

A CROSS SECTIONAL ANALYTICAL STUDY ON BIOPHYSICAL AND BIOCHEMICAL PARAMETERS IN REPEAT BLOOD DONORS OF A TERTIARY CARE CENTRE IN KERALA

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Abstract

Background: Blood transfusion services mainly depend on healthy regular repeat non remunerated voluntary blood donors. Regular repeat donors used to donate 3-4 times a year for at least two consecutive years. It is very important to study the effect of blood donation on the health of donors especially those above forty years. Is regular blood donation has any deleterious or beneficial effect to the donors. **Materials and Methods:** A cross sectional analytical study on regular repeat blood donors who have donated 3-4 times a year for at least two consecutive years. 150 donors were included in the study. Anthropometric assessment, height and weight were taken and calculated the BMI. A sample was taken for biochemical evaluation, total protein and lipid profile. The donors were divided into two groups. First group those with 118 donors total donation less than or equal to 20, second group, 32 donors were total donation more than 21. The values obtained were compared and analyzed. **Result:** Average weight in the group 1 and group 2 was 79.4 and 76.8 respectively. BMI of two the groups were 28 and 27.3 respectively, overweight category. Plasma protein values were same in both groups. Lipid profile values were lower in regular donors whose total donation more than 21. **Conclusion:** Regular repeat blood donation won't leads to malnutrition. BMI assessment is better to check the nutritional status of the donors prior to donation. Present study found out that those with BMI above 23 are donating repeatedly. Lipid profile showed lower values in regular donors.

INTRODUCTION

The advantages and disadvantages of blood donation is an important aspect frequently discussed among current and prospective donors. A donor generally donates 350 ml to a maximum of 450ml of blood at the time of donation depending on his weight and hemoglobin. Minimum weight required for blood donation is 45 Kg. There is no maximum weight limit for blood donation. Obesity and overweight are common in all populations. They are caused by increase in the size and amount of fat cells in the body. Obesity and altered lipid profile is one of an important risk factor for major illness like cardiovascular diseases, diabetes, stroke and many cancers like breast cancer, endometrial cancers and others. Throughout the world overweight and obesity kills people than malnutrition. Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and

obesity in adults. It calculated as a person's weight in Kilograms divided by the square of his height in meters, Kg/m². Some of the current regular voluntary donors had started donating blood from their teens. It is very important to study the effect of blood donation on the health of donors especially those above forty years. What is actually happening to our blood donors who were repeatedly giving blood to our blood banks and tried to address the following questions. Does regular blood donation affect the health of the donor in any way? What are the changes in biophysical and biochemical parameters in those donors who have donated blood multiple times? Whether the potential benefits observed in regular donors were due to blood donation itself or due to the healthy lifestyle adopted by such individuals? Whether we have to set an upper limit for the total number of donation so that the physical health of donors are not adversely affected?

MATERIALS AND METHODS

The study was conducted in a blood centre attached to a tertiary care centre which is also a Government Medical College in Kerala during 2017. Ethical clearance was obtained from the Institutional Ethical Committee, IRB No: 36/2017. A cross sectional analytical study was done for a period of 3 months May 2017 to July 2017. Donors who attended blood banks were screened and enrolled as per usual. All categories of donors were included in the study, both in house donors and camp donors, Voluntary and replacement donors. Donors in the age group 40-60 years who repeatedly donating blood were included in the study. Donors were selected following DGHS guidelines with standard questionnaire, regular counseling, health checkup including anthropometric assessment. Those with history of hypertension, altered lipid profile or on antihypertensive or antilipidemic drugs were not included in the study. A cross sectional analytical

study on regular repeat blood donors who have donated multiple times. Regular donors used to donate 3-4 times a year for at least two consecutive years. 150 donors were included in the study. The donors were divided into two groups. First group total donation less than or equal to 20, total donation more than 21 in group 2. Anthropometric measurements, height in cm and weight in Kilogram were taken and calculated the Body Mass Index / BMI using the formula weight in Kilogram divided by height in meter square. After phlebotomy a sample was collected for accessing various biochemical parameters. Total protein, lipid profile was performed in the biochemistry department. The values obtained were compared and analyzed.

RESULTS

Regular repeat blood donors of age group 40 to 60 years of age were enrolled in the study.

Table 1: Age group of blood donors

Age group	Frequency	Percent
41-50 years	148	98.7
>51years	02	1.3
Total	150	100

98.7% of study population comes in the age group of 41 to 50 years. Of this total 150 repeat donors, 148 males and two females were enrolled. These two females with rare blood group hence donated repeatedly.

Table 2: Total number of donations during life time

Total number of donations during life time	No of donors	Percent
Less than 10	62	41.3
11-20	56	37.3
21-30	18	12
More than 30	14	9.3
Total	150	100

118 donors donated blood less than 20 times in their life time while 32 donated more than 21 times.

Table 3: BMI- Body Mass Index

Donors with total donations	Mean BMI	Standard deviation
Less than 20, Group1	28	+1.9
More than 20, Group2	27.3	+ 2.4

Body Mass Index was calculated using the formula weight in Kg divided by square of height in meters. Minimum weight recorded in the study group was 58 Kg and a maximum weight recorded was 110 Kg. Minimum height recorded was 149 cm and maximum of 180 cm. Minimum BMI calculated for regular repeat donors was 23 and a maximum recorded was 38.6. Average BMI of the study group is 27.65, that is overweight category (BMI 24.9- 29.9).

Total protein remained almost same in the study population. Total protein remained in the normal range in all blood donors. Repeat regular blood donation could not affect total protein values. Minimum value recorded was 6.8 mg% and maximum 7.4 mg%.

Table 4: Lipid profile of blood donors

Study group	Mean lipid profile		Standard deviation
Total blood donation Less than 20	HDL	50.6	+ 11.7
	LDL	147.16	+30.6
	T.Chl	203	+ 42.3
	T.G	170.5	+ 44.9
Total blood donation More than 21	HDL	50	+ 11.4
	LDL	128.1	+12
	T.Chl	181.2	+ 12.6
	T.G	162.6	+ 57.1

Except HDL (P value >0.1), other three P value <0.001, that is significant.

Variable results obtained as it was a postprandial sample collected at the time of blood donation.

DISCUSSION

To ensure safe, good quality, adequate and sustainable blood products to the needy is the responsibility of the nations. The demand for blood and blood products are increasing day by day. Donor motivation and maintenance is important to meet this demand. Some donors started donating blood from their teens and are regularly donating. It is very important to study the effect of blood donation on the health of donors especially those above forty years. Is it affecting the health of donors. Is regular blood donation has any deleterious or beneficial effect to the donors; or the effect is due to their healthy life style.

The donation process in India are strictly following the Director General of Health Services, CDSCO (Central Drugs Standard Control Organization) guidelines. Donors were selected with the help of a donor questionnaire. Counseling and physical examination including recording of height and weight, vitals were done prior to donation. History and a mini physical examination were done prior to donation. Those with history of hypertension, diabetes, cardiovascular diseases, cancers, bleeding disorders, liver and kidneys diseases were not allowed to donate. Only those who were physically and mentally fit only were allowed to donate blood. Past history of illness were enquired in detail and the deferral period were strictly followed. Mandatory screening for five infections were done after phlebotomy. Those with symptoms of flu or minor ailments were not allowed to donate. Regular health check up and screening for anemia are done prior to blood donation.^[1-3]

Biophysical and various biochemical parameters of regular repeat blood donors were assessed so as to study the effect of regular repeat blood donation. The age group selected was 40 to 60 years. Those who were donating blood 2-3 times in a year for two consecutive years was included in the study. Out of 150 donors enrolled only two were females. Being a rare group, these two females became regular donors but total donation was less than 10. 18 to 65 years of age is the lower and upper limit of age for blood donation. Both males and females can donate blood. Like in all other blood banks female blood donation is less than 10 percent. Measures were taken to promote voluntary female donation by conducting mega camps in colleges. Minimum hemoglobin required for blood donation is kept as 12.5g%. Most of the female donors failed to attain this criterion and had deferred.

There were many studies conducted on blood donors. Those donors with weight more than 45Kg only were permitted to donate blood (350ml) of

whole blood. Those with weight above 60 Kg were required for taking 450 ml blood. Donors with body weight more than 55 Kg are good for preparing components. Blood centers prefer donors more than 60 Kg for apheresis procedure. Blood centers preferred donors with adequate weight and height as they were less prone to donor reactions and can prepare quality products. Those with BMI above 25 were less prone to donor reactions also. Those with body weight less than 50 were not donating repeatedly due to fear of losing health. In the present study most of the regular donors BMI were in the overweight category. Those donors were motivated to become regular donors and donor adverse reactions were also less in that category.

Anthropometric examination is a single best indicator of health, and a tool for assessment of nutritional status of an individual. Anthropometric factors and BMI were studied in blood donors. Anthropometry provides the single most portable universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and composition of human body. Basic anthropometric measurements weight, height, waist circumference and hip circumference and their derived indices like Body Mass Index, Waist Hip Ratio were used as indicators for the presence of diseases and their assessment in clinical practice.^[4]

Obesity is a global pandemic characterized by many co morbidity. Blood donors with high BMI were recruited for special procedures in Blood bank like apheresis. Donors with high BMI were motivated and recruited for blood donation. Of these overweight categories with BMI 24.9 to 29.9 Kg/m² had been becoming regular repeat donors and the blood centres were maintaining their donor pool for getting safe blood. According to present study repeat blood donation did not leading to weight loss. Dhanashree Naidu V S et al study showed that repeat blood donors were at a risk of becoming under weight.^[5] But in our study repeat donors were not under weight.

The benefits of blood donation to donors were widely discussed in many studies It was seen that regular blood donors were following healthy life style and they were less prone to life style diseases like hypertension, diabetes, cardiovascular diseases, cerebrovascular accidents and cancers. They were less prone to diseases like haemochromatosis as iron stores were get depleted due to repeated blood donation.

In the present study regular repeat donors were having normal lipid profile values. A cross sectional study conducted by Somesh Rajuetal study of BMI and lipid profile of blood donors of north Indian population could not find out any significant relation with blood donation.^[6]

Some studies found out some beneficial effects of blood donation , while some pointing out the complications and long term deleterious effect of repeated blood donation .Blood centers could also educate general public about lifestyle modifications

and preventing non-communicable diseases.^[7] Many studies pointing out the benefits of blood donation like normalizing lipid values, hypertension and reducing cardiovascular events.^[8-11]

Some harmful effect of repeat blood donation was iron deficiency anemia, depletion of iron stores, especially in females. Many studies done on blood donors emphasized the importance of doing serum ferritin in regular repeat donors.^[12-14]

Frequent donation and life style modifications attributed to the normal range values. Those with overweight and obesity were usually motivated and become repeat donors. Donors with weight less than 55Kg would not repeatedly donate blood due to a fear of losing health.

Limitations

The parameters studied were not solely depended on blood donation .Food habits, genetic predisposition, exercise, life style, socioeconomic status also contributed to variations. Total number of donations during life time was taken from the donor history itself and no way to cross check as they donated in various Blood banks over years. All the donors studied were non vegetarians and 56.0% of them were taking red meat 2- 3 times a week. Sedentary lifestyle and food habits also attributed to high lipid values and overweight in regular repeat donors, as they were in the habit of taking high fat containing diet. The blood samples taken at the time of phlebotomy was used for testing lipid profile. Donors in this blood centre were in the habit of taking fat rich non vegetarian diet prior to blood donation.

CONCLUSION

Maintaining healthy donor pool of regular repeat donors is essential in Blood Transfusion services. Regular repeat blood donation won't leads to malnutrition. BMI assessment is better to check the nutritional status of the donors prior to donation. Present study found out those with BMI above 23 are donating repeatedly. Lipid profile showed variable results as samples were collected after having food, though values are lower in regular donors (p <0.001). Blood centre can also act as community teaching centre educating the importance of following healthy life styles and maintaining adequate BMI and lipid profile thereby

controlling non-communicable diseases. Regular voluntary blood donors can act as effective donor educators, recruiters and health promoters and an active agent in health promotion by following healthy life styles.

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