THE INCIDENCE OF STAPHYLOCOCCI IN THE NOSE AND ON THE SKIN OF AFRICANS AND EUROPEANS IN WEST AFRICA.

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In moist tropical regions, such as West Africa, pathogenic staphylococci are of considerably greater importance than streptococci as causes of morbidity and mortality. Among West African troops, for instance, staphylococcal septicemia and a form of pyomyositis associated with coagulase positive staphylococci have not only been common but have been responsible for a considerable number of deaths. Little is known as to the source of the invading organisms in these cases.

As part of an investigation into the relationship between staphylococci and tropical pyomyositis it appeared to be of interest to determine the distribution of coagulase-positive staphylococci in the nose and on the skin of Africans in West Africa. Studies on the carriage of *Staphylococcus (pyogenes) aureus* in cooler climates by Hallman (1937) and later by many others (cf. Mills, Williams and Clayton-Cooper, 1944) have shown that in the case of healthy adults the percentage of carriers varies from 22 to 47.4 per cent in the nose and from 5 to 24 per cent on the skin. The percentage of those carrying staphylococci on the skin is always less than that of those carrying staphylococci in the nose.

In the present investigation 300 Africans and 100 Europeans were examined. All were living in or around Accra on the Gold Coast Littoral which, though one of the drier regions of West Africa, nevertheless has a constantly high relative humidity except during the few days in December and January when the hot dry Harmattan, blowing from the Sahara, has sufficient force to reach the coast. The examinations were made from March to November, a period that is to say embracing both the early and late rains and the intervening drier period during August and September.

The Africans were divided into two groups, 150 soldiers and 150 villagers. The first group consisted of approximately equal numbers of nursing orderlies and other hospital attendants and of soldiers in hospital suffering from medical conditions. This group thus contained only adult males from 18 to 40 years of age.

The second group was made up of villagers from the Fulani Zongo, an overcrowded and poorly sanitated slum area on the outskirts of Accra. Facilities for washing were limited in the village and the general hygienic conditions were...
far inferior to those of the first group. Yaws and such abnormalities as crazy pavement skin were common while tropical ulcers were by no means rare. All ages and both sexes were included in this village group.

As a comparison with Africans, similar examinations were made of 100 Europeans. Approximately half the Europeans were nurses, medical officers and R.A.M.C. personnel; the remainder were officers and British other ranks from units in the neighbourhood of Accra. Their length of service in West Africa varied from two months to four years, with an average of eleven months.

**TECHNIQUE.**

The technique employed was very similar to that used by Mills, Williams and Clayton-Cooper (1944), except that owing to the difficulty of ensuring the sterility under tropical conditions of large numbers of blood-agar plates these were eliminated. Sterile swabs moistened with peptone water were rubbed on a circular area of skin approximately 3 cm. in diameter on the back of the right wrist while others were taken from both nostrils. The swabs were at once inoculated into 9 ml. of sterile nutrient broth to which had been added immediately before inoculation 1 ml. of distilled water containing potassium tellurite, so that the final concentration was 1 in 2,000.

The screw-topped bottles containing the tellurite broth were incubated at 37° C. for from twenty-four to forty-eight hours. Subcultures were made on nutrient agar and incubated for a further eighteen to twenty-four hours. Colonies were then identified as Gram-positive cocci and suitable colonies were inoculated into nutrient broth for the coagulase test.

The coagulase test was performed by mixing equal volumes of a twenty-four hours’ broth culture of the organism and of a 1 in 10 dilution of fresh human plasma in 3·8 per cent sodium citrate in water. The mixture was incubated for three hours at 37° C. Dried human plasma, as supplied by the Army Transfusion Service, after reconstitution failed to give satisfactory readings with known coagulase-positive staphylococci. The results of the test are shown in the table.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total No. examined</th>
<th>Total No. carrying coagulase + organisms</th>
<th>No. with coagulase + organisms on skin</th>
<th>No. with coagulase + organisms in nasopharynx</th>
<th>No. with coagulase + organisms both on skin and nasopharynx</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>150</td>
<td>40 (26-6%)</td>
<td>14 (9-3%)</td>
<td>35 (23-3%)</td>
<td>9 (6-0%)</td>
</tr>
<tr>
<td>Soldiers</td>
<td>150</td>
<td>42 (28-0%)</td>
<td>19 (12-6%)</td>
<td>33 (22-0%)</td>
<td>10 (6-6%)</td>
</tr>
<tr>
<td>African Villagers</td>
<td>150</td>
<td>42 (27-3%)</td>
<td>17 (11-0%)</td>
<td>38</td>
<td>13 (6-3%)</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>82 (27-3%)</td>
<td>33 (11-0%)</td>
<td>68 (22-6%)</td>
<td>19 (6-3%)</td>
</tr>
<tr>
<td>Europeans</td>
<td>100</td>
<td>42</td>
<td>17 (11-0%)</td>
<td>38 (28-0%)</td>
<td>13 (13-0%)</td>
</tr>
</tbody>
</table>

The results show that in West Africa the percentage of Europeans carrying coagulase-positive staphylococci in the nasopharynx and on the skin does not
differ significantly from that found in England. The percentages for Africans were, in the nose 22.6 per cent, on the skin 11.0 per cent: the percentage having coagulase-positive staphylococci both on the skin and in the nose was 6.3. Mills et al. (1944), working in England, found that of 479 persons 47.4 per cent had coagulase-positive staphylococci in the nose and 18.4 per cent on the skin while 11.7 per cent only had coagulase-positive staphylococci both on the skin and in the nose.

The differences observed in the rates for Europeans and Africans in West Africa are not statistically significant. It will be noted that in the case of the Africans with coagulase-positive staphylococci on the skin 19 out of 33 also had coagulase-positive staphylococci in the nose while in Europeans the corresponding figures were 13 out of 17. These figures support the theory that the nose is a source of skin staphylococci, a suggestion for which additional evidence has recently been obtained by Williams (1946). It is of interest that life largely in the open air, with daily baths and daily washing of clothes, has so little effect in decreasing the incidence of staphylococci in the nose and on the skin of Europeans, as shown by the numbers found carrying staphylococci in cold climates and in the tropics.

The incidence of coagulase-positive staphylococci in the nose in cases of pyomyositis is not without interest. In 18 cases where a coagulase-positive staphylococcus was found in the abscesses, a similar coagulase-positive coccus was isolated from the nose in 13. While further investigations are necessary, it is possible that in this condition the nasopharynx may be a portal of entry for the staphylococcus into the blood. In two cases, however, small septic abrasions on the leg were the probable portal of entry since no coagulase-positive staphylococci were found in the nasopharynx. The reasons why pyomyositis associated with staphylococci is so rare among Europeans in the tropics is unknown: only two cases have occurred in European troops in West Africa while many hundreds of African soldiers have been admitted with this curious condition.

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REFERENCES.