STATUT OF PLATELET FUNCTIONS IN VOLUNTEERS OF VARIOUS BLOOD GROUPS : EFFECT OF ASPIRIN

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Summary: Platelet functions (platelet aggregation and adhesiveness) were studied in volunteers of different blood groups. The platelet aggregation time was found to be significantly ($P < 0.01$) more in blood group O as compared to A, B and AB blood groups. Similarly, platelet adhesive index was higher in A, B and AB blood groups when compared to that of blood group O. The administration of a single dose of aspirin (4 mg/kg, po) increased the platelet aggregation time and reduced the platelet adhesive index in all the blood groups.

Key words: platelet aggregation platelet adhesiveness blood groups aspirin

INTRODUCTION

Gertler and White (4) were the first to describe an association between blood groups and thrombosis. Also in women taking oral contraceptives, higher incidence of thromboembolic disorders was noted in blood groups A, B and AB as compared to women of blood group O (7, 8, 11, 17). A predominance of blood group A and B over O was noted in the patients of myocardial infarction (3). Similarly Slone et al. (13) noted that group O fared least frequently amongst medical patients who were under treatment with anticoagulants for thrombosis. The incidence of cerebral thrombosis was also found to be more in persons with blood groups A and AB than in those with O and B group (6). A significantly greater number of patients with group A was noted amongst the cases of coronary thrombosis with ratio A:O greater than B:O (11, 17).

Although platelets play an important role in thrombosis and atherogenesis (14), platelet functions have not been yet studied well in patients with thrombotic disorders, having different blood groups. Further, it has been observed that a good prophylactic use of aspirin and other antithrombotic drugs leads to decreased incidence of myocardial infarction (2, 9).
Aspirin also inhibits the synthesis of prostacyclin, a potent vasodilator and platelet deaggregator (5, 10) in vascular tissue. The present study aims at studying the platelet functions (aggregation and adhesiveness) in volunteers of various blood groups and to observe the effect of aspirin administration on these functions.

**MATERIAL AND METHOD**

*Platelet aggregation:* The study involved healthy volunteers of either sex and of different blood groups (n=15, each group) who had not ingested aspirin or any non-steroidal anti-inflammatory drugs (NSAID) for a week. Before and one hr after aspirin (4 mg/kg, po) blood was collected from antecubital vein in a vial containing 3.8% sodium citrate solution in the ratio of volumes 9:1. Platelet rich plasma (PRP) was obtained by centrifuging the blood samples at 150-200 G for 15 min. Platelet aggregation was induced by adding 20 µg of sodium salt of adenosine 5′ diphosphate (ADP, Sigma, 0.02% solution) to 3 ml of vigorously stirred PRP. The resulting formation of platelet clumps produced an alteration in the optical density, which was measured by serial readings with the photo-electric colorimeter (12). The results were expressed as platelet aggregation time, in sec.

*Platelet adhesiveness:* Platelet adhesiveness was determined by a glass bead-column technique using a modification of Salzman’s method (1). 2 ml blood obtained from the antecubital vein was passed over grease-free soda lime silica glass beads (34 beads, 0.5 mm D) for 40-60 sec. It was then collected in vials containing 2 mg of disodium ethylenediamine tetraacetic acid (Na₂ EDTA), an anticoagulant. A second sample was collected from the antecubital vein of the other arm in a similar manner but was not passed over the glass beads. Platelet counts were determined in both the samples of the blood, and the difference expressed as a percentage of the first count was termed as adhesive index.

Adhesive index was calculated as \( \frac{(X-Y)}{X} \times 100 \) where \( X \) is the platelet count of the blood not passed over beads and \( Y \)=platelet count of the blood after passage over the beads. Each volunteer was then given aspirin (4 mg/kg, po). Two samples of the blood were collected as above and the platelet adhesive index was calculated.

**RESULTS**

*Platelet aggregation:* The blood group A, B and AB showed an aggregation time which was not statistically different from each other. The difference in aggregation time between these groups and 0 group was however significant. Further, a marked increase in platelet aggregation time was noted in all the blood groups after aspirin administration. Aspirin caused maximum prolongation of aggregation time in blood group 0 as compared to other blood groups (Table I).
### TABLE I: Platelet aggregation time and adherence in volunteers of different blood groups.

<table>
<thead>
<tr>
<th>Blood groups</th>
<th>Platelet aggregation time in sec.</th>
<th>Platelet adhesive index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before aspirin</td>
<td>After aspirin</td>
</tr>
<tr>
<td>O</td>
<td>56.67±2.25</td>
<td>84.93±1.00</td>
</tr>
<tr>
<td>A</td>
<td>48.73±1.30</td>
<td>65.67±1.75</td>
</tr>
<tr>
<td>B</td>
<td>49.07±1.50</td>
<td>68.80±2.15</td>
</tr>
<tr>
<td>AB</td>
<td>50.70±1.73</td>
<td>70.87±2.06</td>
</tr>
</tbody>
</table>

*a Value significantly (P<0.01) differs from corresponding values in other groups (t test).

*b Value significantly (P<0.01) differs from 'before aspirin' value (t test).

**Platelet adhesiveness:** The platelet adhesiveness was much less in blood group O as compared to blood groups A, B and AB. The administration of aspirin significantly decreased the platelet adhesiveness in all the blood groups.

**DISCUSSION**

As indicated by the results the blood group A, B and AB are more prone towards platelet aggregation and platelet adherence as compared to blood group O. The finding supports the observations (3, 4, 7, 17) that there are minimal blood group cases amongst the patients suffering from thromboembolic disorders. These findings may explain the predominance of A, B and AB blood group over O group cases in patients of ischaemic heart disease (I.H.D.) and thromboembolic disorders.

The administration of aspirin caused an increase in platelet aggregation time and helped to lower the adhesive index in all the blood groups to a significant extent.

Aspirin is known to impair hemostatic properties of human platelets (16). Ability of aspirin to suppress the platelet activity might prove beneficial in I.H.D. and may be the basis for the suggested negative association between aspirin use and incidence of myocardial infarction in retrospective (2) as well as in prospective (15) studies.

**REFERENCES**


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