



Research Article

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Comparison Between The Chemical And Antioxidant Content of The Egyptian And Saudi Doum Fruit

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ABSTRACT

The chemical and antioxidant contents of the Egyptian and Saudi doum fruit were analyzed based on chemical analysis techniques and HPLC analysis. The epicarp of the Saudi doum fruit contains higher phenols and flavonoids in comparison to the Egyptian one. On the other hand, Egyptian doum fruit contains more saccharides than the Saudi one. The Saudi doum fruit has more antioxidant activity than the Egyptian doum fruit due to its higher content of phenols and flavonoids.

Keywords: *Doum, epicarp, Egyptian, Saudi, phenols, antioxidants*

INTRODUCTION

The Doum palm (*Hyphaene thebaica*, Palmae) is a desert palm growing wild throughout the drier regions in Nile valley of Egypt, (Sub-Saharan) Africa, and west India. Its herb tea is traditionally used for treatment of hypertension, bilharzias, and hematuria bleeding [1]. The flavonoid compounds isolated from *Hyphaene thebaica* epicarp have anti-diabetic properties in alloxan induced diabetic rats [2]. The aqueous extract of the dormant fruits of *Hyphaene thebaica* also has antifungal activity [3].

Doum extract could be an important dietary source of phenolic compounds with high antioxidant and anticancer activities [4]. Doum extracts also exert anti-inflammatory potential [5,6] incorporated doum flour in bread production to increase the total phenolic contents, total flavonoids contents and antioxidant properties of bread quality.

The aim of the present study was comparison between the Egyptian and Saudi doum fruit based on different analytical tools.

MATERIALS AND METHODS

Chemicals of this study are of analytical grade. Doum fruits were purchased from Aswan, Egypt, whereas the Saudi doum fruits were purchased from a shop in Jeddah, Saudi Arabia. The Doum fruits were cracked to collect epicarp.

Chemical analysis

Moisture, ash, crude protein and ether extracts were determined according to the method of [7]. Crude fiber was determined according to the method described by [8]. Carbohydrates were calculated by a difference method (=100-(% protein + %fat +%ash +%fiber)) as described by [9]. Tannins were determined according to the method of [10]

Total phenols

Total phenols were determined by HPLC according to the method described by [11]

Flavonoids

Flavonoids were determined by HPLC according to the method described by [12].

Saccharides

Saccharides were determined by HPLC according to the method of [13].

RESULTS AND DISCUSSION

Food supplements became major interest for populations all over the World as sources of antioxidants for its importance for health and protection against diseases [14, 6, 15, 16,17]. Table 1 shows the percentage of moisture, protein, crude fibers, fat, and total phenols and flavonoids in Egyptian and Saudi doum. Saudi doum has more protein, crude ash, fat, phenols, flavonoids total sugar and antioxidant activity than the Egyptian doum; whereas, the Egyptian doum has more total sugar, saponines and tannins. In this study, the phytochemical analysis of Egyptian and Saudi doum fruit was compared for evaluating their values for nutrition. Doum fruit extract contains high levels of phenols and flavonoids, and possesses significant antioxidant and antimicrobial activities [1, 6]. The high content of antioxidant in doum fruit is consistent with [18]

Table 1. The percentage of moisture, protein, crude fibers, fat, and total phenols, flavonoids, total sugar, antioxidant activity, saponins, tannins in the Egyptian and Saudi doum fruit

	Moistur %	Protein%	Ash%	Crude fibers	Fat%	Total phenols (mg/g)	Total flavonoids (mg/g)	Total sugar	Acidity	Antioxidant activity	Saponine content	Tannins
Egyptian doum	7.81	3	6.68	15.5	1.41	31.53	9.4	29.38	0.56	78.84	9.67	8.56
Saudi doum	7.13	3.8	6.99	13.44	2.39	81.15	16.51	3166	0.43	87.51	7.12	7.86

The HPLC analysis

Table 2 showed that the Saudi doum fruit contains more phenolic compounds than the Egyptian doum. It contains higher gallic acid (which is a type of phenolic acids) pyrogallol, 4-amino benzoic, Protocatchuic acid, catechein (which is a group of flavan-3-ols), chlorogenic acid, vannilic acid, p-coumaric, ferulic acid, Iso-ferulic acid, Benzoic acid, 5-methoxy-cinnamic, coumarine, cinnamic and catechol more than the Egyptian one. In contrast, the Egyptian doum contains higher caffeine, P-OH-benzoic acid, reversetrol, Ellagic acid and salycilic acid more than the Egyptian one.

The saccharides analysis (Table 3) showed that the Egyptian doum fruit contains stachyose, galacturonic and raffinose that are not contained in the Saudi one, whereas the Saudi doum fruit contains xylose and fructose that are not present in the Egyptian one. In addition, the Egyptian doum fruit contains inulin, glucuronic acid, glucose, galactose, mannitol, sorbitol and ribose more than the Saudi one, whereas the Saudi doum fruit contains higher sucrose more than the Egyptian one. Numerous health benefits are associated with an increased intake of dietary fiber including a reduced risk of coronary heart disease, diabetes and obesity [14,19,18, 16,17]. Keeping in view the above rationale, doum fruit was used in food products [6].

Flavonoid content (Table 4) of the Saudi doum is also higher than that of the Egyptian one. It contains higher luteo.6-arbinose8-glucos, luteo.6-glucose 8 –glucos, apig -6-arabinose8-galactose, apig -6-glucose 8-galactose, luteolin, narengin, rutin, kamp-.3-7-dirhamoside, kamp-.3-7-dirhamoside, quercetrine and quercetin than the Egyptian doum fruit. On the other hand, the Egyptian doum fruit contains higher contents of hespridin, rosmarinic, apig7-O-neohespiroside, kamp-3-(2-p-comaroyal) glucose, naringenin, hespirtin, rhamnetin, apegnine and acacetin than the Saudi doum. The Saudi doum fruit contains more phenolic compounds such as gallic acid (which is a type of phenolic acids) pyrogallol, 4-amino benzoic, Protocatchuic acid, catechein (which is a group of flavan-3-ols), chlorogenic acid,

vannilic acid, p-coumaric, ferulic acid, Iso-ferulic acid and catechol than the Egyptian one. These compounds have high antioxidant activity due to their high scavenging activity to free oxygen species [15, 16].

Table 2. The HPLC analysis of Egyptian and Saudi doum fruit

Phenolic compounds	Egyptian Doum (ppm)	Saudi Doum (ppm)
Gallic	11.87	32.80
Pyrogallol	471.63	595.03
4-amino-benzoic	12.25	78.39
Protocatechuic	105.09	606.61
catechin	46.34	308.60
chlorogenic	19.37	65.11
Catechol	59.50	281.50
Epicatchin	137.42	122.48
Caffeine	31.85	28.73
P-OH-benzoic	210.35	90.61
Caffeic	29.35	20.39
Vanillic	30.24	285.01
p-coumaric	68.81	81.99
Ferulic	16.78	31.90
Iso-ferulic	56.52	88.14
Reversetrol	7.51	6.87
Ellagic	209.23	75.67
e-vanillic	495.34	934.84
Alpha-coumaric	10.35	12.66
Benzoic	282.62	291.04
5-methoxy-cinnamic·4·3	3.43	8.47
Coumarine	7.71	8.72
Salycilic	48.38	31.50
Cinnamic	13.50	18.34

Table 3. The Saccharide content of Egyptian and Saudi doum fruit

Saccharide	Egyptian doum	Saudi doum
Inulin	16.253	15.114
Glucuronic	0.474	0.380
Stachyose	0.594	----
Galacturonic	0.344	----
Sucrose	12.468	13.917
Glucose	5.904	3.362
Xylose	----	0.249
Galactose	0.967	0.345
Raffinose	3.719	----
Fructose	----	1.790
Mannitol	0.383	0.155
Sorbitol	0.090	0.024
Ribose	0.074	0.034

Carbohydrates and total Energy

The Egyptian doum fruit (Figure 1) contains higher total carbohydrates and total soluble carbohydrates than the Saudi doum fruit; whereas, the Saudi doum fruit contains more total energy. The current results illustrated that the Saudi doum contains more phenolic compounds and other reducing sugar that is reflected in the higher antioxidant activity of the Saudi doum compared to the Egyptian one [1, 6].

Table 4. The flavonoid content of the Egyptian and Saudi doum fruit

Flavonoids	Egyptian Doum	Saudi Doum
Luteo.6-arbinose8-glucos	1006.07	2939.30
Luteo.6-glucose 8 -glucos	63.70	117.17
Apig -6arabinose8-galactose	115.96	159.45
Apig -6-rhamnose 8-galactose	163.71	232.05
Apig -6-glucose 8-galactose	278.36	368.86
Luteolin	205.54	430.45
Narengin	47.61	178.35
Rutin	18.28	44.88
Hespridin	82.77	61.67
Rosmarinic	23.24	15.51
Apig7-O-neohespiroside	60.63	20.09
Kamp-3-7-dirhamoside	26.21	49.52
Apig 7-glucose	18.80	33.94
Quercetrine	6.80	12.32
Quercetin	9.02	11.89
Kamp-3-(2-p-comaroyal) glucose	287.09	188.72
Naringenin	39.32	32.80
Hespiritin	55.58	17.51
Kampferol	6.56	26.54
Rhamnetin	4.81	4.64
Apegnine	3.62	3.22
Acacetin	62.54	41.95

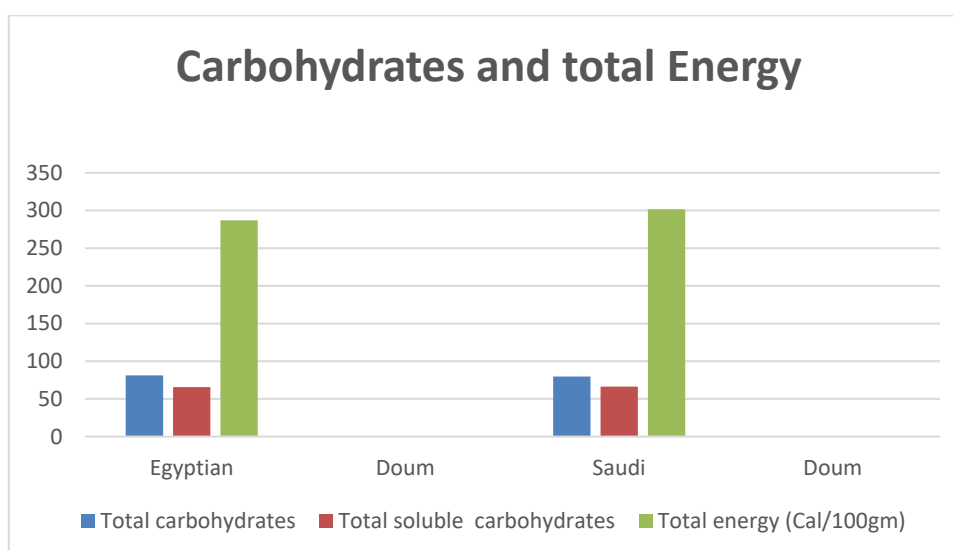


Figure (1): Total carbohydrates, total soluble carbohydrates and total energy in the Egyptian and Saudi doum fruit

CONCLUSION

The analytical and HPLC analysis of the Saudi and the Egyptian doum fruit showed that the Saudi doum fruit contains higher nutritive valuable phenolic constituents than the Egyptian one. These valuable phenolic constituents gave it higher antioxidant activity that can be protected against different diseases.

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