

STUDY OF PLATELETS ADHESIVENESS AND ITS RELATION WITH DIFFERENT DIETETIC FATS IN NORMAL HUMAN SUBJECTS

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Summary: This study was undertaken on two hundred medical students. The normal platelet adhesiveness was found to be 79.74 ± 8.45 . There was no difference between males and females. There was no significant rise in non-vegetarians as compared to vegetarians. Postprandial lipaemia produced increase in platelet adhesiveness significantly. Ingestion of pure ghee and Dalda in single meals increased the platelet adhesiveness as well as total serum lipids, while ground nut oil decreased the platelet adhesiveness and total serum lipids. The ground-nut oil in diet, therefore, may be less risky than Dalda and pure ghee in the causation of thrombosis.

Key Words: *platelet adhesiveness etiology of thrombosis effect of dietary fats on platelet stickiness.*

INTRODUCTION

The interest in platelet adhesiveness and aggregation, with regard to arterial thrombosis in general and coronary thrombosis in particular was initiated by Wright (19). Since then many workers have produced evidence in favour of increased platelet adhesiveness and aggregation in arterial thrombosis (2, 7, 12, 13, 14).

Studies carried out in the recent years indicate that the fat content of the diet changes the platelet adhesiveness and it is an important factor in the causation of various cardiovascular diseases (1, 6, 9, 10, 12). A number of workers (8, 13, 18), have shown that saturated fatty acids induce greater platelet adhesiveness than unsaturated fatty acids.

In spite of these studies, yet it has not been clearly investigated if the intake of different dietetic fats in normal amount is accompanied by any change in platelet adhesiveness in healthy subjects. This paper reports a study which was planned to find an answer to this question.

MATERIALS AND METHODS

Platelet adhesiveness was estimated in 200 healthy subjects who were mainly medical students of ages between 17-28 years. Each subject was thoroughly interrogated on the dietetic habits and stress was laid on the fat intake. The cases were studied under three groups:

1. First group comprised of the entire series of 200 subjects in whom platelet adhesiveness was determined under basal conditions after overnight fasting.
2. Second group consisted of 75 subjects selected from the first group. Platelet adhesiveness was determined in them under basal conditions and at 4-4½ hours after mixed fat meal.
3. In the third group, 45 subjects were selected from the second group, and divided in three series of 15 subjects each and effect of 70 gms of each fat *i.e.* Dalda, pure ghee and groundnut oil taken in a single meal was studied respectively on platelet adhesiveness and total serum lipids. Rest of the constituents of meal remained identical.

The platelet adhesiveness was determined by the method of Bridges *et al* (3), which in brief was as follows :

Platelet count was done in a part of the anticoagulated blood sample from the vein (initial count). The other part was placed in a non-silicized glass bulb and slowly rotated for 20 min, and a further platelet count was done (final count). The final count was expressed as a percentage of the initial count which indicated the platelet adhesiveness. Less the percentage, more is the adhesiveness. Total serum lipids were determined by the method of Swahn (17).

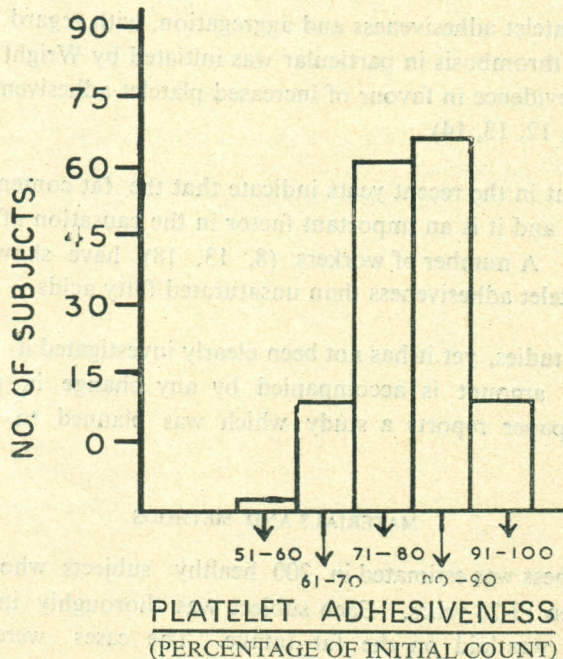


Fig. 1 : Block diagram of distribution of platelet adhesiveness in 200 subjects.

RESULTS

Figure 1 depicts that although there was a wide range of platelet adhesiveness, more than 75% of subjects ranged between 70-90% of the initial count. The data obtained from the first two groups of subjects is summarized in table I which demonstrates that there was no difference in males and females. The platelet adhesiveness in the non-vegetarians however, was slightly higher than that in the vegetarians. Increased adhesiveness was also observed 4-4½ hours after mixed fat meal.

TABLE I : Effect of various factors on platelet adhesiveness.

Factors	No. of cases	Platelet adhesiveness % (mean ± S.D.)	Significance of difference
Entire Series	200	79.74 ± 8.54	—
Males	134	79.95 ± 8.36	—
Females	66	79.56 ± 8.91	—
Dietetic Habits			
Vegetarians	103	81.34 ± 7.88	—
Non-Vegetarians	97	78.26 ± 6.54	—
Effect of meals			
Before meal	75	80.61 ± 7.23	P < 0.01
After mixed fat meal	75	78.50 ± 8.70	

Results of the 3rd group are given in table II, and plotted in fig. 2. It can be noted that ingestion of Dalda or pure ghee in the meal increased the platelet adhesiveness and total serum lipids, but ingestion of ground-nut oil decreased the platelet adhesiveness and total serum lipids.

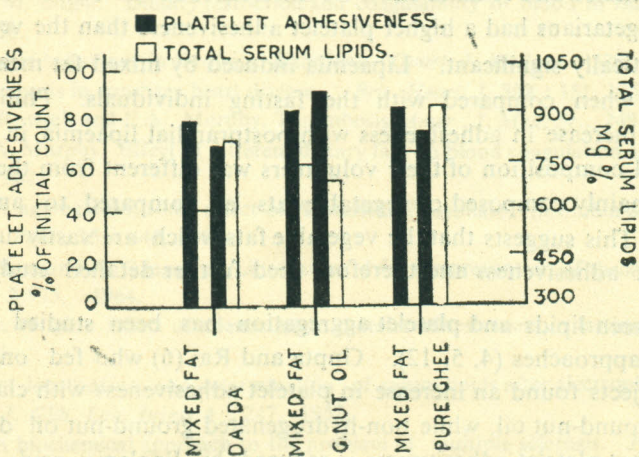


Fig. 2 : Changes in platelet adhesiveness and serum lipids when subjects were fed different types of fat in their meal. Comparisons were made in the same subject when fed with mixed fat in their meal.

TABLE II : Effect of different fats in single meal on platelet adhesiveness and total serum lipids.

Factors	After mixed fat meal (mean \pm S.D.)	After different fat meals (mean \pm S.D.)	Significance of difference.
	<i>After Dalda meal</i>		
Pl. Adh.	76.44 \pm 9.02	67.55 \pm 4.71	P < .01
T.S.L. (Mg%)	606.00 \pm 173.27	832.00 \pm 195.33	P < .01
	<i>After ground-nut oil meal</i>		
Pl. Adh.	82.45 \pm 6.02	89.42 \pm 4.66	P < .01
T.S.L. (Mg%)	736.66 \pm 199.55	686.66 \pm 138.08	N.S.
	<i>After pure ghee meal</i>		
Pl. Adh.	80.57 \pm 7.33	72.62 \pm 9.29	P < .01
T.S.L. (Mg%)	766.00 \pm 202.58	913.00 \pm 201.57	P < .01

DISCUSSION

The mean value of platelet adhesiveness in this series of 200 healthy adult subjects was 79.74% \pm 8.45%. The values reported by Bridges *et al* (3) in 31 control subjects varied between 68-82%. These values were similar to the ones reported earlier by McDonald (10), who commented that the values greater than 65% should be considered normal. In this series, we in addition report that males and females show no differences in the stickiness of their platelets. Although the non-vegetarians had a higher platelet adhesiveness than the vegetarians, the difference was not statistically significant. Lipaemia induced by mixed fat meals led to increased platelet adhesiveness when compared with the fasting individuals. Philip and Wright (16) also observed slight increase in adhesiveness with postprandial lipaemia in seven normal volunteers, but the meal composition of their volunteers was different from the meal taken by our subjects which was mainly composed of vegetable fats as compared to animal fats given by Philip and Wright. This suggests that the vegetable fats which are vastly used in Indian diets can affect the platelet adhesiveness and therefore need further detailed studies.

The link between lipids and platelet aggregation has been studied by several workers employing different approaches (4, 5, 12). Gupta and Rai (6) who fed one type of fat each week to all their subjects found an increase in platelet adhesiveness with clarified butter (ghee) and hydrogenated ground-nut oil, while non-hydrogenated ground-nut oil decreased it. Owen *et al* (15) reported that platelet adhesiveness is reduced by linolenic acid but not by linoleic acid. Kerr *et al* (8) similarly suggested that a possible link between thrombosis and the lipid metabolic disorders in ischaemic heart disease lies in the type of fatty acids with which platelets

come in contact. The type of FFA predominating in the plasma as governed by dietary fat will be an important factor in determining the tendency towards thrombosis.

Most of the studies mentioned above reported long term effects. We, on the other hand, have demonstrated that single meal of each fat in fixed amount is attended with changes in platelet adhesiveness which can be correlated with total serum lipids of these subjects. As shown in fig. 2 the Dalda and pure ghee meal increased the platelet adhesiveness as well as total serum lipids significantly. The ground-nut oil meal decreased the platelet adhesiveness and total serum lipids. These findings, in general, were statistically significant.

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