Total Phenol/Flavonoid Content, Antibacterial and DPPH Free Radical Scavenging Activities of Medicinal Plants

L. Fahmideh, A. Mazaraie, and M. Tavakoli*

ABSTRACT

The general desire to replace antibiotics and synthetic antioxidants with natural plants extracts has gained importance in recent years. This approach may be associated with the negative health effects of synthetic antioxidants and antibiotic resistance. Due to these controversial issues, in this study, free radical scavenging activity, Total Phenolic Content (TPC), Total Flavonoid Content (TFC), and antimicrobial activity of Methanolic Extracts (ME) from *Teucrium polium*, *Smyrnium cordifolium* Boiss, *Mentha longifolia*, and *Nectaroscordum tripedale* leaves were compared with *Crocus sativus* tepals. The antioxidant activity of these extracts was investigated in comparison with BHA, BHT, and α-tocopherol by DPPH method. Antimicrobial activities were determined by paper disc agar diffusion method against *S. aureus* (Gram positive) and *E. coli* O157: H7 (Gram negative). Results showed that *C. sativus* tepals contained the highest TPC (37.36 mg GAE g⁻¹) and TFC (138.52 mg Q g⁻¹). Also, radical scavenging activity of *C. sativus* tepals ME (87.33%) was significantly higher than the other extracts; and it was the same as BHA and α-tocopherol statistically. In addition, a significant relationship between radical scavenging activity and TPC (R= 0.964) and TFC (R= 0.806) was found, illustrating the major role of these compounds in antioxidant activity of the mentioned plants. Antibacterial activity of *N. tripedale* leaf extract and *C. sativus* tepal extract against the two abovementioned pathogens were the highest among all the studied herbal extracts (P< 0.05). Moreover, Results of antimicrobial activities were also strongly correlated to free radical scavenging activity and TPC, which indicates the importance of these factors on antimicrobial properties of the five studied medicinal herbs.

Keywords: *C. sativus*, *Nectaroscordum tripedale*, Paper disc agar diffusion method, Total phenolic content.

INTRODUCTION

In the last decade, great efforts have been devoted to the study of medicinal plants properties like antioxidant and antibacterial activities (Mishra et al., 2018a). Antioxidants are compounds that can reduce cell damage by inactivation of free radicals which cause reduction in cardiovascular disease and cancer (Mishra et al., 2018b; Salehi et al., 2018; Vali Aftari et al., 2017). Although artificial antioxidants are extensively used in foods and drinks, experts have raised concerns about their negative side effects. Therefore, replacement of synthetic antioxidants with natural ones is an important issue for scientists (Dolek et al., 2018; Mianabadi et al., 2015; Yang et al., 2018). In the last few years, there has been a growing interest in chemical and microbial characteristics of medicinal plants as a perfected replacement for artificial antioxidants (Sharifi-Rad et al., 2018).
On the other hand, quite recently, considerable attention has been paid to antibiotic resistance among plant and human pathogens, which is drastically increased because of the growing interest in the use of commercial antimicrobial drugs for the treatment of infectious diseases (Tavakoli et al., 2017).

Current researches on spices and aromatic vegetable materials, which have long been used as flavoring agents and preservatives for foodstuffs, are focused on their important role in extending the shelf life of food products (Sethi et al., 2013). Saffron (Crocus sativus) is an expensive spice that has been used as food colorant and flavorant. Apart from that, several publications have appeared in recent years documenting the functional properties of C. sativus like antioxidant (Menghini et al., 2018; Rahaeie et al., 2015), antidepressant (Ghasemi et al., 2014), and anti-hyperlipidemic activity (Lee et al., 2005). For several years, great effort has been devoted to study of C. sativus stigmas, but little attention has been paid to the other parts of saffron flower such as tepals. C. sativus tepals are important by-products, since researchers reported that 350 kg tepals are discarded to produce 1 kg of saffron spice (Lotfi et al., 2013). On the other hand, Iran ranks worldwide as the first saffron producer and provide more than 80% of the world's saffron supply, especially Ghaenat producer and provide more than 80% of the world's saffron supply, especially Ghaenat City (Khorasan Province) (Azadi et al., 2017; Rahaeie et al., 2015). However, most of the previous studies did not take into account antimicrobial properties of this study was to investigate and compare, for the first time, the potential application of the methanolic extract of Ghaenat C. Sativus tepals and the ME of M. longifolia, N. tripedale, T. polium and SCB leaves extracts as natural food preservatives. Indeed, we aimed to compare TPC and TFC, antioxidant (DPPH assay) and antimicrobial (Disc-diffusion) activity of ME of M. longifolia, N. tripedale, T. polium and SCB leaves with C. sativus tepals extract; and compare free.

SCB, which belongs to the umbeliferae family, can be found in Zagros Mountains of Iran, specifically Ilam Province (Mehrabi and Mehrabi, 2011). Recently, some authors have proposed that the SCB leaves could be a good source of natural antioxidants for industrial purposes (Sodeifian et al., 2014). However, to the authors' knowledge, leaf extract of SCB plant have been scarcely investigated from the point of view of antioxidant and antimicrobial activities.

N. tripedale is a species of the Alliaceae family that wildly grows in the west part of Iran (Yasuj region). Root, leaves, bark, and fruit of N. tripedale have been used traditionally for medical treatments like rheumatic disease, joint pains, and kidney and bladder stones (Mahmoudvand et al., 2016). However, to the author's best knowledge, very few publications can be found in the literature that discuss antioxidant and antimicrobial activities of N. tripedale. Based on the above approaches, the purpose of this study was to investigate and compare, for the first time, the potential application of the methanolic extract of Ghaenat C. Sativus tepals and the ME of M. longifolia, N. tripedale, T. polium and SCB leaves extracts as natural food preservatives. Indeed, we aimed to compare TPC and TFC, antioxidant (DPPH assay) and antimicrobial (Disc-diffusion) activity of ME of M. longifolia, N. tripedale, T. polium and SCB leaves with C. sativus tepals extract; and compare free.
radical scavenging capacity of the 5 mentioned medicinal plants extracts with 3 commercial synthetic antioxidants (BHA, BHT and α-Tocopherol). In this paper, authors also explore the possible relationships between different assays.

MATERIALS AND METHODS

Materials

Five types of wild medicinal plants, namely, *C. sativus*, *T. polium*, *N. tripedale*, *M. longifolia* and SCB were collected from different parts of Iran. Folin-Ciocalteu reagent, gallic acid, sodium carbonate, aluminium chloride, potassium acetate, quercetin, Butylated HydroxyAnisole (BHA), Butylated HydroxyToluene (BHT) and α-tocopherol were purchased from Sigma and Merck Chemical Companies. Gentamicin disc were obtained from PatanTeb Co. Iran.

Sample Preparation

Sun dried medical herbs were powdered and sieved. Powder samples (5 grams) were used for methanolic extraction with methanol %76 (1:10) at room temperature under agitation (48 hours). Then, the mixtures were filtered in a Buchner funnel over Whatman No. 1 paper. The filtered methanolic extracts were concentrated in a rotary evaporator followed by oven distillation to constant weight. Finally, the dried residual materials were collected and stored at 4°C in a dark-glass container. Further analysis on the crude extracts was performed by using a concentration of 90 μg mL⁻¹.

Determination of Total Phenol Content

The amount of total phenolic was determined by using the Folin–Ciocalteu method (Chang *et al.*, 2002). A volume of 0.5 mL from each of ME solutions was mixed with 25 mL of Folin-Ciocalteu reagent (0.2 normal). The reaction mixture was vigorously shaken for 5 minutes and 2 mL sodium carbonate (20% w/v) was added. The suspensions were maintained at room temperature for 2 hours, then, the absorbance was read at 760 nm. The TPC was expressed as mg of gallic acid equivalent per gram of extract dry powder based on a standard calibration curve.

Determination of Flavonoid Content

The colorimetric method was performed in order to estimate TFC (Chang *et al.*, 2002). Half mL of extract solution was dissolved in 1.5 mL methanol and 0.1 mL aluminium chloride (10%), 0.1 mL of potassium acetate (1M) and 2.8 mL distilled water were added to the mixture and kept at room temperature for 30 minutes. The prepared samples absorbance was read spectrophotometrically at 415 nm. TFC of samples were calculated as quercetin equivalent (mg quercetin g⁻¹ extract powder) from a calibration curve.

Determination of Antiradical Activity

Free radical-scavenging activity was examined by (1,1-diphenyl-2-picryl hydrazyl radical) DPPH assay (Burits and Bucar, 2000). Samples of 0.1 mL of plant extracts and synthetic antioxidant (α-Tocopherol, BHA and BHT) solutions were added to 3.9 mL DPPH (0.004%) in methanol (As). A control sample containing 0.1 mL methanol in the DPPH solution was prepared (Ac). After 30 minutes incubation at room temperature in dark, absorbance of samples were determined spectrophotometrically at 517 nm. The equation that describes radical Scavenging activity is as follows:

\[
Sc(\%) = \left[\frac{(Ac - As)}{Ac}\right] \times 100
\]

Where, Sc was DPPH scavenging activity (%), Ac was the Absorbance of the control sample and As was the Absorbance of the control.
and $A_i$ was the Absorbance of the herbal extract.

**Antibacterial Activity Determination**

Disc diffusion inhibitory method on Mueller-Hinton agar was carried out to find out antimicrobial activity of the 5 studied herbal extracts against *Escherichia coli* O157: H7 and *Staphylococcus aureus* ATCC25923. Microbial suspension containing $10^6$ cfu mL$^{-1}$ of the mentioned bacteria was used for plate inoculation by sterile swabs. Disc (6 mm diameter) was placed on each plate. The distance between two discs was approximately 25 mm and the distance between a disc and the plate edge was at least 5 mm. Eighteen microliters of herbal extract suspension was placed onto the center of the discs using micropipette. Gentamycin (GM10) was used as positive control. Finally, the plates were incubated at 37°C for 18 to 24 hours. The inhibition zone diameters were measured using a caliper (Jahan et al., 2013).

**Statistical Analysis**

Experimental treatments were carried out using full factorial design with three replications. Analysis of variance was performed by ANOVA procedures (SAS 9.1 for Windows). Tukey's tests were performed to analyze for mean differences. $P$ values ($< 0.05$) were regarded as significant level. Correlations between data obtained were calculated by statistical coefficient correlation option in the MS Excel software.

### RESULTS AND DISCUSSION

**Total Phenolic Analysis**

In this study, the Folin–Ciocalteu assay was performed in order to estimate the TPC of 5 medicinal plants. Phenolic compounds in plants play an important role in antioxidant properties. Analysis of variance showed that *C. sativus* tepals extract contained the highest amount of TPC (37.36 mg GAE g$^{-1}$ of extract) despite SCB extract (13.86) which had the lowest level of this

![Figure 1](https://via.placeholder.com/150)

**Figure 1.** Total phenolic content (mg gallic acid g$^{-1}$) (■) and Total flavonoid content (mg quercetin g$^{-1}$) (□) of methanolic extracts from *C. sativus* tepals and *Teucrium polium*, *Smyrnium cordifolium* Boiss., *Mentha longifolia*, *Nectaroscordum tripedale* leaves. Columns followed by different letters (a–d) are significantly different ($P<0.05$). Columns followed by different letters (A–E) are significantly different ($P<0.05$).
factor (P < 0.05) (Figure 1). In this way, the TPC (mg GAE g⁻¹) of N. tripedale (26.63), M. longifolia (18.47), and T. polium (16.46) were determined (P < 0.05). Sariri et al. (2011) studied C. sativus flower waste and proposed 86.65 mg GAE g⁻¹ of TPC for its ME. Similar to the current study, Abbasvali et al. (2016) obtained a TPC value of 64.18 mg GAE g⁻¹ for C. sativus tepals. In addition, previous researches have documented the different TPC values for the ME of M. longifolia (67.05 mg GAE g⁻¹) (Bahadori et al., 2018) and (89.1 mg GAE g⁻¹) (Hajlaoui et al., 2009). Several authors have proposed that the antioxidant activity of M. longifolia extract is related to its phenolic compounds (Asekun et al., 2007; Tepe et al., 2004). In similar studies, the amount of TPC in ME from T. polium and SCB leaves was 157.84 and 22.26±0.18 mg GAE g⁻¹ (Stanković et al., 2012; Tabaraki and Ghadiri, 2013). More researches on T. polium extract have revealed that phenylpropanoid, glycosides, iridoid glycosides, and flavonoids compounds play a key role in the antioxidant activity of this plant (De Marino et al., 2012). Further analysis of essential oils obtained from SCB leaves indicated the presence of curzerenone (22.8%), hexadecanoic acid (18.7%), curzerene (16.9%), and spathulenol (7.7%) with potential antioxidant activities (Amiri et al., 2006). In this context, to the author's knowledge, this is the first study to investigate the TPC of N. tripedale.

From the above section, it could be recognized that the experimental data of the present study are not compatible with the other researchers' data. This may be due to the differences in environmental factors, climate, cultivars, time of collection, and variation in the sample preparation, solvent extraction methods, extraction times, and storage condition.

**Total Flavonoids Analysis**

Figure 1 represents the TFC of the 5 medicinal plants extracts. Among all the herbal extracts, C. sativus tepals had the highest TFC (mg Q g⁻¹ extract) (138.52), followed by T. polium (121.06), N. tripedale (115.81), M. longifolia (92.4), and SCB (58.06) (P < 0.05).

The anthocyanins belong to the flavonoid family, which is mostly responsible for the C. sativus tepals color. C. sativus tepals contain different types of flavonoids (Kaempferol, quercetin, isorhamnetin) and anthocyanins (delphinidin, petunidin, malvidin). Several studies have suggested that there are relationships between flavonoids and antioxidant activity and health effects (Bagherzade et al., 2017). Menghini et al. (2018) compared the TFC of the ME of C. sativus tepals (27±4 mg Q g⁻¹) and stigma (162±8 mg Q g⁻¹) as well.

In addition to C. sativus, scientists found considerable TFC for the ME of M. longifolia (63.93 mg Q g⁻¹) (Hajlaoui et al., 2009). Lately described in the literature, Mentha plant contains a variety of natural antioxidants such as flavonoids and phenolic acids (Bahadori et al., 2018). Also, several publications have appeared in recent years documenting a variety of flavonoids in T. polium such as cirsimaritin, cirsilineol, 5-hydroxy-6, 7, 3', 4'-tetramethoxy flavone, salvigenin, apigenin 5-galloylglucoside, apigenin-7-glucoside, vicenin-2 and luteolin-7-glucoside (Hasani et al., 2007).

Previous research on chemical structure of SCB species has demonstrated the presence of flavonoid glycosides, essential oils and sesquiterpenelactones (Amiri et al., 2006). Contrary to the 4 abovementioned plant extracts, very few publications are available in the literature about N. Tripedale ingredients.

**Antioxidant Activity**

Radical scavenging activity of C. sativus tepals, T. polium, N. tripedale, M. longifolia and SCB were tested against the DPPH (2, 2-Diphenyl-1-Picryl-Hydrazyl-Hydrate) free-radical (Figure 2). ANOVA Results indicated that radical scavenging activity of
ME of *C. sativus* tepals (87.33%) was significantly higher than the rest of the herbal ME (P< 0.05). On the other hand, although the capacity to scavenge DPPH by *C. sativus* tepals extract was lower than BHA and α-tocopherol standards, the differences were not statistically significant. These results are consistent with previous studies which have found out that tepals of *C. sativus* contain active constituents with antioxidant potential (Abbasvali *et al*., 2016; Sanchez-Vioque *et al*., 2012). Ochiai *et al*. (2004) studied Crocin, isolated carotenoid from saffron, and showed that the lipid peroxidation-inhibiting properties and antioxidant activity against neuronal oxidative stress of crocin was higher than α-tocopherol. According to the phytochemical analysis of *C. sativus* flower, it is rich in antioxidant ingredients like flavonols, flavanones, crocin and crocetin (Zeka *et al*., 2015).

It can be understood from the ANOVA analysis that *N. tripedale* (64.22%) had the second highest level of antiradical activity among 5 herbal extracts comparable with that of BHT and much lower than that of α-tocopherol and BHA. Although some researchers have investigated the important substances (flavonoids, terpenoids, tannins and fatty acids) in *N. tripedale* (Mahmoudvand *et al*., 2016), very few publications can be found in the literature that discuss its antioxidant activity.

As plotted in Figure 2, the free radical-scavenging activities of *T. polium* (37%), *M. longifolia* (23.88%) and SCB (22.5%) were statistically similar and lower than synthetic antioxidants (BHA, BHT and α-Tocopherol). Numerous articles have appeared recently documenting the antioxidant activity of the abovementioned herbal medicines as well (Bahadori *et al*., 2018; De Marino *et al*., 2012; Hajlaoui *et al*., 2009; Sodeifian *et al*., 2014; Stanković *et al*., 2012; Tabarakı and Ghadiri, 2013; Tepe *et al*., 2004;). In related references, it was observed that compounds such as iridoid glycosides, phenyl propanoid glycoside and flavonoids were the most potent DPPH scavengers in *T. polium* extracts (De Marino *et al*., 2012).

As mentioned above in sections 1 and 2, *C. sativus* tepals represented the highest TPC and TFC. These findings could be good reasons for high antiradical activity of *C. sativus* tepals extracts. On the other hands, our results described for the first time that *N.*

![Figure 2](image-url)

**Figure 2.** DPPH radical scavenging activity (%) of methanolic extracts obtained from *C. sativus* tepals and leaves of *Teucrium polium, Smyrnium cordifolium Boiss, Mentha longifolia,* and *Nectaroscordum tripedale.* Columns with unlike superscript letters are significantly different (P< 0.05).
**Table 1. Growth inhabitation of Staphylococcus aureus ATCC25923 and Escherichia coli O157: H7 bacteria by methanolic extracts from C. sativus tepals and Teucrium polium, Smyrnium cordifolium Boiss, Mentha longifolia, Nectaroscordum tripedale leaves.**

<table>
<thead>
<tr>
<th>Medicinal plants</th>
<th>Inhibition zone diameters (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. aureus</td>
</tr>
<tr>
<td>Crocus sativus</td>
<td>22.35 ± 0.25&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>M. longifolia</td>
<td>7.55 ± 0.10&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>N. tripedale</td>
<td>20.00 ± 0.12&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>T. polium</td>
<td>6.25 ± 0.50&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>SCB</td>
<td>11.30 ± 0.37&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gentamicin (Control)</td>
<td>24.95 ± 0.19</td>
</tr>
</tbody>
</table>

* Mean values ± standard deviation in first column followed by different superscripts letters ‘a–b’ are significantly different (P< 0.05). ** Mean values ± standard deviation in second column followed by different superscripts letters ‘A–C’ are significantly different (P< 0.05).
Table 2. Correlation coefficient (R) between Assays.

<table>
<thead>
<tr>
<th>Phenolic content</th>
<th>Flavonoids content</th>
<th>Antimicrobial effects against S. aureus</th>
<th>Antimicrobial effects against E. coli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavonoids compounds</td>
<td>0.759</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimicrobial effects against S. aureus</td>
<td>0.877</td>
<td>0.470</td>
<td></td>
</tr>
<tr>
<td>Antimicrobial effects against E. coli</td>
<td>0.850</td>
<td>0.553</td>
<td></td>
</tr>
<tr>
<td>Antioxidant activity</td>
<td>0.964</td>
<td>0.806</td>
<td>0.892</td>
</tr>
</tbody>
</table>

Significant correlations were observed between the antioxidant activity, TPC, TFC and antimicrobial activity (P< 0.05). It has been found that the correlation between DPPH assays and TPC was the highest (R= 0.964, Figure 3-A). These findings indicate that TPC plays a major role in the antioxidant activity of these herbal medicines. Similarly, correlations reported in the literature.

**Correlation between Assays**

Table 2 outlines a regression analysis to correlate the results of different analyses [correlation coefficient (R)]. Significant

![Figure 3. Correlation between: (A) DPPH assay and Total phenolic contents (R= 0.964), (B) DPPH assay and Total flavonoid contents (R= 0.806), (C) DPPH assay and antimicrobial activity against S. aureus (R= 0.892), (D) DPPH assay and antimicrobial activity against E. coli (R= 0.877), (E) Total phenolic contents and antimicrobial activity against S. aureus (R= 0.863), (F) Total phenolic contents and antimicrobial activity against E. coli (R= 0.850), (G) Total flavonoid contents and antimicrobial activity against S. aureus (R= 0.470), (H) Total flavonoid contents and antimicrobial activity against E. coli (R= 0.553), and (I) Total flavonoid contents and Total phenolic contents (R= 0.759).](image-url)
results of antiradical activity were also correlated to TFC (R= 0.806, Figure 3-B). These strong correlations are in good agreement with the viewpoint that describes the potential of antioxidant activity of medicinal plants as a function of their TPC and TFC. Likewise, results obtained with DPPH and TPC assays can be related significantly with results obtained in antimicrobial assays against gram positive (S. aureus) (R= 0.892, Figure 3-C and R= 0.877, Figure 3-E) and gram negative bacteria (E. coli) (R=0.86, Figure 3-D and R= 0.850, Figure 3-F). All these data clearly demonstrated that the correlation between antioxidants and gram-positive bacteria was higher than their correlations with gram-negative bacteria. Moreover, all these results may be able to support the idea of antimicrobial properties of medicinal herbal extracts as a function of their antioxidant capacities. The lowest correlations were found between TFC and antimicrobial assays (R= 0.553, Figure 3-H and R= 0.470, Figure 3-G against E.coli and S. aureus, respectively). On the contrary, results showed a moderate correlations between TFC and TPC (R= 0.759, Figure 1).

CONCLUSIONS

The application of antioxidants and antimicrobials of natural origin in human food have drawn more attention in recent years. In this research, we studied the TPC, TFC, antioxidant and antimicrobial activities of 5 Iranian herbal medicine (T. polium, SCB, M. longifolia, C. sativus, N. tripedale). This paper has clearly shown that C. sativus tepals contain the highest amount of phenolics (37.36 mg GAE g⁻¹) and flavonoids (138.52 mg Q g⁻¹) and also the highest antiradical activity (87.33%); and antimicrobial activity against E. coli and S. aureus. Based on the results, it can be concluded that the antioxidant activity of the 5 mentioned extracts had significant correlations with TPC (R= 0.964) and TFC (R= 0.806). From this, we deduce that TPC and TFC are two most effective compounds on antioxidant activity of the abovementioned medicinal plants. Likewise, significant correlation was found between antimicrobial activity of these plants and DPPH assay (R= 0.892, against S. aureus and R= 0.86, against E. coli). In the same way, results of antimicrobial properties were also correlated to TPC (R= 0.877, against S. aureus and R= 0.850, against E. coli). These results indicated a high significant relationship between antioxidant concentrations in medicinal plant extracts and their antimicrobial capacities against pathogens. The findings suggested that the tepals of C. sativus, as a by-product, have great potential for industrial applications such as food preservatives and pharmaceutical formulations. Regression analysis indicated that the antioxidant properties were significantly correlated with TPC and TFC. The next stage of our research will study more medicinal plants extracts to find a mathematical model to predict the effects of their major compounds on their antioxidant and antibacterial activities. Further, in our future research, we intend to concentrate on the potential use of these medicinal plants extracts in foods and drugs formulations.

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REFERENCES


Fahmideh et al.


47. مقادیر فنل/ فلاونوئید کل، فعالیت ضد باکتری و مهار رادیکال آزاد به روش DPPH گیاهان دارویی

ل. فهمیده، ا. مزارعی، و. تولکی

چکیده

در سال های اخیر تأمین عمومی برای جایگزینی آنتی بیوتیک ها و آنتی اکسیژنی با عصاره های گیاهی طبیعی اهمیت فراوانی یافته است. این رویکرد به دلیل تاثیر منفی آنتی اکسیژنی به سلامت و مقاومت یافته به آنتی بیوتیک ها می باشد. لذا به دلیل این مشکلات، به روش دیگری در این تحقیق مهار رادیکال آزاد، مقدار فنل و فلاونوئید کل و فعالیت ضدمیکروبی عصاره مانوئلی گلبزگ سعفزا، آلفا-توکوفورول و آلفا-بیوتین می باشد. فعالیت آنتی اکسیژنی با عصاره های بالاترین مقایسه شد. فعالیت آنتی اکسیدانهایی از عصاره ها با آنتی بیوتیک ها، دیسک کاغذی در آگار روی S.aureus (گزم هثبت) و E. coli (هثبت انسانی) انجام گردید. تأثیر نشان داد که گلبزگ سعفزا به خوبی عصاره ها را به مقدار 33/7% بالاترین فعالیت داشت و با آنتی بیوتیک ها مقایسه شد. فعالیت ضد میکروبی عصاره ها به روش انتشار دیسک کاغذی در آگار روی S.aureus (گزم مثبت) و E. coli O157:H7 (گزم منفی) (77/64 mg GAЕ/g) افزایش یافت. فعالیت آنتی اکسیژنی با عصاره ها در بین مقایسه شده عصاره ها به روش دیگری در آگار روی آلفا-بیوتین و آلفا-توکوفورول مشابه بود. به علاوه، رابطه منفی بین فعالیت مهار و آنتی بیوتیک ها و آنتی اکسیژنی با عصاره ها مشاهده شد. مصرف عصاره ها به روش دیگری در آگار روی فعالیت آنتی بیوتیک ها و آنتی اکسیژنی به دست آمد که اثر مهم این عصاره ها در تأمین عمومی به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره ها به روش دیگری در آگار روی عصاره H
ترکیبات روی فعالیت آنتی اکسیدانی گیاهان دارویی تحقیق حاضر را نشان می‌دهد. عصاره بزرگ انیشک و عصاره گلازگ زعفران از بین سایر عصاره گیاهان دارویی تحقیق بالاترین فعالیت ضد میکروبی بر علیه میکروگانیسم‌های استفده شده نشان داد (P<0.05). همچنین نتایج فعالیت ضد میکروبی ارتباط قوی با فعالیت مهار رادیکال آزاد و مقدار فلک نشان داد که این ارتباط اهمیت این فاکتورها در فعالیت ضد میکروگی 5 عصاره گیاه دارویی تحقیق را مشخص می‌نماید.