INTRODUCTION

Antioxidants are the compounds or materials which can effectively catch the free radicals and reduce the occurrence of damage induced by the oxidative stress. Now a day, antioxidants and free radicals are widely discussed in in the nutritional and clinical field [1] since the free radicals induced oxidative stress is mainly associated with the number of human diseases. The risk of illness caused by the free radicals is mainly due to pollution, unhealthy life style, exposure to chemicals, smoking, drugs etc., [2-3]. Furthermore, antioxidants also play a vital role in food preservation through the oxidation inhibition process and contribution to health promotion rented by nutraceuticals and dietary supplements [4]. Lipid oxidation is a main factor destroying food quality of fruits and vegetables, meat [5] and dairy products [6] in the food industry [7,8].

The synthetic antioxidants such as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), propyl gallate and citric acid are widely used in the food industry as preservatives/additives. Application of these antioxidants during food processing leads to the appearance of notable side effects [9] i.e., enlarge the liver size, increase the microsomal enzyme activity in living cells and can exhibit carcinogenic effects [10]. Hence, the researchers are focused on natural antioxidants found in plants, animals and microorganisms [4,11,12] and also strong chelators of metal ions [13]. So, the present investigation was aimed to investigate the preliminary phytochemical analysis and antioxidant potential of some UAE indigenous plants such as Haloxylon salicarnicum, Ochradenus arabicus and Tamarix nilotica.

METHODS

Plant Collection and Crude Extract Preparation

The leaves of Haloxylon salicarnicum, Ochradenus arabicus and Tamarix nilotica were collected from its natural habitats in various palaces of Al Ain, UAE and the collected plants were dried in shade followed by oven (50 °C) prior to grinding in an
electrical blender. For phytochemical analysis, methanol was used for the preparation of crude extracts. Whereas, for antioxidant study, different solvent systems viz. hexane, chloroform, acetone and methanol were used for preparation of crude extracts. After preparation, the solvents were evaporated and dried extracts were stored at 4 °C and used for antioxidant assay.

**Preliminary Phytochemical Analysis**

Pytochemical analysis (flavonoids, carbohydrates, alkaloids, saponin, phenols, tannins, phlobatannins, steroids, terpenoids, cardiac glycosides, volatile oils) were done on the methanolic extract of the powder form the leaves of *H. salicarnicum*, *O. arabicus* and *T. nilotica* using standard qualitative methods as described by and Harborne, Edeoga et al. [14,15].

**Antioxidant Activity**

**DPPH• radical scavenging activity**

The DPPH scavenging activity was determined spectrophotometrically by the method of Brand-Williams et al. [16].

**ABTS•+ radical cation decolourization assay**

ABTS•+ radical cation scavenging potential was determined by the method of Wolfenden and Willson [17].

**Superoxide anion radical (O_2•−) scavenging assay**

Superoxide anion scavenging activity was determined by the method of Nishimiki et al. [18].

**Hydroxyl radical (OH•) scavenging assay**

The hydroxyl radical scavenging activity of the plants was evaluated by the method of Halliwell et al. [19].

**Statistical Analysis**

Statistical analysis was performed using one way analysis of variance followed by Duncan’s Multiple Range Test using Statistical Package for the Social Science software (SPSS) package version 21.00. Results were expressed as mean±standard deviation for six replicates. P values < 0.05 were considered statistically significant.

**RESULTS AND DISCUSSION**

**Phytochemical Analysis**

Preliminary phytochemicals analysis is a valuable step, in the detection of the bioactive compounds available in medicinal plants and subsequently may lead to drug discovery and development. The results on the preliminary phytochemical screening of *H. salicarnicum*, *O. arabicus* and *T. nilotica* are presented in Table 1. The results indicated that the presences of phytochemicals are varied among the plants tested. In the present study, volatile oils are not deducted in all the plant samples. Nevertheless, *H. salicarnicum* had strong presence of alkaloid, tannin, steroids and partially strong presence of flavonoid, saponin, cardaglycoside and weak presence of phenols, terpenoids, carbohydrate, protein, phlobatannin and anthraquinines contents. Whereas, *O. arabicus* has strong presence of flavonoid phenols and partially strong presence of Alkaloid, Tannin, Saponin and weak presence of terpenoids, carbohydrate, protein, phlobatannin, cardaglycoside, anthraquinines. Steroid content was not deducted in the leaves of *O. arabicus*. In *T. nilotica*, strong presence of saponin and partially strong presence of flavonoid, alkaloid, tannin, protein and phlobatannin were observed. Furthermore, phenols, carbohydrate, steroids, cardaglycoside were weakly present in the *T. nilotica* leaves and anthraquinines was not deducted in the plant.

There is no previous report on preliminary phytochemical screening of *H. salicarnicum*, *O. arabicus* to compare it. However, the result on phytochemical screening of *T. nilotica* is similar to the previous work [20].

**Antioxidant Activity**

The results on percentage of DPPH•, ABTS•+ , O_2•− and OH• radicals inhibition are given in Figs. 1a-d (*H. salicarnicum*), 1e-h (*O. arabicus*) and 1i-l (*T. nilotica*) and the IC_{50} values are presented in Table 2. All the extracts inhibited the free radicals in dose depended manner. In the present investigation, the

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**Table 1: Phytochemical screening of *H. salicarnicum*, *O. arabicus* and *T. nilotica***

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Observation</th>
<th><em>H. salicarnicum</em></th>
<th><em>O. arabicus</em></th>
<th><em>T. nilotica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavonoid</td>
<td>Yellow colour persist</td>
<td>++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Alkaloid</td>
<td>orange precipitate</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Phenols</td>
<td>Blue colour</td>
<td>+</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>reddish brown colour</td>
<td>+</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>Green colour</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannin</td>
<td>Green brownish colour</td>
<td>+++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Protein</td>
<td>White precipitate which turns red</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>A reddish brown ring</td>
<td>+++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Saponin</td>
<td>formation of emulsion</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Phlobatannin</td>
<td>red precipitate</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cardaglycoside</td>
<td>No yellowish brown ring of upper layer</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Anthraquinines</td>
<td>Pink, violet or red coloration</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Volatile oils</td>
<td>White precipitate</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*+++-strong presence; ‘++’ – partially strong presence; ‘+’– week presence; ‘-’– shows absence of phytochemicals*
methanol extract of O. arabicus was identified as potential crude extract compared to all other extracts with the IC$_{50}$ values of 91.65 (DPPH), 94.62 (ABTS), 95.82 (O$_2$) and 96.02 (OH) µg/mL. Whereas, the IC$_{50}$ value of the standard, Gallic acid were 125.25 (DPPH), 142.32 (ABTS), 130.78 (O$_2$) and 139.93 µg/mL (OH). The presence of high level of phenols may be responsible for this activity. The activities of several extracts having antioxidant power have been elucidated by various workers in different plants recently [21-24]. The hexane, chloroform, acetone and methanol extracts of H. salicarnicum and T. nilotica, hexane, chloroform and acetone extract of O. arabicus also showed slight to moderate antioxidant potential and IC$_{50}$ values of the extracts were H. salicarnicum = hexane extract–194.17 (DPPH), 190.35 (ABTS), 202.42 (O$_2$) and 150.96 µg/mL (OH); chloroform extract–149.70 (DPPH), 158.02 (ABTS), 178.76 (O$_2$) and 162.28 µg/mL (OH); acetone extract–158.93 (DPPH), 141.44 (ABTS), 149.61 (O$_2$) and 156.29 µg/mL (OH); methanol extract–112.56 (DPPH), 104.38 (ABTS), 105.10 (O$_2$) and 107.22 µg/mL (OH); O. arabicus= hexane extract–162.49 (DPPH), 183.01 (ABTS), 178.44 (O$_2$) and 143.80 µg/mL (OH); chloroform extract–118.79 (DPPH), 133.15 (ABTS), 132.69 (O$_2$) and 146.92 µg/mL (OH); acetone extract–162.49 (DPPH), 155.47 (ABTS), 148.50 (O$_2$) and 133.90 µg/mL (OH); T. nilotica= hexane extract–147.57 (DPPH), 169.43 (ABTS), 151.19 (O$_2$) and 153.84 µg/mL (OH); chloroform extract–156.20 (DPPH), 153.18 (ABTS), 119.73 (O$_2$) and 137.95 µg/mL (OH); acetone extract–124.10 (DPPH), 152.29 (ABTS), 137.43 (O$_2$) and 141.20 µg/mL (OH); methanol extract–115.23 (DPPH), 113.76 (ABTS), 116.84 (O$_2$) and 111.21 µg/mL (OH). Recently, several antioxidant studies were performed on different plant species. Lim et al. [25] reported the antioxidant potential of ethyl acetate, ethanol, and methanol extracts of Sargassum serratifolium. The authors found that ethanol was the efficient solvent for the extraction antioxidant molecule as the ethanol extract showed good antioxidant potential. Antioxidant activity of ethanol and water extracts of Tropaeolum bispinosa leaves was studied by Xia et al. [26]. Ethanol extracts showed good stronger superoxide anion scavenging capacity potential. In that way, the present study suggests that methanol extract of O. arabicus can be used for the isolation potential natural antioxidant.

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REFERENCES