PHAGOCYTIC RESPONSE OF LEUCOCYTES IN SECRETORS AND NON-SECRETORS OF ABH (O) BLOOD GROUP SUBSTANCES

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Summary: Secretor status of healthy young volunteers in the age group of 18-22 years and having similar socio-economic background was determined by standard agglutination inhibition test of the saliva. Phagocytic response of leucocytes was worked out by in vitro suspension technique and average number of cocci engulfed by leucocytes calculated in secretors/non-secretors of each blood group. Leucocytes of non-secretors of O and AB seem to have more and highly significant ingestion power as compared to secretors. Non secretors in group A & B also show more phagocytic activity. Relatively different concentration of the components of the blood group substances in secretors/non-secretors seems to affect phagocytic activity of the leucocytes.

Key words: phagocytic response blood group substances ABH (O) in vitro suspension technique ingestion power agglutination inhibition test

INTRODUCTION

ABO blood groups have been correlated with various diseases (11). Incidence of peptic ulcer is much higher in blood group O whereas cancer of stomach, tumours of salivary glands, and leprosy are more frequent in A group individuals (1,5,12). It is assumed that blood group substances may interact with microbes and make a person more or less susceptible to particular disease (14). Moreover, progressive loss of blood group substances from the tissue cells makes them carcinomatous (6). Further, correlation between secretor status and diseases of gastrointestinal tract has also been worked out (7). These blood group substances are also present on leucocytes (2, 9) and seem to affect their property of phagocytosis. Constant and persistent use of alcohol converts A group secretors to non-secretors (6) and in vitro it also affects phagocytosis (4). The fact that quantitative differences exist between phagocytic responses of leucocytes of ABO system (15), it was of interest to see whether secretor status has any association with leucocyte phagocytosis in individuals of same blood group.
MATERIAL AND METHODS

Healthy young male volunteers in the age group of 18-22 years were selected for this study. These subjects were clinically free from any disease and had similar socio-economic status. Their blood group was determined by slide technique using standard antisera for ABO blood grouping. Secretor status was determined by using agglutination inhibition technique in different dilutions of saliva in saline - as described by Boorman et al. (3). Leucocyte separation, treatment with staphylococcus aureus and calculation of the phagocytic response were done using the technique described earlier (15, 16). Number of cocci engulfed by hundred or more leucocytes was counted and average number of cocci ingested per leucocyte, taken as phagocytic response in each case.

RESULTS

Frequency distribution of ABO blood groups amongst 513 medical students is given in Table I, secretor status of 102 of these students is also shown in this table. In this selected group, more than 68% were secretors. Table II gives the phagocytic response

TABLE I: Showing distribution of blood groups and secretor status.

<table>
<thead>
<tr>
<th>% distribution of ABO blood groups (n = 513)</th>
<th>Secretor status (n = 102)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O 30.8</td>
<td>A 19.1</td>
</tr>
<tr>
<td>Secretor</td>
<td>Non-secretor</td>
</tr>
<tr>
<td>70</td>
<td>32</td>
</tr>
<tr>
<td>(68.6%)</td>
<td>(31.4%)</td>
</tr>
</tbody>
</table>

TABLE II: Showing leucocyte phagocytic response in secretors and non-secretors of ABO system of blood groups.

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Secretor (S)</th>
<th>Non-secretor (NS)</th>
<th>No. of subjects</th>
<th>Leucocyte Phagocytic response</th>
<th>SE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of cocci ingested (mean)</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>NS</td>
<td>11</td>
<td>12.05</td>
<td>1.489</td>
<td>0.40</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>8</td>
<td>8.10</td>
<td>0.630</td>
<td>0.045</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>A</td>
<td>NS</td>
<td>10</td>
<td>7.80</td>
<td>2.707</td>
<td>0.86</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>8</td>
<td>6.30</td>
<td>1.009</td>
<td>0.36</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>NS</td>
<td>9</td>
<td>10.12</td>
<td>6.317</td>
<td>2.10</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>14</td>
<td>5.91</td>
<td>1.503</td>
<td>0.40</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>AB</td>
<td>NS</td>
<td>6</td>
<td>8.31</td>
<td>3.420</td>
<td>1.40</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>8</td>
<td>3.52</td>
<td>0.740</td>
<td>0.28</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
Phagocytic Response and Secretor Status

of secretors and non-secretors. Non-secretors of each group show higher and better phagocytic response as compared to secretors. Statistically higher (P<0.001 and <.01) phagocytic responses are obtained in non-secretors belonging to group O and AB, whereas in group A & B, the difference in the phagocytic response between non-secretor/secretor is less significant (P<.05).

DISCUSSION

It has long been realised that the blood group substances A, B, H (O) are not confined to the red cells but can also be detected in tissue cells and particularly in body fluids. They have a wide distribution and have been found in serum, saliva, gastric juices, ovarian cyst fluid, semen, amniotic fluid and in smaller quantities in sweat, urine, tears, bile and milk. Since one of the richest and most readily available sources of group specific substances is saliva, it has been used for detecting the secretor status in the present study. Our secretor status incidence of more than 68% as also the percentage distribution of ABO groups in North Indians (Table I) are in agreement with the values reported by other workers (10,13). We have found that the phagocytic response is maximum in individuals of O and least in those of AB group. This was also reported earlier by Tandon (15). Even in same blood group, secretors show less leucocyte phagocytic activity as compared to non-secretors, and this difference is highly significant in blood groups O and AB (Table II).

It has been established that secretion of group specific substances is controlled by a pair of allelomorphic genes SeSe, heterozygous Sese or homozygous sese. The first two classes are secretors and third one, non-secretors. There are two distinct forms of group specific substances: (i) water soluble glycoprotein present in most body fluids and tissues, (ii) alcohol soluble glycolipid present in blood cells and absent from secretions. Since the water soluble form is controlled by the secretor gene, it will be present in tissue fluids and body secretions of secretors only. Glycolipid form of blood group substances will be present in all tissue cells in secretors and non-secretors but in secretors there seems to be higher concentration of glycolipid on tissue cells as compared to non-secretors.

In the in vitro suspension technique employed in the present study, where other factors affecting phagocytosis like temperature and pH are kept constant, the difference in phagocytic response in secretors from that of non-secretors might, therefore, be due to presence of these blood group substances. That may be the reason for depressed phagocytic activity in the secretors where both the group specific substances are present in higher concentration on leucocytes and in plasma. Their absence from plasma of non-secretors and low concentration on leucocytes would promote this immune process of phagocytosis. The present findings, therefore, suggest that the absence of water soluble glycoprotein form of blood group substance from serum and low concentration of alcohol soluble glycolipid on leucocytes in non-secretors enhance engulfing power of leucocytes. Presence
of both these forms of blood group substances in secretors somehow impairs phagocytic activity of leucocytes.

The above results further suggest that studies on the enzyme-profile of the leucocytes in secretors and non-secretors may be conducted to see if they are responsible for the process of phagocytosis and whether that has any bearing on the quantitative differences in phagocytic response in these two groups.

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REFERENCES