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Original Article

Level of hyperlipidemia in blood donors: A correlative study in North Indian population

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ABSTRACT

Background: Hyperlipidemia can be caused by abnormal elevation of lipids and lipoproteins in the blood. This increased can lead to heart disease. Risks which can be controlled include alcohol intake, physical activity, smoking, high blood pressure and genetic factors. Markers of increased cardiovascular risk appear to be lower in regular blood donor compared with single time donors as reflected by significantly lower total cholesterol and LDL levels. And it has been thought that there will be a direct relationship between lower risks of Heart diseases with repeated blood donation.
Aim: The aim of the present study is to determine the effect of blood donation on single time and repeat donors by assessing their lipid levels and their family history of heart diseases.
Material & methods: This cross-sectional study was carried out on ($n = 80$) random blood donors from the department of Transfusion Medicine KGMU.
Results: A significant correlation was found amongst hyperlipidemic level in single time donor & repeat donors and in donors with family history of heart diseases ($p < 0.05$). A positive association was found between hyperlipidemia with donor's weight ($p < 0.05$).
Conclusion: Screening random donor platelets for hyperlipidemia and correlating the condition with other donor criteria like family history of heart diseases, types of donors, donors weight age and gender will help in making the patients safe as well as the donor deferral criteria more stringent to improve the quality of blood supply and will enable blood bankers to supply safe blood and improve the guidelines for blood safety.

1. Introduction

Safe blood starts with me, Blood saves lives" was the WHO theme for 2000 AD [1].In every country and patients, blood donation and transfusion is very important component for the health care system as the patient requires transfusion for their condition has a right to expect safe and sufficient unit of blood for their conditions. But this need is not always help full in developing countries as there is a shortage of blood supplies which results in patient's death and suffer unnecessary as they do not get the right unit of blood and blood products [2]. Hyperlipidemia can be caused by abnormall elevation of lipids and lipoproteins in the blood. This increased can lead to heart disease [3]. Risks which can be controlled include alcohol intake, physical activity, smoking, high blood pressure and genetic factors [4]. Markers of increased cardiovascular risk appear to be lower in regular blood donor compared with single time donors as reflected by significantly lower total cholesterol and LDL levels [5]. And it has been thought that there will be a direct relationship between lower risks of Heart diseases with repeated blood donation [6] which seems that those regular blood donors have lower risks as compared to single time [7]. Although HDL appears to be significantly higher in single time donor population, it thus appears that regular blood donation is associated with lowering of serum lipids [5]. But it is unclear that how repeated blood donation will lower the onset of cardiovascular. A hypothesis was made that by blood donation lipid oxidation is inhibited by the reduction of iron which will going to decease the

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LDL level from the blood and finally reducing the risk of heart diseases [8]. Health care providers are very much concerned about the development of hyperlipidemia because of the well established association between lipid levels and risk of Heart diseases [9]. Hyperlipidemia are detected because lipid profile is done as a routine analysis of health care evaluation or because plasma lipid profile is analyzed after the heart disease is detected [10]. The American Heart Association quoted on its web site [11] that "The American Heart Association urges all Americans to have their physicians determine their total and HDL blood cholesterol levels. This is very important for those people with a family history of heart disease, taking lipid rich diet, alcoholic and with high blood pressure. So here it can be stated that screening refers not only analyzing lipid profile in people with associated diseases or having without symptoms. It means that if any person is diagnosed with disease related to hyperlipidemia should have their lipid levels to be checked. And this also implies with same who had been diagnosed with any type of cardiovascular diseases. Hyperlipidemic platelets are frequently transfused to patients with various disorders. Screening random donor platelets for hyperlipidemia and correlating the condition with other donor criteria such as family history of heart diseases and type of donors will lead to further deciding the exclusion criteria for donor selection and make blood transfusions more safe. In this study, the aim is to determine the effect of blood donation on single time and repeat donors by assessing their lipid levels and their family history of heart diseases.

2. Materials & Methods

2.1. Study design

This cross-sectional study was carried out on ($n = 80$) random blood donors of both sexes with aged 18–66 and weight above 50 kgs, from the department of Transfusion Medicine King George's Medical University (December 2015–June 2016).Blood donors they were grouped into two groups Single time donors and repeat donors (donated blood within last 3 months). A complete history was taken to exclude previous operations, transfusion, and any chronic disease, hematological disease, and any previous drug abuse. A complete medical examination was carried out. Donor's weight and hemoglobin was done. Written consent was taken from the donors during sample collection.

2.2. Exclusion criteria

Donor above 65 yrs of age, Blood Donor with any infection or chronic disease, those whose age is above 65 years or with any previous blood transfusion or any other surgery, Donor undergoing any medication and in female donors (Any abortion in last 3 months and having any child less than one year old) were excluded from the study.

2.3. Questionnaire

Questionnaires were recorded from the donors regarding the donor criteria like if they having Family history of heart disease. Addict of alcohol, Smoking habits, their.Life Style (physical activity and sedentary lifestyle).and the type of diet which they include in food Lipid rich diet (saturated and unsaturated fats) and Oral contraceptive pills intake.

2.4. Blood collection and hematological analysis

After donation of 350 ml of blood, 5 ml of blood sample was taken for analysis. The following criteria were considered for donor (Weight, Age and General History). Following investigation was carried out on donor's sample Hemoglobin (Hb), Blood sample was taken in plain vial and centrifuged at 3000 rpm for 5 min to obtain serum. The Lipid Profile of blood donors comprising of Cholesterol, triglyceride, HDL and LDL levels were analyzed by fully automated analyzer Cobas C311-Roche Diagnostic) with standard Roche test kits.

2.5. Ethics

The Ethics Committee of the King George's Medical University approved the study. Voluntary blood donation was done and written informed consent was taken from blood donors.

2.6. Statistical analysis

Statistical analysis was done using IBM SPSS Statistics version 23 (IBM, Armonk, NY, USA). Descriptive statistics and one way ANOVA was done as mean ± standard deviation. And additionally, independent sample *t*-test was used to compare between means. In all statistical analysis, level of significance (*p*-value) was set at $P \leq 0.05$.

3. Results

Total of 80 blood donors were included in the study in which 30 samples of blood donors were found to be hyperlipidemic (whose LDL levels are high).Significant association was evaluated between single time donors and repeat donors with LDL levels ($p = 0.008$) (Table 1). The total serum LDL levels were slightly higher in Single time donors when compared with repeat donors (Fig. 1). There is a significant ($p = 0.008$) association between hyperlipidemic level of blood donors and their family history of heart diseases (Fig. 2).positive correlation was also found between LDL levels with donor's weight ($p = 0.30$) (Table 1).No association were tabulated between donors age and gender with respect to LDL levels (Table 1).

4. Discussion

Blood components are an unexplored area prone to numerous discoveries which influence patient's care. Experiments at different levels will further change the present concept of blood banking. Hyperlipidemic platelets are frequently transfused to patients with various disorders. Screening the random donor platelets for hyperlipidemia and correlating the condition with other donor criteria such as weight type of donors and family history of heart diseases will be helpful in deciding the exclusion criteria for donor selection. Which will be help in making the patients safer as well as the donor deferral criteria more stringent to improve the quality of blood supply. Technical evaluation and assessment will enable blood bankers to supply safe blood and improve the guidelines for blood safety. It has been found from this study that majority of blood donors belonged to age grouped between 18 and 65 years i: e; younger and middle generation showing that younger and middle generation plays a major role in blood transfusion services. Many studies showed that Repeated blood donation will be helpful in reducing blood lipid levels (cholesterol, Triglycerides, and LDL) from the blood, Thus it conclude that, regular blood donation will be benefial for health because by lowering lipid levels of plasma LDL, Cholesterol and Tryglycerides can be benefial in reducing the risk of developing cardiovascular diseases [12]. Our study also showed a positive association of type of donors (repeat and single time blood donors) with LDL levels. Serum LDL levels were higher in single time donors when compared with repeat donors.

Various studies have been done on obesity and hyperlipidemia

Table 1
Distribution of Weight, Age, gender & history of blood donors with respect to hyperlipidemia.

Parameter	Hyperlipidemia (n = 30)		Mean	Standard Deviation	P-Value (≤0.05:significant*)
Gender	Male	19	169.653	4.1724	.868
	Female	11	169.955	5.6145	
Age	18–25	11	170.782	4.7131	.189
	26–45	13	170.331	3.7846	
	46–65	6	166.667	5.7504	
Weight	50–70	22	170.859	4.8632	.030*
	Above 70	8	166.750	2.1876	
Type of Donors	Single time donors	21	171.186	4.7296	.008*
	Repeat donors	9	166.444	2.2423	
Family history of heart diseases	Yes	20	171.295	4.8252	.008*
	No	10	166.700	2.2632	

Note: * Descriptive statistics was done as mean ± standard deviation for donors weight and gender, One way ANOVA was used for measuring the donors age with respect to hyperlipidemia and Student's *t*-test was used for measuring the significance between single time donors and repeat donors and for family history of heart diseases.

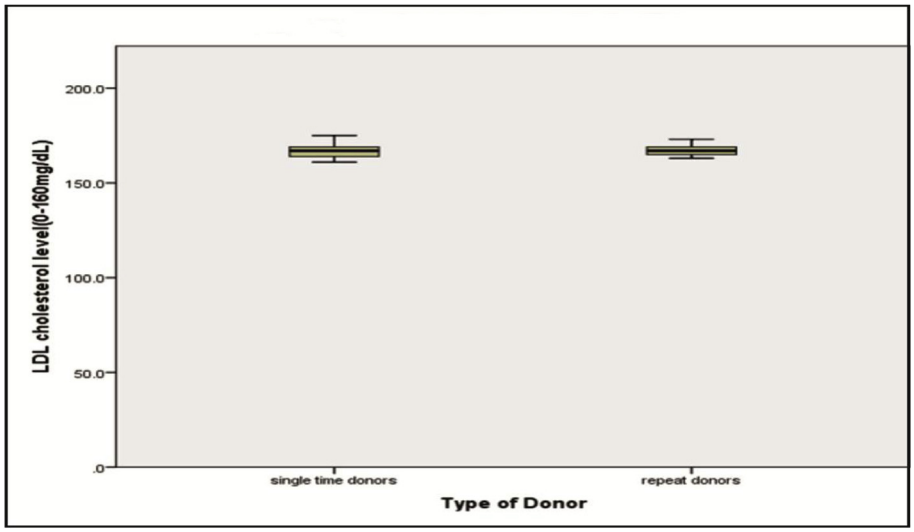

Fig. 1. Levels of LDL with type of Donors.

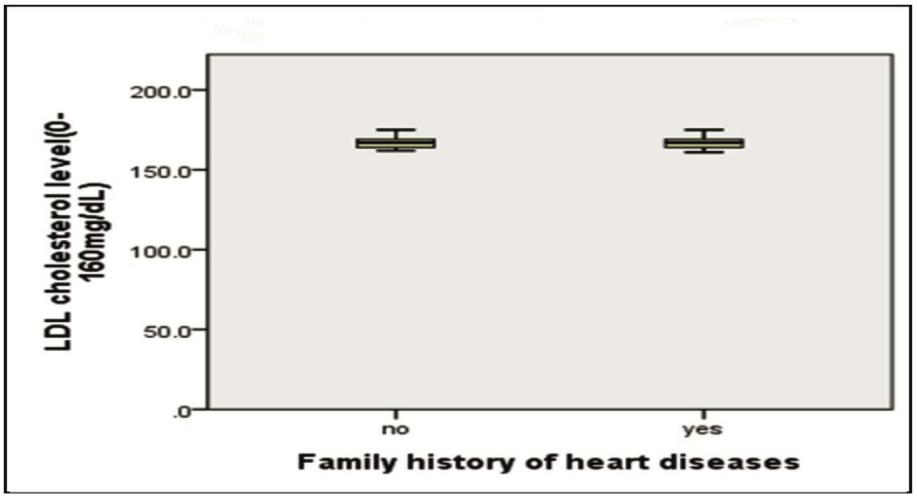

Fig. 2. Levels of LDL with family history of heart diseasses.

where they showed that obesity is significantly associated with risk of developing hyperlipidemia and were significantly associated with regular blood donations. Middle age groups are generally associated with obesity and that is true for blood donors [13]. Phlebotomy process can reduce iron stores from body will helpful in reducing blood pressure and lower risk of cardiovascular diseases [14]. Our finding also show that obesity is associated with developing risk of hyperlipidemia.

Plasma LDL are thought to be the biomarker of Heart diseases events especially atherosclerosis and Coronary artery disease [15].

However the parameter LDL/HDL ratio is a better predictor of heart diseases when compared with LDL and HDL level alone [16]. In our study we found that repeat blood donors have lower levels of LDL when compared with single time donors. Lowering Plasma LDL levels with blood donations was also shown by various many studies which are studies in different regions of world [17–20].Many studies had been studied which showed that blood donation did not affect the lipid levels and no association was found between repeat donors and risk of heart diseases [21]. But in our study we have found that by low LDL plasma levels can be helpful in reducing the onset of Heart diseases.

5. Conclusion

Single time donors & repeat donors with family history of heart diseases have a high probability of hyperlipidemia in their plasma. Their donation will ultimately result in hyperlipidemic plasma and platelets and will be unfit for transfusion. They should be included in the donor deferral criteria which lead to further deciding the exclusion criteria for donor selection. Thus it will help in making the patients safe as well as the donor deferral criteria more stringent to improve the quality of blood supply. And will also enable blood bankers to supply safe blood and improve the guidelines for blood safety. Further studies on larger sample size needed to establish the observation that may be utilized for modifying the donor selection criteria.

Conflicts of interest

None declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dsx.2019.04.033.

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