INTRODUCTION

*Acacia* is a genus belonging to the Fabaceae family and comprises about 135 species of trees which are widely spread throughout the arid and semi-arid tropics. *A. tortilis*, commonly known as umbrella thorn belongs to the sub family Mimosoideae. It is a medium umbrella-shaped tree with flat and glabrous pods. Aerial parts of *A. tortilis* are used as anthelmintic and antidiarrheal, and to treat asthma in folk medicine. The seeds of some *Acacia* species were reported to be used as food and have been assessed for nutritional compositions and were shown to contain considerable amount of oil. As evident from literature, there was no phytochemical investigation on *A. tortilis* seed oil growing wild in south of Iran. Hence the current study includes extraction and characterization of *A. tortilis* seed oil to evaluate its oil potential and explore a new source of fatty acid for nutritional purposes.

MATERIALS AND METHODS

Plant material

*A. tortilis* seeds were collected in August 2014 from Sarkhun village, Bandar Abbas, Hormozgan Province, Iran: (27°23’34" N 56°23’59"

Fatty Acid Profile of *Acacia tortilis* (Forssk.) Hayne Seed Oil Growing Wild in South of Iran

ZAHRA MOGHANLOO1, PARISA ZIARATI1 and JINOUS ASGARPANAH2*

1Department of Medicinal Chemistry, Faculty of Pharmacy, Pharmaceutical Sciences Branch, Islamic Azad University, Tehran – Iran (IAUPS).
2Department of Pharmacognosy, Faculty of Pharmacy, Pharmaceutical Sciences Branch, Islamic Azad University, Tehran – Iran (IAUPS).
*Corresponding author E-mail: asgarpanah@iaups.ac.ir

http://dx.doi.org/10.13005/ojc/310159

(Received: December 01, 2014; Accepted: January 10, 2015)

ABSTRACT

The oil content and fatty acid composition of the mature seeds of *Acacia tortilis* collected from natural habitat of the south of Iran were analyzed in order to determine their potential for human or animal consumption. The oil content in these edible seeds was found to be 4.1 % based on the fresh weight. The oil was analyzed by GC and GC/MS. Three fatty acids and one triterpene were identified which constituted 95.5 % of the oil. The main fatty acid of the oil was linoleic acid (70.0%).

Key words: *Acacia tortilis*, Seed oil, Linoleic acid.
E, 100m). Specimen was identified by R. Asadpour and voucher was deposited in the Herbarium of Faculty of Pharmacy, Pharmaceutical Sciences Branch, Islamic Azad University (IAUPS), Tehran under code number 1537-AUPF.

**Oil extraction**

Oil extraction was performed with a Soxhlet apparatus using n-hexane as the solvent. 100 g of powdered seeds was extracted for 6 h and then the solvent was evaporated by using a rotary evaporator at 40°C. The pure oil was transferred into a small glass vial, flushed with nitrogen and maintained at -18°C until analyzed for fatty acid composition.

**Preparation of fatty acid methyl esters**

Fatty acid methyl esters of the extracted oil were prepared according to the method previously reported by Metcalfe et al.\(^4\). 1 g of the oil was weighed into a volumetric flask. Then, 25 ml of 0.5 N methanolic potassium hydroxide was added and placed in the boiling water for 20 min. Then 12 ml boron trifluoride (BF3) was added and boiled again for 3 min. After that, the flask was cooled and 5 ml n-hexane and adequate saturated NaCl solution were added. The flask was shaken vigorously and left to stand for 5 min. The fatty acid methyl esters were prepared and dissolved in n-hexane (the upper layer). 2 ml of upper layer was transferred to a small vial and stored at 0°C until analyzed by GC/MS.

**Fatty acid analysis**

GC/MS was performed to determine the fatty acid composition of the oil. Fatty acid methyl esters analyses were performed on a Hewlett-Packard 6890 /5972 system with a DB-5 capillary column (30 m × 0.25 mm; 0.25 μm film thickness) under condition listed in the Materials and Methods section. The components of the sample were identified by their retention time, retention indices, relative to C9- C40 n-alkanes, computer matching with the WILEY275.L library and as well as by comparison of their mass spectra with those of authentic samples or with data already available in the literature.\(^5,6\)

The percentage of composition of the identified fatty acids was computed from the GC peaks areas without any correction factors and was calculated relatively.

**RESULTS AND DISCUSSION**

In this study, the fatty acid composition of *A. tortilis* seed oil native to south of Iran was determined. The oil extracted was viscous and yellow-green in color with the total oil content of 4.1%. The quality of oil is mainly governed by the fatty acid composition hence the standardization of oil on the basis of fatty acid composition is mandatory.

**Table 1: Fatty acid composition of *A. tortilis* seed oil.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Compound(^a)</th>
<th>\KI(^b)</th>
<th>\KI(^c)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Palmitic acid, methyl ester (16:0)</td>
<td>1931</td>
<td>1927</td>
<td>20.6</td>
</tr>
<tr>
<td>2</td>
<td>Linoleic acid, methyl ester (18:2)</td>
<td>2087</td>
<td>2092</td>
<td>70.0</td>
</tr>
<tr>
<td>3</td>
<td>Vaccenic acid, methyl ester (18:1)</td>
<td>2111</td>
<td>2104</td>
<td>2.1</td>
</tr>
<tr>
<td>4</td>
<td>Squalene</td>
<td>2779</td>
<td>2790</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>95.5</td>
</tr>
</tbody>
</table>

\(^a\)Compounds listed in order of elution.

\(^b\)KI (Kovats index) measured relative to n-alkanes (C9-C28) on the non-polar DB-5 column under condition listed in the Materials and Methods section.

\(^c\)KI, (Kovats index) from literature.
According to Table 1 seed oil consists mainly of essential saturated and unsaturated fatty acids. Linoleic acid (70.0%) was found to be in maximum in A. tortilis seed oil, followed by palmitic acid (20.6%) and vaccinic acid (2.1%). Higher content of Linoleic acid in analyzed oil is noteworthy. Linoleic acid content in seed (70.0%) is similar to sunflower and safflower vegetable oils having specified codex standard range of 48% - 74% and 67.6% - 73.2% respectively. Moreover, presence of the higher content of the saturated fatty acid palmitic acid (20.6%) was expectable because the genus *Acacia* belongs to the family Fabaceae and being a legume species. Squalene was also identified with a considerable amount of 2.8% in the oil. It is a triterpene compound structurally similar to beta-carotene characterized as the intermediate metabolite in the synthesis of cholesterol. In humans, about 60% of dietary squalene is absorbed. Squalene appears to function in the skin as an antioxidant and protect the human skin surface from lipid peroxidation due to exposure to UV and other sources of ionizing radiation. The primary therapeutic use of squalene currently is as an adjunctive therapy in a variety of cancers and it might be a useful addition to potentiate the effects of some cholesterol-lowering drugs.

In conclusion the present study revealed that the seed oil of *A. tortilis* growing in south of Iran could be a new source of high linoleic-oleic acid-rich edible oil and its full potential should be exploited. The use of oil from the seeds is of potential economic benefit to the poor native population of the areas where it is cultivated. The fatty acid composition of *A. tortilis* seed oil was very similar to that reported for commercially available edible vegetable oils like soybean, mustard, sunflower, groundnut and olive. Hence the seed oil of *A. tortilis* could be a new source of edible vegetable oil after the future toxicological studies.

**ACKNOWLEDGMENTS**

Supports from the Pharmaceutical sciences Branch, Islamic Azad University (IAUPS) are gratefully acknowledged.

**REFERENCES**