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"TO STUDY SERUM CALCIUM AND MAGNESIUM IN PLATELETPHERESIS DONORS"

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ABSTRACT
The study was conducted on 90 healthy voluntary plateletpheresis donors with age group between 21 to 54 years, at Apheresis unit in blood bank Bharati vidyapeeth (Deemed to be University) Medical College and Hospital sangli. Pre and post estimation of serum calcium and magnesium was done, study suggest significant reduction in serum calcium and magnesium post apheresis. We conclude on basis of findings of present study, as serum Calcium and serum Magnesium were decreased significantly after plateletpheresis. So if any plateletpheresis donor has already decreased biochemical parameters which are below normal level, then these donors may face the severe adverse reactions during apheresis donations. Hence, it is better to refuse these donors till the levels are reached at normal.

KEYWORDS: Sr. Calcium, Sr. Magnesium, ACD, Plateletpheresis.

INTRODUCTION
Therapeutic apheresis has been used since it is introduce in 1960 worldwide. It is possible to collect desired component required for transfusion from healthy donor using apheresis.[1] Apheresis is a technique which reduces the risk of transmission disease and immigrate transfusions reactions by blood transfusion. The increase demand of platelet transfusion in conditions like medical and surgical emergencies, along with the new technologies available to promoted and increased demand of plateletpheresis.[2] Platelet can be prepared or collected from whole blood after several stages of processing or through the apheresis (plateletpheresis) using cell separators. Apheresis is a technique performed on donors or patients where by a particular component of the blood is separated ex vivo and the remainder of the blood is returned to the donor or patients. Our aim is Assessment of certain biochemical parameters and their derangement in plateletpheresis donors in case of pre and post plateletpheresis, certain biochemical investigations are definitely useful in providing the guidelines for the transfusion consultant in the management of plateletpheresis. Therefore the estimation of serum calcium and magnesium was performed in pre and post plateletpheresis donor. Our objective was to determine the levels of following biochemical analytes in pre and post plateletpheresis donor.

MATERIAL AND METHODS
Material
Proposed Research work was carried out in Department of Biochemistry, Vidyapeeth (Deemed To Be) University Medical college & Hospital, Sangli. Period of the study was from October 2018 to September 2020. The study has been approved by Institute of Ethical Committee (IEC/ Dissertation 2017-18/247).

The study was conducted on 90 healthy first time voluntary plateletpheresis donors with age group between 21 to 54 years, at Apheresis unit in blood bank Bharati Vidyapeeth (Deemed to be) University Medical College & Hospital,Sangli. Details of plateletpheresis were explained to each donor who gave their consent before the procedure. Average weight of donors was 67.5 kg and average height was 5 feet 6 inch. The mean hematological value of apheresis donor for platelet was 301×10^3 / cumm. and haematocrit average was 44.15%. The average time taken for per procedure was 6.7 minutes and average product volume was 311.5 ml. All procedures were performed by using cell separator machine Fenwal Amicus Cell Separator (Baxter Healthcare Corporation Deerfield IL USA). All plateletpheresis procedures were performed following the departmental standard operating procedure (SOP) using closed system apheresis kits and ACD anticoagulant in the proportion of 1: 12. The end point of each procedure was based on the target yield of 3×10^{11} platelets per unit maintaining a blood flow rate for all collections at 50-80 ml/min. During procedure donors

were under the influence of soft instrumental music. To measure the pre and post donation biochemical analytes, whole blood sample (5ml) was collected in plain vial just before and within 30 min after completion of the procedure, taking all aseptic precautions. Serum calcium and serum magnesium were measured on fully automated analyzer and semi auto analyzer MerilAutoQuent.

Statistical Analysis

All graphics and statistical comparisons were performed with spreadsheet software (Excel, Microsoft) .The statistical analysis was done using "t" test. All results were calculated as mean ± SD and a "p" value of <0.05 was considered statistically significant. Mean values were compared using the paired 't' test. bivariate correlation is obtained to check the relationship between serum calcium and serum magnesium in pre and post plateletpheresis donors.

RESULT AND DISCUSSION

Calcium, magnesium and phosphorus are the mineral present in largest quantities in bones and are important in giving strength and shape to the bone.[1] However, these play an important physiological function in other parts of the body as well.[3] Calcium is a major element in intercellular regulation and metabolism.[2] Table No. 1and graph No.1 Shows the mean level of serum calcium was 9.60 mg/dl. before starting plateletpheresis while post procedure it was observed 8.47 mg/d. The difference between pre and post level of serum calcium was 1.13 mg/dl, indicates that level of serum calcium was found significantly reduced after plateletpheresis. (P<0.001)

Possible reasons for decline levels of serum calcium in post plateletpheresis may be due to the relatively higher volume of Acid Citrate Dextrose (ACD) infused as the primary anticoagulant in apheresis procedures.[5] The anticoagulant effect of citrate results from its ability to chelate calcium ions resulting in the unavailability of calcium ions to participate in biological reactions such as the coagulation cascade.[4]

Table and Graph No. 1.Concentration of serum calcium in pre and post plateletpheresis Donors.

Serum calcium	Mean ± S.D.	Std.Error Mean	"t"	"p" value
Pre Plateletpheresis	9.60 ± 0.385	0.049	22.73	0.001
post Plateletpheresis	8.47 ± 0.32	0.032		

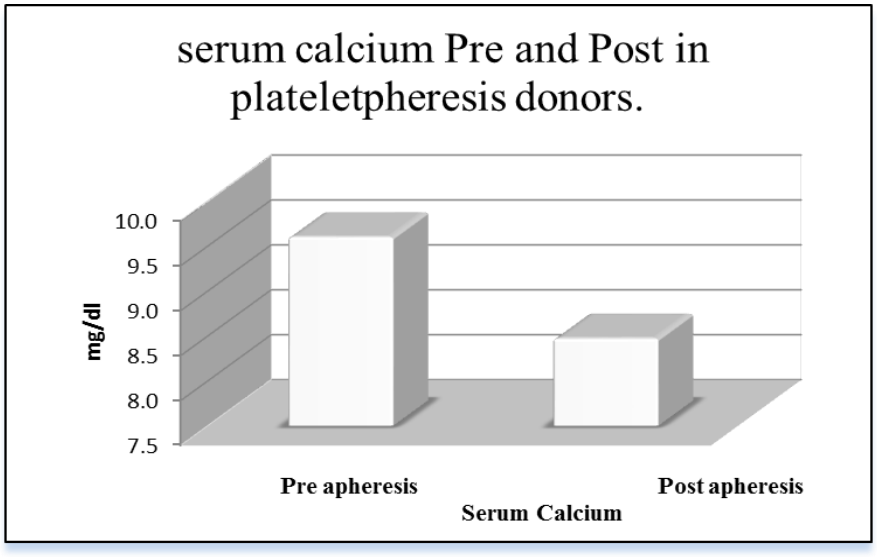
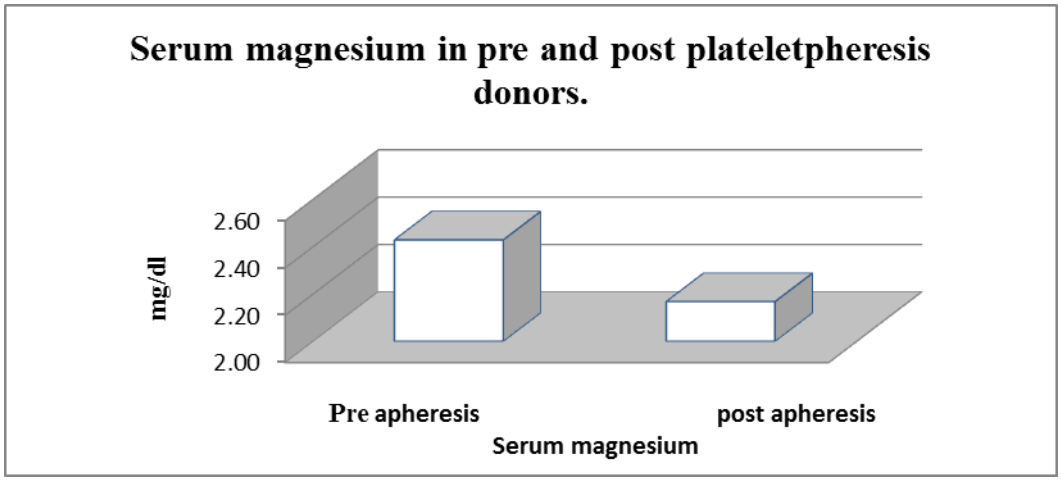


Table No. 2 and graph No.2 observed decreased level of serum Magnesium in plateletpheresis donors post procedure was very highly significant as compared to pre procedure (P <0.001). The level of serum magnesium pre procedure was 2.43 mg/dl and that of post procedure was 2.16 mg/dl. The difference between pre and post procedure was 0.27 mg/dl. Its variations may have repercussions on both calcium metabolism and parathromone (PTH) response. Determination of changes in magnesium activity during citrate infusion would therefore help in the assessment of its role in the side effects of plateletpheresis.7 Hypocalcaemia and hypokalemia are usually associated with hypomagnesaemia. Release of calcium from the sarcoplasmic reticulum is inhibited by magnesium. Thus hypomagnesaemia results in an increased intracellular calcium level may be also cause of decreased plasma calcium level.[8]

Table and Graph No.2:-Concentration of serum magnesium in pre and post plateletpheresis donors.

Serum Magnesium	Mean ± S.D.	Std. Error Mean	"t"	"p" value
Pre plateletpheresis	2.43±0.28	0.036	7.60	0.001
Post plateletpheresis	2.16±0.16	0.021		

Magnesium is not only the second most abundant divalent cation in blood; it is also involved in many metabolic processes that are closely dependent on its presence. Total body content of Mg^{2+} is between 21 to 29 gms i.e. about 43 mgs / kg of fat free tissue.[6] In the body it is mainly distributed in three major compartments, 65% in mineral phase of skeleton, 34 % in intracellular space and only 1 % in the extracellular fluid. More than half of the quantity is present in bones.[7] The highest Mg^{2+} concentration is present in liver and striated muscle followed by brain and kidney. Out of 1% extra cellular Mg^{2+}, 25% is in the plasma and rest is in the red cells.[8]



CONCLUSION

Hypocalcaemia is a common manifestation in hypomagnesaemia. Symptomatic hypocalcaemia is usually seen in moderate to severe magnesium deficiency and there is a positive correlation between serum magnesium and calcium concentrations. Even mild degrees of magnesium depletion can cause a significant decrease in serum calcium concentration. Magnesium therapy may be helpful to restore serum calcium concentration to normal.

We suggest that the donor should be screened for biochemical investigations serum calcium and serum magnesium in pre plateletpheresis donors which have been included in our study along with the serological and hematological investigations.

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REFERENCE

1. Karin Amrein, Claudia Katschnig,Sabin Slpurzyshi, Tatjanan stojakovic Gerhard . Lanzer, Elisabeth Stach. Apheresis affects bone and mineral metabolism.Elsevier, 2010; 46: 789-95.
2. Bolan,C.D.,Cecco,S.A.,Yau,Y.Y.,Wesley,R.A.,Oblitas,J.M.,Rehak,N.N. and Leitman,S.F. Randomized placebo controlled study of oral calcium carbonate supplementation in plateletpheresisII, metabolic effect. Transfusion, 2003; 43: 1414-22.
3. I.O.Szymonski.Ionized calcium during plateletphersis. Transfusion, 2003; 18: 701-8.
4. Olson,P.R.,CoxC.and McCullouh,J.Laboratory and clinical effect of the Infusion of ACD solution During Plateletpheresis.Transfusion, 2009; 33; 79-7.
5. Susan.f.Leiteman.M.D.Randomized placebo-Controlled study of Oral Calcium Carbonate administration in plateletpheresis. Transfusion, 2003; 43: 114-122.
6. Gaetan Bastin, R.N. Dany Mercan .Importance of ionized magnesium measurement for monitoring of citrate anticoagulant plateletpheresis. Transfusion, 1997; 37: 418-422.
7. G. Harvey. M.D.Klein. J. David.Anstee. Exchange transfusion and haemapheresis.Mollisons, 2005. Blood Transfusion in clinical Medicine. 11th Edition; 788-801.
8. S.S.Das, R. Chaudhary. D.Khetan, J.S. Shukla. Calcium and Magnésium levels during automated plateletpheresis in normal donors. Transfusion Medicine, 2005, 15: 233-236.