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Dietetic Habits and Quality of Semen in Indian Subjects

V.S. JATHAR, R. HIRWE, S. DESAI and R.S. SATOSKAR

Large proportion of the population from the Indian subcontinent does not consume nonvegetarian food except some quantity of milk and is essentially considered as vegetarians. Previous studies have reported markedly low serum vitamin B₁₂ values in apparently healthy Indian vegetarians as compared to Indian nonvegetarian subjects (Mehta et al.; Jathar et al.; Inamdar-Deshmukh et al.). The present study was undertaken to investigate the effect of various dietetic habits in Indian subjects on the morphological and certain biochemical characteristics of their semen.

Methods and Materials

Subjects included in this study belonged to the low economic group, thus representing the majority of the population in India. They were all apparently healthy and clinical examination revealed no significant findings. Those with recent history of any disease or blood haemoglobin levels less than 14 g/100 ml, packed cell volume below 38% and/or serum total proteins less than 7.0 g/100 ml were excluded. Out of the total 134 individuals, 50 subjects were normal volunteers with normal sperm count and sperm morphology. Sixty subjects were classified as having oligozoospermia, while the remaining 24 individuals whose semen was free from sperms without the evidence of obstruction were grouped as those having azoospermia (Mann - 1964).

The subjects in each group were further subclassified according to their dietetic habits. The *Lactovegetarians* took strictly vegetarian food supplemented with 20–50 ml of milk or milk products daily. Nonvegetarians who took eggs, meat, fish or fowl as often as four times a week or more were classified as *Nonvegetarian-frequent meat eaters*, while those who partook eggs, meat, fish or fowl less than four times a week were classified as *Nonvegetarian-occasional meat eaters*.

The semen samples were collected in a clean, sterilised glass containers by masturbation, after observing abstinence for five days. Volume and viscosity were noted immediately. After allowing 30 minutes for liquefication, total sperm count, motility and sperm morphology were studied by standard techniques (Davidsohn and Henry; Williams).

Seminal plasma was separated by centrifugation and the samples were preserved in the refrigerator at 4°C for vitamin B₁₂ and other biochemical estimations.

Total proteins and albumin content were estimated by biuret method (Gornall et al.). Fructose estimations were carried out by the circular paper chromatography method described by Sheth and Rao. Citric acid was estimated by the method of Murray and Orville. Acid and alkaline phosphatase activities were measured by Bodansky’s method.

Key words: Seminal vitamin B₁₂ – total proteins – albumin – fructose – citric acid – acid phosphatase activity – alkaline phosphatase activity – diet
Table 1
Biochemical analysis of seminal plasma in fertile, sub-fertile and infertile Indian subjects

<table>
<thead>
<tr>
<th>Group</th>
<th>Vitamin B12 pg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normals</strong></td>
<td></td>
</tr>
<tr>
<td>Lactovegetarian (15)</td>
<td>196 ± 27.4</td>
</tr>
<tr>
<td>Nonvegetarian-Occasional (21)</td>
<td>296 ± 95.5</td>
</tr>
<tr>
<td>Nonvegetarian-Frequent (14)</td>
<td>615 ± 65.5</td>
</tr>
<tr>
<td>Normal as a whole group (50)</td>
<td>355 ± 32.5</td>
</tr>
<tr>
<td><strong>Oligozoospermia</strong></td>
<td></td>
</tr>
<tr>
<td>Lactovegetarian (12)</td>
<td>125 ± 17.0</td>
</tr>
<tr>
<td>Nonvegetarian-Occasional (33)</td>
<td>226 ± 23.2</td>
</tr>
<tr>
<td>Nonvegetarian-Frequent (15)</td>
<td>453 ± 12.5</td>
</tr>
<tr>
<td>Oligozoospermia as a whole group (60)</td>
<td>290 ± 21.4</td>
</tr>
<tr>
<td><strong>Azoospermia</strong></td>
<td></td>
</tr>
<tr>
<td>Lactovegetarian (4)</td>
<td>123 ± 9.0</td>
</tr>
<tr>
<td>Nonvegetarian-Occasional (14)</td>
<td>153 ± 21.6</td>
</tr>
<tr>
<td>Nonvegetarian-Frequent (6)</td>
<td>235 ± 28.0</td>
</tr>
<tr>
<td>Azoospermia as a whole group (24)</td>
<td>168 ± 17.0</td>
</tr>
</tbody>
</table>

Mean values ± S.E.

using sodium-β glycerophosphate as a substrate and the activity was expressed in terms of Bodansky's unit. The phosphorus was measured by Fiske and Subbarow's method. The seminal plasma vitamin B12 activity was measured using *Euglena gracilis* var. *bacillaris* as test organism as described by Ross.

Results

Table 1 shows that the mean values for seminal plasma vitamin B12 activity in lactovegetarians in all the groups are significantly lower than the corresponding mean values observed in the nonvegetarian subjects. Thus, the mean seminal plasma vitamin B12 content was 196 pg/ml ± 27.4 (S.E.) in normal lactovegetarians as compared to the mean of 615 pg/ml ± 65.5 (S.E.) observed in normal nonvegetarian-frequent meat eaters. The difference is highly statistically significant (p < 0.001).

Analysis of normal volunteers according to their dietetic habits revealed no significant effect of diet on total proteins, albumin, fructose, citric acid, alkaline and acid phosphatase levels of seminal plasma. Similarly although the type of diet did show a marked effect on seminal plasma vitamin B12 levels in both oligozoospermic and azoospermic subjects, it was without any significant effect on other biochemical parameters studied. The mean value for seminal plasma phosphorus content in nonvegetarian-frequent meat eaters was lower than the corresponding mean in all lactovegetarian groups. The difference, however, was not statistically significant.

Studies on sperm morphology revealed no significant effect of the type of diet on sperm count, sperm motility and percentage of abnormal sperms in the normozoospermic group. Further, seminal plasma vitamin B12 values showed no correlation with the sperm content of the corresponding semen in both normozoospermic and oligozoospermic subjects. The mean vitamin B12 content of seminal plasma in azoospermic group,
Discussion

The present study clearly shows that the vitamin B12 content of the seminal plasma in Indian lactovegetarians is distinctly lower than that observed in Indian nonvegetarians. This is consistent with the earlier findings that Indian lactovegetarians have significantly lower serum vitamin B12 levels than the nonvegetarians from the same population; and this difference in vitamin B12 status is related to the dietetic intake of this vitamin B12 (Mehta et al.; Jathar et al.; Inamdar-Deshmukh et al.). However, such low levels of vitamin B12 in the semen do not appear to influence the morphological quality of the semen nor is it responsible for oligozoospermia. Further, the dietetic differences do not seem to affect the semen content of total proteins, albumin, fructose, citric acid, alkaline and acid phosphatase activities.

Summary

Dietetic habits revealed significant effect on seminal plasma vitamin B12 levels. The mean values for seminal plasma vitamin B12 activity in lactovegetarians from normozoospermic, oligozoospermic and azoospermic groups are significantly lower than the corresponding mean values observed in the nonvegetarian subjects. The mean vitamin B12 content of seminal plasma in azoospermic group was distinctly lower than the mean values in normozoospermic and oligozoospermic groups. However, seminal plasma vitamin B12 values showed no correlation with the sperm content of the corresponding semen in both normozoospermic and oligozoospermic subjects. Studies on sperm morphology and on biochemical parameters revealed no significant effect of the type of diet on sperm count, sperm motility, percentage abnormal sperms, seminal plasma total proteins, albumin, fructose, citric acid, acid and alkaline phosphatase activity in normozoospermic group.


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