Levels Of Antioxidant Enzyme In Infertile Patients With Normal And Abnormal Semen Parameters And Fertile Men

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Objective: Semen contains many enzymatic and non-enzymatic antioxidants to counter act the harmful effects of excessive reactive oxygen species. Superoxide dismutase (SOD) and catalase are important antioxidant enzymes that can quench excess free radicals such as: superoxide anion and hydrogen peroxide respectively. The objective of our study was to evaluate and compare the seminal antioxidant enzymatic activity (SOD and catalase levels) among fertile and infertile men.

Design: Prospective study

Material and Methods: Ten fertile donors and 63 infertile patients were included in the study. Infertile patients were subdivided into patients with normal (n = 19) or abnormal semen parameters (n = 44). Semen analysis was performed according to the WHO guidelines. Superoxide dismutase and catalase levels were determined with a spectrophotometer.

Results: Significantly lower levels of SOD and catalase were seen in infertile patients compared to fertile donors (P <0.0001, Table). A significant difference was noted in the median levels of SOD between patients with normal and abnormal semen parameters (P = 0.021). Similar difference was also noted with catalase (P = 0.032). Sperm morphology by WHO criteria was significantly correlated with levels of SOD (r = 0.434, P = 0.000) and catalase (r = 0.395, P = 0.001). SOD was also correlated with sperm concentration (r = 0.303, P = 0.012) and percentage motility (r = 0.295, P = 0.014). Levels of catalase and SOD in all subjects showed a significant correlation (r = 0.461, P = 0.000).

Conclusions: Decreased antioxidant enzyme levels are associated with infertility. The SOD and catalase levels were significantly less in patients with abnormal semen parameters. High degree of correlation between sperm morphology and antioxidant enzymes suggests the ability of abnormal spermatozoa to produce reactive oxygen species resulting in reduced levels of antioxidant enzyme.

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Table: Levels of superoxide dismutase (SOD) and catalase in different study population
<table>
<thead>
<tr>
<th>Antioxidant enzymes/Study population</th>
<th>Fertile donors (n = 10)</th>
<th>Infertile patients</th>
<th>P-value&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Patients with normal semen parameters</th>
<th>Patients with abnormal semen parameters</th>
<th>P-value&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOD (U/g)</td>
<td>28.36 (25.15, 46.49)</td>
<td>10.72 (7.18, 16.36) (n = 59)</td>
<td>&lt; 0.0001</td>
<td>15.15 (10.63, 18.73) (n = 18)</td>
<td>9.74 (6.53, 13.32) (n = 41)</td>
<td>0.0217</td>
</tr>
<tr>
<td>Catalase (U/mg)</td>
<td>30.51 (18.72, 47.58)</td>
<td>14.22 (5.25, 24.7) (n = 63)</td>
<td>0.0138</td>
<td>23.19 (9.52, 36.81) (n = 19)</td>
<td>12.44 (4.61, 21.3) (n = 44)</td>
<td>0.0329</td>
</tr>
</tbody>
</table>

Values presented as median (25<sup>th</sup>, 75<sup>th</sup> percentiles). *P* < 0.05 was considered significant by Mann-Whitney *U* test

<sup>a</sup>*P* value between fertile donors and infertile patients

<sup>b</sup>*P* value between infertile patients with normal and abnormal semen parameters

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