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PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF FRUIT EXTRACTS OF *CERATONIA SILIQUA*

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ABSTRACT

The objective of this study was to test for the presence of phytochemical constituents and to evaluate the antioxidant activity of carob fruit extracts. The fruits were collected from the Botanical Garden in Kadugli (South Kordofan State) during December 2018. The samples were dried under shade, grinded and then extracted by immersion using distilled water, ethanol 99% and hexane. Water yielded 8.9%; ethanol 17.5% and hexane 0.884% extract. The evaluation of antioxidant activity of different crude extracts was determined by 2.2-di (4-tetra-octyl-phenyl) -1-bicryl hydrazyl free radical (DPPH) method. The antioxidant activity was in the order of water (80 ± 10.0)> ethanol (25 ± 0.02)> hexane (16±0.02) extract. Water extract showed the highest antioxidant activity which is comparable with the antioxidant activity of propyl gallate (91±0.01). All extracts were found to contain tannins and terpenoids except for the absence of saponins and alkaloids in hexane extract and alkaloids in ethanol extract. Flavonoids were not detected in all extracts.

KEYWORDS: Ceratonia siliqua, phytochemical constituents, antioxidant activity, carob fruit.

1 INTRODUCTION

Medicinal plants have a promising future because there are about half million plants around the world, and most of them their medical activities have not investigated yet, and their medical activities could be decisive in the treatment of present or future studies (Bassam, 2012). Besides that these plants play a critical role in the development of human cultures around the whole world (Singh, 2015). In more than 50% of all the drugs in clinical use in the world today, the higher plants contribute no less than 25% of the total (Farnsworth, et al., 1985; Cragg and Newman, 2005). In the Citrus family two powerful anti-cancer agents from the Rosy Periwinkle (Catharanthus roseus), laxative agents from Cassia sp. and a cardio tonic agent to treat heart failure from digitalis species (Newman, et al., 2000). The papaw (Asimina spp), the western yew tree (Taxus brevifolia), effective against ovarian cancer and the mayapple (Podophyllum peltatum) used to combat leukaemia, lymphoma lung and testicular cancer (Gurib-Fakim, 2006).

Traditional medicine that has been adopted by other populations (outside its indigenous culture) is often termed complementary or alternative medicine (Mahomoodally, 2013).Ceratonia siliqua L derives from Greek keras, horn and Latin siliqua, common name originates from the Hebrew kharuv, from which the Arabic Carob is derived. The pulp represents 90% of the fruit. Carob powder or syrup is used as an

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ingredient in cakes and cookies and chocolate substitute, contained high levels of carbohydrates (75.92%), protein (6.34%), low level of fat (1.99%), fiber content 7.30%, was rich source of Fe, Ca, Na, K, P and S as well as vitamins E, D, C, Niacin, B6, folic acid and consisted of 11 phenolic compounds. The soluble fibers exert a preventative role against heart disease and lowering serum cholesterol (Kamal et al., 2013).

MATERIAL AND METHODS

Materials

Plant material

Carob pods (Ceratonia siliqua L) were randomly harvested from various parts of several trees grown in different locations in the plant garden in Kadogli (South of Kordofan); the samples were collected in the morning in December 2018. The plant was authenticated by a plant taxonomist at Elobeid agricultural researches station to be Ceratonia siliqua, same physiological maturity (dark brown) and of uniform shape and size. The fruits were shade-dried, cleaned and grinded by a mechanical grinder. The grounded samples were stored at room temperature to be ready for further extraction.

Methods

Preparation of plant extracts

Hundred grams of the dried fruits powder were macerated exhaustively for three days and five hours at room temperature with 1000 ml of ethanol 99% and with 1000ml of distill water separately and respectively. 250g of dried fruits powder were macerated exhaustively for three days at room temperature with 2500 ml hexane. The extracts were filtered and the solvents were left to evaporate, after evaporation of the solvents, solid products with beige color for water extract, dark orange color for ethanol extract and viscous liquid product with dark green color for hexane extract was obtained, and the products weighed prior to further analysis.

Phytochemical screening of the plant extracts

The dried extracts subjected to qualitative chemical screening for the identification of the various classes of photo constituents according to methods described by Harborne (1998).

DPPH radical scavenging assay

Free radical activity of the samples was determined using 2,2-Di(4-tert-octylphenyl) -1- picryl-hydrazyl stable free radical (DPPH) according to the method of Shimada et al., (1992) with some modification. In 96- well plate, 0.5mg from each sample was allowed to react with stable free radical DPPH for half an hour at 37 °C. The concentration of DPPH was kept as 300 µM.

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Vol.1 No.2; 2020

Percentage radical scavenging activity by sample was determined in comparison with a DMSO treated as control group. All tests and analysis were run in triplicate.

RESULTS AND DISCUSSION

Crude extracts

Some of the physical properties of the extracts were shown in table 1.

Table 1: Physical properties of Ceratonia siliqua fruit extracts

Plant material	Solvent	Color	Consistency	yield %
Fruit	Water	Beige	Solid	8.9
Fruit	Ethanol	Dark orange	Solid	17.5
Fruit	Hexane	Dark green	Viscous liquid	0.884

The results in table 1 showed that ethanol yield high percentage of extract, water is the next and hexane yield low percentage of the extract. This indicates that most of the compounds in fruits are of polar nature.

Phytochemical screening

The phytochemical screening of the fruit extracts was shown in table 2. The water extract showed high concentration of tannins and low concentration of saponins, terpenoids and alkaloids. The ethanol extract showed high concentration of saponins, tannins and low concentration of terpenoids. Hexane extract showed high concentration of terpenoids and low concentration of tannins. Flavonoids were not detected in the fruit extracts.

Table 2: Phytochemical screening of the ceratonia siliqua fruit extracts

Components	Water extract	Ethanol extract	Hexane extract
Saponins	L.c	H.c	N.d

ISSN: 2582-6271

Vol.1 No.2; 2020

Tannins	H.c	H.c	L.c
Terpenoids	L.c	L.c	H.c
Flavonoids	N.d	N.d	N.d
Alkaloids	L.c	N.d	N.d

H.c: high concentration, L.c: low concentration, N.d: not detected.

Antioxidant activity

The antioxidant activity of the fruit extracts was determined by DPPH method and the results were shown in table 3. The antioxidant activity of the different extracts from the fruit of ceratonia siliqua were found to be in the order of water extract> ethanol extract> hexane extract. Water extract showed the highest antioxidant activity (% 80±0.01) which is comparable with the antioxidant activity of propyl gallate (% 91±0.01).

Table 3: Antioxidant activity of the fruit extracts

Plant material	Solvent	% of activity ±SD
Fruit	Water	80±0.01
Fruit	Ethanol	25±0.02
Fruit	Hexane	16±0.02
Standard	Propyl gallate	91±0.01

SD: standard deviation

$$\text{Percentage of activity} = 100 - \frac{\textbf{absorption of the sample}}{\textbf{absorption of the blank}} \times 100$$

CONCLUSION

ISSN: 2582-6271

Vol.1 No.2; 2020

Phytochemical screening of the chemical constituents showed that the fruits were rich in saponins, tannins and terpenoids. DPPH radical scavenging assay indicated that the water extract has potent antioxidant.

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REFERENCES

Bassam Abdul Rasool Hassan, (2012). Medicinal Plants (Importance and Uses), Pharmaceut Anal Acta, Volume 3 • Issue 10 • 1000e139, p1.

Batlle, I. and J. Tous. (1997). Carob tree. Ceratonia siliqua L., Promoting the conservation and use of underutilized and neglected crops. 17. Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources Institute, Rome, Italy.p7-26.

Beissert, S. and Schwarz, T. (2002). Role of immunomodulation in diseases

Responsive to phototherapy. Methods 28 (1):138-144.

Cragg, G.M. and Newman, D.J. (2005). Biodiversity: A continuing source of novel Drug leads. Pure Appl. Chem. 77 (1):7-24.

Farnsworth, N., Akerele, A.O., Bingel, A.S., Soejarto, D.D., Guo, Z., (1985). Bull.WHO 63:965-981.

Gurib-Fakim, A. (2006). Medicinal plants: Tradition of yesterday and drugs of tomorrow. Review article. Mol. Aspects Med. 27 (1):1-93.

Harborne, J. B. (1998). Phytochemical methods. Halsted press. New York.

Mahmoud Rafieian-Kopaei, 2012. Medicinal plants and the human needs, J HerbMed Pharmacol. 2012; 1(1): 1–2.

M. Kamal E. Youssef, Moshera M. El-Manfaloty, Hend M. Ali.2013. Assessment of Proximate Chemical Composition, Nutritional Status, Fatty Acid Composition and Phenolic Compounds of Carob (Ceratonia Siliqua L.), Food and Public Health 2013, 3(6):304.

M. FawziMahomoodally.2013. Traditional Medicines in Africa: An Appraisal of Ten Potent African Medicinal Plants, Evidence-Based Complementary and Alternative Medicine, Volume 2013, p 1.

Newman, D. J., Cragg, G.M. and Snader, K.M. 2000. The influence of natural Products upon drug discovery, Nat. Prod. Rep. 17 (3):215-234.

Shimada k, Fujikawa k, Yahara k, Nakamura T, 1992. Antioxidative properties of xanthan on the antioxidation of soybean oil in cyclodextrin emulsion. Agric Food Chem.: 40:945-8.

Singh R.2015. Medicinal plants: A review, Journal of Plant Sciences, Vol. 3, No. 1-1, pp. 50.

Staniszewska, I., Królicka, A., Malinski, E., Łojkowska, E. and Szafranek, J. 2003.Elicitation of secondary metabolites in in vitro cultures of Ammi majus L. Enzymes Microb. Technol. 33: 565-568.