OBJECTIVE and AIM:
Sperm processing (e.g., centrifugation) used in preparation for assisted reproduction can result in excessive generation of reactive oxygen species (ROS) with potential sperm damage (1). Oxidative stress can influence the fertility potential of spermatozoa and may result with sperm dysfunction. This effect has been shown to be by lipid peroxidation and formation of stable peroxidation products like malondialdehyde (MDA) in seminal plasma. ROS can also cause sperm DNA and chromatid damage (2). The use of antioxidants during sperm processing has been shown to prevent iatrogenic sperm damage, including DNA damage. In this study we evaluated the effect of caffeic acid phenethyl ester (CAPE) on oxidative stress–mediated sperm dysfunction and DNA damage (3).

MATERIAL and METHODS:
30 control (fertile male donors), 30 treatment group (Oligoasthenoteratozoospermia male donors). Semen samples were obtained and allowed to liquefy at room temperature. After centrifugation and washing protocol spermatozoa were incubated in single step medium (Oligoasthenoteratozoospermia male donors). Semen samples were 10, 50 and 100 µmol/L CAPE for 2 hours at 36.0 °C. After incubation period, MDA levels of seminal plasma were measured. The fragmented DNA of spermatozoa were detected by Anilin Blue Assay with light microscopy, and morphology (spermatozoa structure) were analyzed by transmission microscopy. Results were given as mean ± SD.

Table 1: Seminal Plasma Malondialdehyde levels and Chromatin Condesation Levels

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>CAPE 10</th>
<th>CAPE 50</th>
<th>CAPE 100</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malondialdehyde Mmol/L</td>
<td>6.67 ± 3.25</td>
<td>4.32 ± 3.92</td>
<td>4.09 ± 2.26</td>
<td>3.35 ± 2.40</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Chromatin Condensation</td>
<td>0.00 ± 0.00</td>
<td>0.02 ± 0.02</td>
<td>0.04 ± 0.04</td>
<td>0.05 ± 0.05</td>
<td>0.0033</td>
</tr>
</tbody>
</table>

RESULTS

Significant increase has been observed in percent Chromatin condensation (assayed by anilin blue staining) and Malondialdehyde (Mmol/L) in Oligoasthenoteratozoospermia group before the centrifugation (0.57 ± 0.15). After centrifugation and incubation of samples with 100 µmol/L CAPE resulted in a significantly lower percent Chromatin condensation than samples incubated without CAPE (0.42 ± 0.12) (P<0.0033). After centrifugation and incubation of all samples with CAPE (10 µmol/L, 50 µmol/L, 100 µmol/L) resulted in a significantly lower percent Malondialdehyde levels. (Table 1).

The results of this study emphasize the susceptibility of human spermatozoa to oxidative injury in vitro. The data suggest that preincubation of spermatozoa with the antioxidant CAPE offers protection against oxidative DNA damage in vitro. These data also highlight the differential effects of CAPE on sperm DNA integrity.

CONCLUSION

We have found that incubation of spermatozoa with CAPE protects spermatozoa from DNA damage. The data suggest that preincubation of spermatozoa with the antioxidant CAPE offers protection against oxidative DNA damage in vitro.

References
1. Armand Zini, Maria San Gabriel, and Jamie Libman. Lycopene supplementation in vitro can protect human sperm deoxyribonucleic acid from oxidative damage. Fertility and Sterility 2010. 94;(3), 1033-36.