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PRELIMINARY PHYTOCHEMICAL SCREENING AND MINERAL CONTENT OF *NIGELLA SATIVA* LINN (BLACK CARAWAY) SEED

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ABSTRACT

Preliminary phytochemical screening and mineral contents of *Nigella sativa* (black caraway) seed were investigated. The dried ground matter (300g) was macerated with 80% methanol for five days, filtered and concentrated in vapour using a rotary evaporator. The extract concentrate was estimated to be 14.5 $^{\rm w}/_{\rm w}$. The methanolic extract were subjected to preliminary phytochemical analysis using standard procedures which indicate the presence of Saponins, Terpenoids, Flavonoids, Carbohydrates Anthraquinone, Alkaloids and Cardiac glycoside. While the result of the proximate contents indicates that the dry matter has the highest percentage of 98.4 %, crude fibre 35.0%, carbohydrate 33.31%, ether 24.0 %, crude protein 5.69 %, ash 2.0 % and moisture content 1.6 %. The elemental analysis using (AAS) reveal the presence of Na (1.96mg/l), K (3.40mg/l), Cr (0.01mg/l), Zn (1.97mg/L), Fe (1.01mg/l), Mn (18.40mg/l), Ca (22.30mg/l), P (17.00mg/l). These elements are found in low concentration whereas Pb and Cr were not detected.

Keywords: Element, Extract, Phytochemicals, Nigella, Blackcaraway.

INTRODUCTION

Plants are natural factories for the production of chemical compounds, many of which are used to promote health and fight diseases and some of them are marketed as food or herbal medicines [1]. Herbal medicines have long been viewed as a source of curative remedy based on religious and cultural traditions [2]. The use of indigenous plant medicines in developing countries became a World Health Organization policy since 1970. Of the 520 new drugs approved in the period 1983-1994 by either the US Food and Drug Administration or comparable entities in other countries, 30 drugs came directly from natural product sources, 173 were either semi-synthetics or synthetics originally modeled on a natural parent product [3]. Nigella sativa is an annual herb of the Ranunculaceae family, which grows in countries bordering the Mediterranean sea, Palestine and India. This widely distributed plant is native to Arab countries and other part of the Mediterranean region.

EXPERIMENTATION Sample collection and Identication

The seeds of *Nigella sativa* (blackcaraway) were randomly purchased in Monday market in Maiduguri, Borno State Nigeria. The plant specimen was identified and authenticated by a Plant Taxonomist, Prof. S.S. Sanusi of the Department of Biological Sciences, Faculty of Science, and University of Maiduguri. The herbarium specimen with a voucher number 554D was deposited at the Post Graduate Research Laboratory, Department of Chemistry. The seeds were air-dried in the laboratory. Five hundred gram (500g) of it was pulverized into a coarse powder using mortar and pestle.

Extraction and phytochemical analysis

The grounded powder of the seed (300g) of black caraway were macerated with 80% methanol for five (5) days, filtered and concentrated in vapour using rotary evaporator. The methanolic extract subjected to preliminary phytochemical screening by adopting the standard protocols described by [4-6].

Determination elemental content of the seed of Nigella sativa

Ashing and Digestion

The air dried seed was pulverized manually into a coarse powder. Then 5g of the sample was packed into an acid washed porcelain crucible and ashed in a muffle furnace for 3 hours at 550° C. The crucible was removed from the furnace and cooled. To the ashed sample (0.5g), 10 ml of 6M HCl was added and covered, and this content was then heated on a steam bath for 15minutes. Then 1 ml HNO₃ was then added and the mixture was heated for an hour in order to dehydrate silica and completely digest organic substances. Lastly 5 ml of 6M HCl and 10 ml distilled water were added and the mixture was heated on a steam bath to complete dissolution. The mixture was then cooled and filtered through Whatman No. 1 filter paper into a 100ml volumetric flask and then made up to the mark with distilled water [7].

Determination of some elements in the seed of *nigella* sativa

The micro and macro elements were determined using AA-6800 Shimadzu Japan atomic absorption spectroscopy (AAS) and DR/2000 direct reading spectrophotometer [8].

Preparation and Determination of Proximate Composition

The grounded air-dried seed (10.0g) of nigella sativa was exhaustively processed for various parameters according to the Association of Official Analytical Chemists method.

The proximate analysis (carbohydrates, fats, crude protein, moisture, dry matter, crude fiber, nitrogen free extract and ash) of the leaves were determined using AOAC methods. Using weight difference, moisture and ash were obtained. The fiber content was estimated from the loss in weight of crucible and its content on ignition. Carbohydrate was determined when the sum of the percentage of moisture, ash, crude protein and fats were subtracted from 100. The nitrogen value, which is the precursor for protein of a substance, was determined by micro kjeldahi method, involving digestion, distillation and finally titration of the sample [9]. The nitrogen value was converted to protein by multiplying with a factor of 6.25. The determination of crude lipids content of the samples was done using soxhlet type of direct solvent extraction method. The solvent used was petroleum ether (boiling range 40 -60° c). While the nitrogen free extract was calculated indirectly by difference as the sum of crude protein, fibre, fats and ash subtracted from 100. The result of proximate value was all estimated as percentage.

RESULTS AND DISCUSSION

The methanolic extract is black in colour and gummy in texture. The extract concentrate of *nigella* sativa blackcaraway was estimated to 14.5 $^{w}/_{w}$ The preliminary phytochemical analysis of *nigella sativa* seeds revealed the presence of saponnins, terpenoids, flavoniods, carbohydrates, anthraquinone, alkaloids and cardiac glycoside as shown Table 1. The phyto constituents found in the black caraway seed have many pharmacological relevance. Flavonoid and tannins exhibit anti-oxidant and anti-inflammatory properties and tannins apart from acting as astringent, they also known to inactivate enzymes [6,10].

The elemental content analysis using atomic absorption spectrometer reveal the presence of Na (1.96mg/l), K (3.40mg/l), Cr (0.01 mg/l), Zn (1.97 mg/l), Fe (1.01 mg/l), Mn (18.40mg/l), Ca (22.30mg/l) and P (17.00mg/l). Pb and Cd were not detected in the seed of black caraway. The concentration of the mineral elements are found in low concentration when compare to World health organization (WHO, 1996) standard [11]. The result of the proximate of nigella sativa content indicates that dry mater has the highest percentage of 98.4%, crude fibre 35.0%, carbohydrate 33.31%, ether 24.0%, crude protein 5.69%, ash 2.0% and moisture content 1.6%. Many trace/heavy elements are known to influence various functions due to their direct or indirect action in physiological or toxic concentration [12]. In addition these elements are used extensively in both chemotherapy and radiography; elements such as Na, Mg and Fe play essential roles in human health and diseases. Moderate intake of magnesium (Mg) is known to regulate Calcium (Ca) transport and therefore can play important roles in bone metabolism [13]. Adequate zinc nutrition is essential for human health, its deficiency affect children physical growth hence risk severity of variety of infections [12]. The proximate contend indicate the nutritional benefits of the carbohydrate, protein and other minerals in our balance diet. Plants are natural factories for the production of chemical compounds, many of which are used to promote health and fight diseases. The phytochemical screening of the nigella sativa seed indicates the presence of saponins, terpenoids, flavonoids, carbohydrate, anthraquinones, alkaloids and cardiac glycoside. These phytochemical are known to have many medicinal importances and many pharmacological actions. Also the seed was found to contain elements like sodium, potassium, zinc, iron, manganese, calcium and phosphorus in low concentration.

CONCLUSION

This research shows that the seed of *nigella sativa* have some medicinal and nutritional relevance in treatment of ailment and diseases by possession of various phytochemicals and elements.

S/N	Chemical Components	Inference
1.	Test for Carbohydrate	
	General test - Molisch's test	_
	Test for monosaccharide – Burfoed's test	+
	Test for free reducing sugars – Fehling's test	+
	Test for combined reducing sugars	+
	Test for ketoses (Seliwanoff's test)	-
	Test for Pentoses	-
2.	Test for soluble starch	-
	Test for Tannins	
3.	Fernic chloride test	-
	Lead acetate test	-
4.	Test for Phlobatannins	
5	Test for free Anthraquinones	+
5.	Combined Anthraquinone	+
	Test for Cardiac Glycoside	
6.	Salkowski test	+
	Liberman –Burchard test	+
	Test for Flavanoid	-
	Shinoda's test	
7.	Fernic chloride test	_
	Lead ethanoate test	_
	Sodium hydroxide test	_
8.	Test for Saponins glycosides	
	Frothing test	+
9.	Test for Terpenoid	+
	Test for Alkaloid	
10.	Dragendorff's reagent	+
	Mayer's reagent	+

Table 1. Preliminary phytochemical screening results of methanolic seed extract of Nigella sativa

+ = Present in low concentration, - = not present

Table 2. Elemental content determination of Nigella sativa (Black caraway)

Elements	Na	K	Cr	Zn	Pb	Fe	Mn	Ca	Cd	Р
Conc. mg/l	1.96	3.40	ND	1.97	ND	1.01	18.40	22.30	ND	17.00
WHO (1996)mg/l	4-5	0.1-1.0	-	15-20	-	0.5-50	100-200	360-800	-	0.05-0.3

Table 3. Proximate contents of Nigella sativa(Black Caraway) Seed.

S/N	Sample	% Dry matter	% Moisture	% Crude	% EE	% Crude	% Ash	% Carbohydrate
1	Code	Dry Mater	Content	Protein	fat	Fibre	Ash	Carbohydrate
2	Black caraway	98.4	1.6	5.69	24.0	35.0	2.0	33.31

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