Leucopenia in the Healthy Saudi Arabian Population

Masood Anwar, Sagar A. Al-Amri, Zahid H. Syed

The Saudi Arabian population has been reported to have a lower total leucocyte count compared with European and American populations. However, it appears to be confined to certain tribes or families only. Thirty-six adults from suspected tribes (Al-Harthy, Al-Zaharani, Al-Shehri, Al-Fifi, Al-Talhi and Al-Qatani) were studied for haematological parameters and compared with a comparable group from other tribes or families. The total leucocyte count in the suspected group was significantly lower compared with the control group mainly because of its lower neutrophil component. As the bone marrow examination performed in four members of the suspected group revealed no abnormality, neutropenia in these tribes or families is suggestive of benign familial neutropenia.

The extensive network of Saudi Arabian health services is largely manned by expatriate medical and paramedical staff. Not too infrequently they are confronted with blood reports showing unexplainable leucopenia. As the most commonly used reference values for interpretation are those given in Western textbooks, it was thought to be possible that the Saudi Arabian population might have lower reference values. In order to test this hypothesis common haematological parameters were studied in 100 healthy army recruits.

During this study a very interesting observation was made, namely that leucopenia was confined to some members of certain tribes or families. It was then hypothesized that leucopenia observed in the general Saudi Arabian native population might be a reflection of its occurrence in a selected group. A small study was then organized to evaluate this observation.

**Material and Methods**

Thirty-six adults of 19-75 (mean 30.3) years of age and weighing 45-80 (mean 61.8) kg were selected from amongst suspected tribes or families. For comparison, a control group of 36 adults of 18-70 (mean 61.8) years of age and 45-75 (mean 62.3) kg weight were selected from other tribes or families. Details are shown in Table 1. The following criteria were followed:

a. Absence of intermarriages with other families at least for the last two generations.
b. Absence of any abnormality on thorough physical examination.
c. No abnormality on routine urinalysis.
d. Negative hepatitis B surface antigen status.
e. Negative anti-HIV antibody status.

Hepatitis B surface antigen detection and HIV detection tests were performed by ELISA technique using Organon kits and equipment.

Blood samples were collected in EDTA and were analysed on a Coulter S-880 Haematology analyser. The instrument was calibrated daily and quality controlled...
Leucopenia in the Healthy Saudi Arabian Population

Table 1
Distribution of study and control groups

<table>
<thead>
<tr>
<th>Tribe/family</th>
<th>Study Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Al-Harthi</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Al-Zaharani</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Al-Shehri</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Al-Fifi</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Al-Talhi</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Al-Qatani</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>27</td>
</tr>
</tbody>
</table>

using 4C standards of Coulter Electronics. All samples were analysed in duplicate and the average was recorded.

Blood smears were prepared in triplicate and stained manually with Leishman’s stain. A differential count of 200 white cells was performed on each and the average was recorded.

Only four males consented to have bone marrow aspiration. Aspirates were obtained from the posterior superior iliac crest and smears were stained with Leishman’s stain and for iron. A differential count of 1000 cells were performed on two smears and the average was recorded.

Results
The haematological parameters found in 100 recruits are shown and compared to control series in Table 2. The blood counts in 36 controls and 36 members of suspected tribes or families are shown and compared in Table 3.

Bone marrow aspirate examination performed in four adult males of study group did not reveal any significant deviation from values stated for Western populations.

Discussion
Variations in normal biological parameters in different geographical areas, populations and ethnic groups are an accepted fact. It has always been stressed that results of tests for various biological parameters should be interpreted in the light of the established reference range for that particular population.

Several studies for the establishment of haematological reference ranges in Saudi Arabs have been published.1-4 Most of these have been criticized on the grounds of sample selection and standardization of methodology.1 Only one study by Bacchus et al. had reasonable sample size and distribution and the conditions of sampling were also well defined.1 We have compared our results in 100 normal recruits with their results and with established values for European and American populations5,6 (Table 2). We found no significant difference between our results and those of Bacchus et al.,1 except for Hb and PCV. Higher Hb values in our subjects can be explained by the high altitude of Taif (1700 m). However, we were unable to explain the difference in packed cell volume (PCV). Both of us have found significantly low total leucocyte counts. Haematology parameters in our control group did not vary from those found in normal recruits (Table 2, row 5).

There was no significant difference observed in haematological parameters other than total leucocyte count between the suspected group and control group (Table 3). The total leucocyte count was significantly (p = <0.01) lower in the suspected group. Bacchus et al. have documented it only in females1 but we have found it to occur in both sexes. Ghafoori et al. have also casually mentioned lower leucocyte counts.3

We also carried out differential leucocyte counts on both groups (Table 3) in order to find out the nature of leucopenia observed. Only the study by Ghafoori et al. contained figures for differential leucocyte counts,5 but they gave these as percentages and hence they are not comparable to our study. There is a statistically significant difference in the neutrophil count (p = <0.01) between suspected and control groups. The pathological nature of neutropenia in our subjects is excluded by normal bone marrow findings in four subjects from the suspected group.

Leucopenia in the populations of tropical countries has been described by Gilles.7 Rougemont has shown it to be because of low neutrophil counts.8 They regard it of racial origin. In contrast, our study shows that it occurs only in members of specific tribes and families in Saudi Arabia.

We think that mild to moderate neutropenia observed in certain tribes or families may be of genetic origin, and its transmission is most probably autosomal. It is benign in nature and probably belongs to the group of benign familial neutropenias.

Benign familial neutropenia (BFN) is a slight to moderate life-long neutropenia inherited as an autosomal dominant.9,10 The bone marrow is normal,
leucoagglutinins are not present in plasma and leucocyte alkaline phosphatase scores are normal.\textsuperscript{9,10} There is a normal neutrophil response in pregnancy and to hydrocortisone administration.\textsuperscript{10,11} There are normal granulocyte colony forming cells in bone marrow. BFN most probably occurs because of a defective release mechanism,\textsuperscript{9,10} it does not require treatment and is non-progressive.\textsuperscript{9} BFN is also called benign ethnic neutropenia when described in large ethnic groups\textsuperscript{9} and has been reported to occur frequently in Blacks in the USA,\textsuperscript{9} and documented in both West Indian and African Blacks in England and in the indigenous black population of Africa.\textsuperscript{1} A similar form has been described to occur in some Jews of Yemenite origin.\textsuperscript{9}

Other chronic and familial forms of neutropenia are also described. These include familial neutropenia due to a deficiency of a plasma factor which is transmitted as X-linked recessive. Familial benign chronic neutropenia resembles closely benign familial or ethnic neutropenia but is not completely asymptomatic and the marrow concentration of colony forming units in culture material is reduced.\textsuperscript{6} Chronic idiopathic neutropenia is also not asymptomatic and shows periodicity but not with the mathematical regularity of cyclic neutropenia.\textsuperscript{11}

Keeping these facts in mind we can only speculate upon the benign familial nature of neutropenia observed in certain families or tribes of Saudi Arabia. More elaborate studies are required to establish its true nature. This would not only be of great academic interest but also of practical importance in management of Saudi Arabian patients.

References
Leucopenia in the Healthy Saudi Arabian Population


