HPLC analysis of β-sitosterol in herbal medicine and vegetable oils

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Abstract
Natural products have been considered anecdotal to the effective maintenance of good health. Solal Beta sitosterol Capsules is a herbal medicine and β-sitosterol is one of its main components. β-sitosterol is known to control cholesterol levels, reduce the activity of cancer cell, promote prostate gland health and enhance immunity in the human body. β-sitosterol can also be found in vegetable oils such as: wheat germ oil, cotton seed oil and so on. The amounts of β-sitosterol in herbal medicines and vegetable oils have not been reported in the literature since an analytical method has not yet been well established. This paper shows that high performance liquid chromatography (HPLC) is a suitable analytical method for determining β-sitosterol levels in several kinds of vegetable oils. HPLC chromatogram of β-sitosterol standard and solal beta sitosterol capsules was performed in the mobile phase as 100% Acetonitrile at pH 6.5 and showed retention time of 67.25 and 67.89 respectively. 95% Acetonitrile and 5% ethanol showed retention time for std beta sitosterol was 55.75, and 85% Acetonitrile and 15% ethanol showed retention time of 36.23 and 36.81 respectively. And Finally The amounts of β-sitosterol of the vegetable oils was also detected by HPLC showing retention time for wheat germ oil is 36.91. Cotton seed oil is 36.21 Soya been oil is 36.47 m. Peanut oil is 36.12.

Key-Words: Solal Beta sitosterol Capsules, β-sitosterol, HPLC, Vegetable oils

Introduction
Natural products have been considered anecdotal to the effective maintenance of good health. β-sitosterol is a known plant sterol. The sterol in plant is called phytosterols. It is a waxy substance which is white in color. β-sitosterol has also been reported to be abundant in wheat germ oil, cotton seed oil, corn oil, and soybean oil. Its efficacy of is reported as follows in the literature review. The structures of β-sitosterol and cholesterol are quite similar. It is reasonable that β-sitosterol can inhibit the absorption of cholesterol in the body and thus reduce the cholesterol levels in the plasma. The liver function activity (GDP, GOP) can be improved with β-sitosterol, and this can reduce prostate cancer and colon-cancer cell growth. β-sitosterol can also be found in vegetables and fruits. The presence of β-sitosterol in soybean foods has been reported to suppress carcinogenesis. It can also be the factor used to form the lympho cells and NK in the immunity process circulation. β-sitosterol can be found in vegetables such as peanut oil.

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It is used in experiments for treating breast cancer and prostate cancer β-sitosterol in soybean oil has been reported to lower cholesterol levels. β-sitosterol in corn oil, rice bran oil and other vegetables oil can affect the cholesterol level in the plasma. Sterol and stanol in plants have been analyzed using high performance liquid chromatography atmospheric pressure chemical ionization mass spectroscopy (HPLC-APCI-MS). The literature survey reveals that Kalo et al. have used thin layer chromatography (TLC) to analyze triacylglycerol. Kuksis et al. used gas chromatography (GC) to analyze sterol in plasma. Kamm analyzed sterol in the cocoa cream with GC method in 2001. Xin Zhang used capillary gas chromatography-mass spectrometry (GCMS) method to analyze β-sitosterol oxides in vegetable oils. Billehime used reversed-phase liquid chromatography to separate sterol esters. Parcherisa analyzed olive oil using HPLC and Kuksis applied the method of HPLC to analyze the plasma lipids too. High-performance liquid chromatography (HPLC) methods have been widely used in the literature given above, but it has not...
been exploited for analyzing β-sitosterol in herbal medicines and vegetable oils.

Material and Methods
Apparatus and reagents
The chromatographic system includes a Agilent MODEL gradient pump, a stainless steel injector (5 µL loop), and a UV-VIS detector operated at 198 nm for detecting β-sitosterol extracted from wheat germ oil, cotton seed oil, peanut oil, soybean oil, wheat germ oil, cotton seed oil, peanut oil, soybean oil, and a concentration of 1mg/1ml of std beta sitosterol purchased from Sigma-Aldrich Co. (U.S.A) and a concentration of 1mg/1ml std beta sitosterol was 55.75(Fig no 2), and 85% Acetonitrile and 5% ethanol showed retention time for std beta sitosterol was 55.75(Fig no 2), and 85% Acetonitrile and 15% ethanol showed retention time of 36.23 and 36.81 respectively(Fig no 3). And Finally the β-sitosterols of the vegetable oils was also detected by HPLC showing retention time for wheat germ oil is 36.91 ,Cotton seed oil is 36.21 Soya been oil is 36.47 ,Peanut oil is 36.12(Table no 1).

Results and Discussion
The high performance liquid chromatography (HPLC) is a suitable analytical method for determining β-sitosterol levels in Solal Beta sitosterol capsules and several kinds of vegetable oils. HPLC chromatogram of β-sitosterol standard and salal betasitosterol capsules was performed in the mobile phase as 100% Acetonitrile at pH 6.5 and showed retention time of 67.25 and 67.89 respectively(Fig no 1), 95% Acetonitrile and 5% ethanol showed retention time for std beta sitosterol was 55.75(Fig no 2), and 85% Acetonitrile and 15% ethanol showed retention time of 36.23 and 36.81 respectively(Fig no 3). And Finally the amounts of β-sitosterols of the vegetable oils was also detected by HPLC showing retention time for wheat germ oil is 36.91 ,Cotton seed oil is 36.21 Soya been oil is 36.47 ,Peanut oil is 36.12(Table no 1).

References


Fig. 1: HPLC chromatogram of β-sitosterol standard and solal betasitosterol capsules was performed in the mobile phase as 100% Acetonitrile at pH 6.5 and showed retention time of 67.25 and 67.89 respectively.
Fig. 2: HPLC chromatogram of β-sitosterol standard was performed in 95% Acetonitrile and 5% ethanol and showed retention time was 55.75.

Fig. 3: HPLC chromatogram of β-sitosterol standard and solal betasitosterol capsules was performed in the mobile phase 85% Acetonitrile and 15% ethanol showed retention time of 36.23 and 36.81 respectively.

Table 1: The Retention time of β-sitosterols of the vegetable oils detected by HPLC.

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Vegetable oil</th>
<th>Retention time</th>
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<tbody>
<tr>
<td>1.</td>
<td>Wheat germ oil</td>
<td>36.91</td>
</tr>
<tr>
<td>2.</td>
<td>Cotton seed oil</td>
<td>36.21</td>
</tr>
<tr>
<td>3.</td>
<td>Soya been oil</td>
<td>36.47</td>
</tr>
<tr>
<td>4.</td>
<td>Peanut oil</td>
<td>36.12</td>
</tr>
<tr>
<td>5.</td>
<td>solal betasitosterol capsules</td>
<td>36.81</td>
</tr>
<tr>
<td>6.</td>
<td>β-sitosterol standard</td>
<td>36.23</td>
</tr>
</tbody>
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