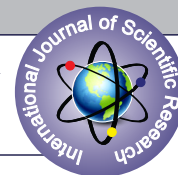


STUDY OF REPEATED BLOOD DONATION ON IRON STATUS OF THE DONORS IN RAMA MEDICAL COLLEGE & RESEARCH CENTER, HAPUR.



Pathology

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ABSTRACT

Introduction : Voluntary unpaid blood donation is a altruistic deed towards the sick by the healthy. The well-being and fitness of the blood donors are of major importance in current health care scenario. In most nations, strict guidelines have been established for the choice of blood donors that include criteria that serve to protect both the donors and recipients. Moreover, hemoglobin (Hb) itself is quite an inadequate measure to detect iron deficiency. Hence, our primary aim was to understand the effect of repeated blood donations on BIS in regular blood donors. Aim: This work is aimed at assessing the influence of frequency of blood donation on iron stores by assessing voluntary blood donors.

Method: This study was conducted in Rama Medical College and research centre, Hapur. This is prospective and observational study and was performed between January 2018 and December 2019. On 115 subjects aged between 18 and 50 years. Donors were divided into four donor groups Blood samples from the study subjects were collected for hematological tests data were analysed using SPSS and simple calculation. Result: In our study haematological parameters in different donors groups was analyzed which showed, subjects in the group I and group II don't have iron storage deficiency while 61.11% of the participant in group III was having iron storage deficiency and in the group IV 81.81% members has low serum ferritin level this is a clear indication that multiple donation effect iron store in the body.

Conclusion: The present study demonstrates iron depletion in regular voluntary blood donors. Therefore, volunteers who repeatedly donate blood should be advised on eating balanced diet with special care of iron supplements and they should undergo ferritin screening.

KEYWORDS

Blood donor, Serum ferritin, Anemia

INTRODUCTION

Iron deficiency is the most extensive form of undernourishment affecting both developing and developed countries. The deficiency affects more people than any other disorder, creating a public health condition of a magnitude equalling to an epidemic. Iron deficiency anaemia (IDA) diminution the work capacity of the affected population, ensuing in disturbing economic consequences and impairments to the national development. According to the World health organization (WHO), in low human development index countries, every second pregnant female and about 40% of preschool children are assessed to be anaemic. IDA is the most common cause of anemia. 2002, it was the most significant factor donating to the global burden of disease. Previous study in India has testified that 73.8% of professional blood donors are anaemic. The result of blood donation on iron status has been measured since the late 1970s. Each donation of whole blood unit reduces a male with about 242 ± 17 mg of iron and a female with 217 ± 11 mg of iron. Chronic iron deficiency is a well-recognized problem of regular blood donation. It is known that the IDA is an ultimate stage of iron deficiency and that hemoglobin level alone are insufficient for noticing blood donors with iron deficiency in the nonappearance of anemia. The comfort and health of the blood donors is of major position for the medical profession. A lot has been revealed and written about safety of the recipients from the potential dangers of blood transfusion. But very little consideration is given to the health status of donors. The main reason is the fear of trailing the donor in a time when the demand of blood is mounting all over the world and the donors are becoming infrequent. Chronic iron deficiency is a well-recognized complication of regular blood donation. After a single donation, the loss is quickly made up by mobilizing the iron stores in the form of ferritin followed by refilling the iron stores, if the diet is passable. As iron stores reduction, iron absorption increases. In most blood banks, haemoglobin (Hb) quantity is used as a screening test for the capability to donate blood. Since haemoglobin levels may be normal in the presence of abridged iron stores. The use of this parameter has been stated to have poor sensitivity in the recognition of initial stages of iron deficiency. Indeed, a precise diagnosis of a state of iron deficiency needs numerous laboratory tests. Measurements of serum ferritin concentrations and red cell indices such as mean cell volume (MCV) and mean corpuscular haemoglobin (MCH) Can be used far better sensitivity and specificity. Earlier studies have publicized that the serum ferritin levels were decreased markedly in consistent donors matching to annual donation frequency. In order to achieve the global and national determination to recruit and hold steady repeat voluntary blood donors, the iron status of the donors desires to be identified and essential steps for iron supplementation need

to be taken. There is scarcity of data in India, particularly in and around Ghaziabad and Hapur concerning impact of regular voluntary blood donation on iron status of donors. The present study was, therefore, intended to measure (using a combination of hematological and iron status parameters) the development of anaemia and incidence of iron deficiency anaemia in the blood donors in Ghaziabad and Hapur city.

MATERIAL AND METHODS

This study was conducted in Rama Medical College and research centre, Hapur. This is prospective and observational study and was performed between January 2018 and December 2019. During this a total number of 115 subjects aged between 18 and 50 years, who came for blood donation in the Blood Bank, were selected. The inclusion criteria are that they must be seronegative for Human Immunodeficiency Virus (HIV 1&2), hepatitis B & C and Syphilis. The exclusion criteria were use of iron supplements, pregnancy, lactation, donation elsewhere (outside them registering organizations) or a major trauma/surgery in the last three months. Donors were divided into four donor groups: **Group I: (n = 48)** includes those who were donating for the first time and not suffering from anaemia, these individuals, thus represented a sample of healthy population in this region. **Group II: (n = 38)**, who had donated ≤ 5 times. **Group III: (n = 18)** 5 to 10 times, who were donated 6-10. **Group IV (n = 11)** > 10 times in last 2 years. Study Methodology A questionnaire was given to each donor after obtaining their informed consent for the participation in the study. Blood samples from the study subjects were collected for hematological tests such as Hb, MCV (mean corpuscular volume), MCH (mean corpuscular Hb), MCHC (mean corpuscular Hb concentration), and red cell distribution width (RDW) & ferritin level. Statistical Measurement the data were analysed using SPSS. The simple descriptive data was analysed through the mean with standard deviation, and quantitative data as percentages. The statistical analysis was done using Student's t test. p values < 0.05 were considered statistically significant.

RESULTS

The mean age in controls and donors ranged between 28 and 44 years.

Table – 1. Characteristics of the subjects in the study groups

Variables	Group I 1st Time Donors (n = 48)	Group II ≤ 5 Donors (n = 38)	Group III 6-10 Donors (n = 18)	Group IV >10 Donors (n = 11)	p value

Age (years)	36.23 ± 10.24	33.28 ± 9.49	39.44 ± 10.64	41.01 ± 3.25	>0.05
Sex					
Male	38(79.16 %)	30 (78.94 %)	12(66.66 %)	9 (81.81 %)	
Female	10(20.83 %)	08(21.05 %)	06(33.33 %)	2 (18.18 %)	
BMI					
18-24.9	33 (68.75%)	22 (57.89%)	10 (55.55%)	9 (81.81%)	
25-30	10 (28.83%)	12 (31.57%)	6 (33.33%)	2 (18.18%)	
>30	5 (10.41%)	4 (10.52%)	2 (11.11%)	0 (00...%)	

Table – 2. Haematological parameters in different donors groups of the donor.

Groups	Hb, gm/dL	Hct, %	MCV, fl	MCHC, g/dL	MCH, pg/cell	RDW	Serum Ferritin, µL
I	14.2 ±1.27	43.29 ±2.25	86.83 ±4.59	32.82 ±2.01	29.88 ±2.44	12.60 ±1.14	110.75 ±86.42
II	14.01 ±1.50	43.25 ±2.20	87.11 ±6.85	32.10 ±1.05	29.26 ±1.89	12.55 ±1.05	75.97 ±110.42
III	12.60 ±1.50	43.00 ±3.20	86.90 ±5.23	31.98 ±1.06	28.50 ±3.02	12.59 ±1.02	45.55 ±30.45
IV	11.50 ±1.01	37.36 ±2.40	84.58 ±6.60	31.10 ±01.15	26.70 ±2.9	13.50 ±2.01	11.00 ±7.89

Table – 3. Number of subject having deficit Iron storage based upon Serum Ferritin Concentration less than 12 ng/ml.

Study Group	Deficit Iron storage subjects	Percentage
Group I	0	0
Group II	0	0
Group III	11/18	61.11
Group IV	9/11	81.81

In our study we have included 115 voluntary blood donor where Table 1 shows Variable Characteristics in which there was no significant variation in the age, as the P value is more than 0.05. Among our study we have 26 (22.60%) Female and Male was 89 (77.39%). In these groups no one have BMI above 30. Table 2 shows Haematological parameters in different donors groups of the donor. The mean standard deviation of parameter like haematocrit, red cell indices (MCH, MCV, MCHC) and serum ferritin was evaluated and enumerated in above table As seen in Table 2 Hb, mean cell volume (MCV) and mean cell haemoglobin (MCH) values gradually decreased as number of blood donations increased. Table 3 shows the frequency of iron deficit among the different study groups. Stratification of four subgroups that are subjects having iron storage deficiency (<12ng/ml) and normal groups reveals that subjects in the group I and group II don't have iron storage deficiency while 61.11% of the subject in group III was having iron storage deficiency and in the group IV 81.81% participants has iron storage deficiency, these data clearly indicates that multiple blood donation within a short periods of interval affect the iron storage.

DISCUSSION

Many studies has shown that repeated blood donation impact on the iron storage and result in iron depletion but still all the laboratory depend on Hb as a criteria for blood donation⁹. In the present study the ferritin concentration in the first time donors was significantly higher than the value of ferritin in the repeated donors. Our finding was consistent with the result of other studies which also suggest that a regular donor have low level of ferritin in compare of non donor.¹¹ The mean ferritin value start decreasing as early as 10 donation in Alvarez et al study also have similar finding showing decrease ferritin level in regular blood donor.¹¹ Abdullah et al and Shahshahani et al also indicates the donor susceptibility of developing anaemia on repeated donation of blood. Another study shows that blood donation results in considerable iron loss as about 0.5 ml iron is lost per each millimetre of blood donation so if not compensated after blood donation may lead to anaemia. One study has indicated iron demand increases with number of annual blood donation at a repeated blood donors. We also found that the mean Hb and haematocrit level was lower in the regular donor group as absorbed in another study also by Al-exander at al. So the donors are on potential risk of developing iron deficiency anaemia which can be detected by the early estimation of ferritin and people should be educated about the impact of regular blood donation especially for the professional donors.

CONCLUSION

Donation of the blood has influence on iron store which is an important factor of iron deficiency mainly among the multiple donor with the special reference to females. Considering the following observation we should suggest that more frequent donation of blood is not

advisable and in the laboratory better indicator such as ferritin should be measure before donation especially if the donor are regular donor and proper data of blood donation should be kept by the blood donor.

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