aside from the studied area. The results agreed generally with the findings of other investigators regarding Hb, Hct, TS and SF[23,27-30]. Excerpts STfR[31] and STfR/SF ratio that is being studied among paid and not paid blood donors. This frequent blood donation there can be likened to haemorrhage that causes iron deficiency anaemia[32]. The unavailability of voluntary blood donors has made the blood donor bay to rely solely on paid donors which are usually contracted by the hospital donor bay vendor in order to maintain the blood transfusion needs of the hospital and Calabar metropolis as a whole.

Many countries are making a significant improvement towards achieving the 100% voluntary donor blood procurement but not so much has been achieved in Nigeria. Sadly, only 5% of voluntary donation has been achieved in some major donor centers in Nigeria. The main sources of blood donations in Nigeria are from commercial (remunerated) blood donors, these blood have been found to be generally inferior in terms of safety and qualities when compared to voluntarily donated blood[33]. The implication of this is that donors iron is continually depleted by donating frequently and recipient are transfused with several units of blood which put the donors and recipient life at risk of transfusion-transmissible infections. The goal of any blood transfusion service is to provide qualitative, safe and adequate blood to recipients/patients[34]. The system of blood donation in Calabar and Nigeria as a whole is not properly structured as we still depend on paid donors whose haematological and iron status are depleted. It has also shown that iron parameters are not determined prior to blood donations. The altitude of what is in it for me? is common in blood donation in Calabar and in many other places and developing countries of the world, particularly those with low capital income. In developed countries, the regulation, legislation and reports of parameters of donating blood once or twice in a year are kept for record purposes and the blood are mostly donated by non-remunerated donors. Also, the blood is fractionated to a different component of blood to avoid wastage. In Calabar, Nigeria and Africa as a whole, blood donation is abused because several donors donate blood as many as 5 times in a year for pecuniary benefits. The various loopholes and irregularities that are associated with blood donation, remunerated, frequent or repeated blood donation have not been documented for Nigerians as a policy. If they are documented, perhaps, the Nigerian government can rely and enforced on these findings to legislate on the control of blood donation. This may prevent an iron deficiency caused by repeated blood donation and also the safety of donors and recipient.

CONCLUSION

Students comprised the highest percentage of donors followed by artisans. The smallest occupational group was made up of bankers, politicians, businessmen. Most repeated paid blood donors in this study were young persons between the ages of 18-35 years. Their haematological and biochemical iron-related parameters were decreased (Hb, Hct, TS and SF) and increase (STfR and STfR/SF ratio). Such report may lead to legislation that will regulate blood donation abuse especially for those that do it for pecuniary benefit.

Voluntary non-remunerated blood donation should be encouraged by effective awareness programs to motivate blood donation that might also change the thoughts of some persons that are strictly against blood donation in our society. By attaining to this, it will educate the blood donors to devote in donating willingly without being remunerated. Also, local reference ranges should be established, strictly monitored and carried out in the donor bay to avoid endangering the donors.

Further motivational/education campaigns where donors comfort is emphasized on should be carried out on blood donors to improve the quality of blood donation, by involving other medical teams, nursing team and counselors.

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