A₁ A₂ B₀ AND MN BLOOD GROUPS AND SICKLE CELL TRAIT AMONG AMMA KODAVAS OF KODAGU DISTRICT OF KARNATAKA STATE

Kodagu district in Karnataka state is the homeland of two distinct, picturesque populations — Kodavas and Amma Kodavas. They both speak Kodagi language. They follow the same customs and practices. The salient differences between these two endogamous groups are that the Kodavas eat nonvegetarian food and drink liquor while the Amma Kodavas are strict vegetarians and teetotallers and follow a few brahminical rituals. The Kodavas number about 66,000 while the Amma Kodavas are about 3,000 in number. Both of them are tall, fair looking people. They claim themselves Kshatriyas with a status next to Brahmins. The Kodavas concede that the Amma Kodavas are higher in status to themselves.

The Southern Regional Office of the Anthropological Survey of India has conducted studies on both these population groups in 1978 and 1979. The study included blood groups, anthropometry, dermatoglyphics, Colour blindness, Sickle Cell trait, PTC taste sensitivity and demography. A few papers on the study of Kodavas have already been presented at the Xth International Congress of Anthropological and Ethnological Sciences, 1978 [Sastry et al. 1978; Yaseen Saheb et al. 1978].

The present paper includes results of A₁A₂B₀ blood groups, MN blood groups and Sickle Cell trait examination at about one hundred of Amma Kodavas. Care was taken to see that only unrelated individuals were included in the sample.

A₁A₂B₀ blood groups:

High titre anti-A, anti-B and group 0 sera were used for AB₀ testing. All these sera were supplied by Haffkine Institute, Bombay. The moist chamber method [Boorman and Dodd, 1957] was utilised for-
Table 1. A₁A₂ B₀ blood groups among Amma Kodavas

<table>
<thead>
<tr>
<th>Phenotypes</th>
<th>Observed number</th>
<th>Observed %</th>
<th>Expected No.</th>
<th>Gene frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>62</td>
<td>50.82</td>
<td>62.01</td>
<td></td>
</tr>
<tr>
<td>A₁</td>
<td>26</td>
<td>25.41</td>
<td>31.00</td>
<td></td>
</tr>
<tr>
<td>A₂</td>
<td>5</td>
<td>19.67</td>
<td>24.00</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>24</td>
<td>4.10</td>
<td>4.95</td>
<td></td>
</tr>
</tbody>
</table>

AB0 tests. Group A bloods were subsequently grouped by anti-A₁ sera by Micro-tube testing technique [Race and Sauger, 1954]. Controls were used in all series of tests. The results are presented in table 1. The gene frequencies were calculated as per the formulae given by Mourant [1954]. The \( \text{Chi}^2 \) value which is negligible indicates a satisfactory agreement with the known mode of inheritance [Bernstein, 1930].

Table 2. Comparison with other Karnataka population groups. Data after Sastry [1970] and Sastry et al. (unpublished)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Population</th>
<th>No. tested</th>
<th>Phenotype numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brahman</td>
<td>133</td>
<td>0  31  36  10</td>
</tr>
<tr>
<td>2</td>
<td>Iyengars</td>
<td>100</td>
<td>39  24  28  9</td>
</tr>
<tr>
<td>3</td>
<td>Vokkaliga</td>
<td>100</td>
<td>46  23  25  6</td>
</tr>
<tr>
<td>4</td>
<td>Lingayat</td>
<td>110</td>
<td>50  19  37  4</td>
</tr>
<tr>
<td>5</td>
<td>Adi Karnataka</td>
<td>225</td>
<td>95  51  68  11</td>
</tr>
<tr>
<td>6</td>
<td>Adi Jambuva</td>
<td>100</td>
<td>43  22  26  9</td>
</tr>
<tr>
<td>7</td>
<td>Muslim</td>
<td>100</td>
<td>45  24  29  2</td>
</tr>
<tr>
<td>8</td>
<td>Kodava</td>
<td>209</td>
<td>97  58  43  11</td>
</tr>
<tr>
<td>9</td>
<td>Amina Kodavas</td>
<td>122</td>
<td>62  31  24  5</td>
</tr>
</tbody>
</table>

The Amma Kodava data is compared with other available data from Karnataka state [Sastry, 1970] and presented in table 2. The data on "9×9" contingency table yields a \( \text{Chi}^2 \) value of 23.76 for 24 degrees of freedom and is insignificant.

MN blood types:
Anti-M and anti-N sera were the products of Biotest laboratories, Vienna. Two per cent saline suspensions were used in the tests. Micro-tube technique was employed. The method prescribed by the manufacturer was followed strictly. The gene count method [Weiner and
Table 3. MN blood groups in Amma Kodavas

<table>
<thead>
<tr>
<th>Phenotypes</th>
<th>Observed number</th>
<th>Expected number</th>
<th>Observed %</th>
<th>Gene frequency</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>69</td>
<td>66.56</td>
<td>66.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MN</td>
<td>29</td>
<td>33.28</td>
<td>27.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>6</td>
<td>4.16</td>
<td>5.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>100.00</td>
<td>99.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vaisberg, 1931] was employed to calculate gene-frequency estimates. Table 3 gives the blood types and gene frequencies. Observed and expected values agree with each other. The $\chi^2$ value is insignificant.

Sickle Cell trait:

Samples of blood from unrelated individuals were tested by applying the sodium metabisulphite (Na$_2$S$_2$O$_3$) technique of Daland and Castle [1948]. A 2% solution of the salt was prepared daily immediately before the testing was done. This solution was used for about 3 hours. A small drop of fresh blood from the finger tip was taken directly on to a microscope slide and then was mixed with a drop of metabisulphite solution and the mixture was covered by a cover slip. The first observations were taken after 20 minutes and the final ones after 30 minutes. No cases of positive sickling were detected among this population.

Conclusion:

$A_1A_2B_0$ blood groups indicate that all the population groups of Karnataka are probably the offshoots of one main group. The "9×4" contingency table gives an insignificant $\chi^2$ value. The "2×4" contingency table which compares this data with the Kodavas gives a $\chi^2$ value of 0.73 which is insignificant again. Thus it may be opined that the Kodavas and Amma Kodavas are probably one group and they might have branched off into two groups in the recent past. This is in accordance with the historical evidence given out in Kaveri Mahatym.

The MN blood groups when compared with the Kodavas again give the same type of picture. The $\chi^2$ value between the Kodavas and Amma Kodavas gives a value of 1.29 which is again insignificant.

The Amma Kodavas do not possess the Sickle Cell trait at all. The Kodavas possess this even though at a very insignificant level.

Finally it may be opined that the Kodavas and the Amma Kodavas belonged to the same parent stock in the past and might have become two groups due to some bio-ecological reasons.
Acknowledgement. The authors are grateful to the Director, Anthropological Survey of India, for the facilities provided for the study. They express their thanks to Sri P. M. Srinivas of Mathur village for all the help received from him. Thanks are also due to all the hospitable Amma Kodavas who very graciously contributed their blood for testing.

REFERENCES

Srinivas M. N., 1952, Religion and society among the Goorgs of South India, Asia, Bombay.

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Autorzy zebrali dane dotyczące częstości markerów genetycznych wśród 122 osób należących do grupy etnicznej Amma Kodavas z południowych Indii. Porównanie obserwowanych częstości z występującymi u innych grup ludności Indii pozwoliło stwierdzić, że lokalne grupy zamieszkujące stan Karnataka wywodzą się z jednej populacji. W szczególności grupy Kodavas i Amma Kodavas różniące się do pewnego stopnia kulturowo można uznać za jedną populację w sensie biologicznym.