Evaluation of Bioactive Potential And Estrogenic Activity of Soy Milk


Abstract

The isoflavones have been associated with estrogenic activity and other health benefits, however, its efficiency is related with the microbiota capability of metabolizing these compounds. This study aims to enhance the estrogenic activity and the antioxidant potential of soy milk (SM) by biotransformation with Tannase Enzyme (SMT) and, as a control, with B-glucosidase Enzyme (SMB), since both enzyme have hydrolysis action. The Total Phenolic Content and DPPH assay (methanolic extract) did not present statistics differences between the samples. The SMT presented increased antioxidant potential when compared with the control (SM) by Orac Assay and FRAP Assay. The Sulforhodamine Assay measured the MCF-7 BUS cells viability at concentrations from 0.1 to 1 µl/ml of sample; all samples increased cell proliferation when compared with the control, indicating that the SMT and SMB presented higher estrogenic activity, since this line is a human mammary cancer estrogen responsive cell. All the samples presented synergy with Estradiol (E2) at E-screen assay, suggesting that SM, SMT and SMB react as phytohormone and have potential to become an alternative treatment to reduce postmenopausal symptoms.

Key words: Biotransformation, Estrogen Activity, Soy Milk.

Introduction

MS has high amount of isoflavones compounds, which are known for reducing the postmenopausal symptoms, however its bioavailability and estrogenic activity depends on the human microbiota capability to hydrolyze the glucose bonds by enzymatic via. This study aims to promote those benefits despite each individual microbiota. In order to achieve a bioavailable isoflavone, SM was biotransformed with Tannase Enzyme, since previous studies showed the increase of bioactive potential in samples biotransformed with Tannase and its hydrolytic action.[1]

Results and Discussion


At ORAC Assay[2] SMT presented the highest antioxidant potential, followed by the SMB and SM. The SMT had the best performance, followed by SMB and SM, at FRAP[4]. Table 1 shows the Total Phenolics Content, ORAC, DPPH and FRAP results.

Table 1: Total Phenolics and Antioxidant Potential Results.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Total Phenolics [µg GAE/ml]</th>
<th>DPPH [µmol TE/ml]</th>
<th>ORAC [µmol TE/ml]</th>
<th>FRAP [µmol TE/ml]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>1.434 ± 27</td>
<td>195 ± 2</td>
<td>26.185 ± 1605</td>
<td>5.643 ± 141</td>
</tr>
<tr>
<td>SMT</td>
<td>1.506 ± 18</td>
<td>196 ± 15</td>
<td>32.344 ± 1328</td>
<td>6.462 ± 507</td>
</tr>
<tr>
<td>SME</td>
<td>1.432 ± 53</td>
<td>196 ± 4</td>
<td>32.109 ± 3669</td>
<td>5.443 ± 46</td>
</tr>
</tbody>
</table>

The results are expressed as mean±standard deviation (n=3). Means in the same column with different letters are significantly different (p<0.05).

The FRAP and ORAC results indicate that Tannase Enzyme has an extensive action, which overcame β-glucosidase hydrolysis action. Tannase is able to cleave ester bonds and side bonds of tannins, producing sugar and gallic acid, therefore enhance the antioxidant potential.

MCF-7 BUS cells were viable[6] at medium RPMI supplemented with sample at concentration from 1 to 0,005 µl/ml, measured at 24 and 144 hours. Chart 1 shows the increase of MCF-7 BUS proliferation[7] when exposed to the samples or the samples supplemented with estrogen, indicating that the samples have synergy with this hormone and does not compete with estrogen active sites.

Chart 1: E-Screen.

Conclusion

The biotransformation can increase the SM antioxidant potential and estrogenic activity, enhancing the benefits of soy products consumption for postmenopausal treatments.

Acknowledgement

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