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Original Article

Nutritional and antinutritional analysis of *Sesamum radiatum* leaves

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ABSTRACT

Sesamum radiatum leaves are widely consumed as food supplement and for ethno-medicinal purposes by the people of Plateau States and the neighboring states. This study aimed at investigating the nutritional and anti-nutritional content of the plant's leaves grown on the Plateau. The proximate constituent of the air-dried leaves of the vegetable were determined using various methods; the anti-nutritional Factors such as phytic acid, oxalic acid, and tannin were also determined using different methods. The result showed that the sample had high level of protein (18.33 g/100 g of sample), Iron (30.778±17.16 ppm), and magnesium (153.684±127.38 ppm); with a considerable level (15.30%) of moisture. The levels of crude fibre (4.10 g/100 g), crude fat (1.30 g/100 g), where low with moderate ash contents (10.50 g/100 g). The concentrations of other minerals analyzed were low: Pb (0.1635±0.05), Mn (1.2935±0.61), Cu (0.172±0.09) and Zn (0.315±0.06) compared to previous studies. The presence of anti-Nutrient was in moderation: Oxalate (230 mg/100 g), Phytic acid (52.73 mg/100 g) and Tannins (3.87 mg/100 g). The result of the study showed that *Sesamum radiatum* leaves could be a good source of some important mineral and protein.

Keyword: *Sesamum radiatum*, nutritional, antinutritional, elemental analyses.

INTRODUCTION

The plant *Sesamum radiatum* also referred to as benniseed (English), ewe-atura (Yoruba), karkashi (Hausa), beni (Tiv/Idoma) and Izhin (Tarok) is common in Africa, especially West and central Africa. [1-3] It is an erect annual herb between 120 and 150 cm tall; with simple stem or branched, glandular pubescent. [3] The leaves of this vegetable are arrange in opposite or alternate positions in the aerial part of the plant, and is grown in small quantity in the rural areas. [4- 5] The fresh leaves of *Sesamum radiatum* and young shoots are finely cut, cooked and use for soups or sauces, which are eaten with porridge. [2, 6]

According to these authors, the plants are sometime grown for its seeds, which are consumed as whole, or after grinding as paste. The plant is a staple food consumed locally in Nigeria especially in South-West and Middle belt areas including Plateau State where local subsistence farmers richly cultivate it. [7] Previous studies have suggested strongly that long-term consumption of diets rich in plant foods offered some protection against diseases, especially chronic diseases. [8- 9] *Sesamum radiatum* has several medicinal and cosmetic uses. It has shown to improve fertility, ease childbirth and antimicrobial activities. [1] It is also known to be effective against many forms of intestinal disorder especially diarrhea and dysentery. [3] Both the leaves and roots decoction has been found to be effective against chicken pox and measles (anti-viral properties) and as hair shampoo for *Taenra capitis* (anti-fungal properties). [3] A mixture of the paste from pounded seeds and shea butter and other ingredients applied for the treatment of rectal prolapsed. Macerated fresh leafy stems drunk as an antidote for scorpion stings; they are applied externally to treat sprains. [3, 10] The use of *Sesamum radiatum* leaves in this study was due to the popular claim of its ethno-medicinal activities, especially in liver conditions and its high consumption rate as food supplement by the people of Plateau State; hence, the study aims at investigating the nutritional and anti-nutritional content of the *Sesamum radiatum* leaves grown on the Plateau.

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MATERIAL AND METHOD

Plant Collection and Identification: The plant, *sesamum radiatum* (family- Pedaliacaea) was purchase from Farin-Gada market, Jos, Plateau State. It was identified and authenticated by Mr. D.D. Nyam of the Department of Plant Science, University of Jos.

Sample Preparation: The leaves were detached from the stalk and properly rinsed with clean water, and air-dried under shed on a wooden board with a constant turning over to avert fungal growth. The sample was ground into fine powder using a mechanical grinder (Corolla), and then sieved through a mesh of about 0.5mm and stored in an airtight jar prior to analysis.

Assay of *Sesamum Radiatum* Leaves

Proximate Analysis: Proximate analysis is a system of analysis of nutrient in which the gross component or proximate (water, carbohydrate, dietary fibres, fatty acids ash, proteins) are determined. [11- 12] The proximate composition of *Sesamum radiatum* leaves was determined according to the methods described by AOAC, [12] and Okaka *et al*. [13]

Anti-nutritional Analysis: Anti-nutrients are natural or synthetic compounds that interfere with the absorption of nutrient. [14] An example is phytic acid found in many grains which forms insoluble complexes with calcium, zinc, iron and copper. [15] Various anti-nutritional Factors such as phytic acid, oxalic acid, and tannin were determined. [11]

Elemental Analysis of *Sesamum radiatum* Leaves: 2.0 g of *Sesamum radiatum* leaves powder was weighed into a dish and heated on the bunsen burner in a fume chamber until the charred mass stopped emitting smoke. The dish and its content were cooled in desiccators, after which 0.1 M HCl was added. The resulting solution was filtered and diluted appropriately. Salts of the metals to be analyzed were used to make standards and relevant lamps and were fixed for the analysis of the elements as described by Oshodi. [16]

RESULTS AND DISCUSSION

Table 1: Proximate Composition of Dried Leaves of *Sesamum radiatum*

Nutritive values	Weight (g)/100g of sample
Moisture	15.30
Crude Protein	18.33
Crude Fibre	4.10
Crude Fat	1.30
Ash	10.50

Table 2: Quantitative Anti-Nutrient Screening of *Sesamum radiatum*

Parameters	Weight (mg)/100 g
Phytic acid	52.73
Tannins	3.87
Oxalate	230.00

Table 3: Mineral Composition of Dried Leaves of *Sesamum radiatum*

Elements	(PPM)
Calcium	1.00 mg/100 g
Phosphorus	0.31 mg/100 g
Pb	0.1635±0.05
Fe	30.778±17.16
Mg	153.684±127.38
Mn	1.2935±0.61
Cu	0.172±0.09
Zn	0.315±0.06

PPM= Part per million; Values are means of three determinations ± SD

The result of this study showed that the leaves of *sesamum radiatum* is a valuable source of nutrient and is comparable to many protein crops (Table 1), hence it could be used as a protein and minerals source for human consumption, especially when the protein source from animal cannot be afforded by individuals. [17] The presence of these nutrients proves the multiple biological and ethno-pharmacological effects of *Sesamum radiatum* leaves, which are yet to be explored. The 18.3% of

crude protein content seen in this study (Table 1) was higher than the protein levels of some commonly consumed plants [18] even though, it was low compared to the protein level in some commonly consumed oil seed in Nigeria as reported by Jackson. [19] Crude protein content is of particular nutritional significance as it may meet man's protein and energy requirements and boost the immune system against diseases like gastro intestinal parasites infestations. [20- 21] Proteins are also essential for continuous replenishment of the endogenous protein that is lost due to infections with gastro-intestinal helminthes. [22] This proteins are mostly in the form of enzymes, rather than acting as a storage pool, as in grains and nuts. [23]

Crude fibre content of 4.10g/100g (Table 1), shows that the sample contains little amount of cellulose, hemicellulose and lignin. The moisture content of 15.30% (Table1) was higher than that of *garcinia kola* (7.6%) indicating the presence of moisture in considerate amount. Studies have shown that too much of moisture in any food sample could make the sample viable for microorganism growth, which may accounts for most of the biochemical and physiological reactions in the plant. [24] The fat content of the leaves was low (1.30%) compared to that of *Chrysnathellum indicum* (2.76%), and previous studies have shown that diet providing between 1 and 2% of its caloric energy as fat could be sufficient to human beings, as excess fats consumption leads to some abnormal conditions including cardiovascular disorders such as atherosclerosis, cancer and aging. [25]

The anti-nutrient content of *sesamum radiatum* leaves are as shown in Table 2. These anti-nutrient factors tend to bind to nutrients forming indigestible complex thereby decreasing their absorptions; the anti-nutrient content of this plant was below the established toxic levels. [26]

The elemental analysis of *sesamum radiatum* leaves (Table 3) showed low calcium level content of 1 g/100g. This may be beneficial for some individuals, since studies have shown that high calcium level in diets may decrease body weight and fat content due to low digestible energy intake caused by increase fecal lipid and low gross energy intake. [17] On the other hand, its relevance in solving mineral deficiency-related problems in children and women of reproductive age who are more vulnerable to micro nutrient deficiency and anaemia will be limited. [27] Iron which is necessary in formation of haemoglobin and normal functioning of the central nervous system, was present in considerable amount of 30.778± 17.16 ppm; it was higher than those in *garcina kola* [28]. Phosphorus, a mineral that is useful in bone formation was also present in modest amount at 0.31 g/100g of sample. The levels of Manganese, Copper, Zinc and Lead were quite low; however, the low content of these heavy metals in the leaves, though play important roles in metabolic activities, are beneficial in the light of the toxicity associated with heavy metal accumulation in the body. [29]

CONCLUSION

The study showed that the *Sesamum radiatum* leaves contain nutrient that can be useful in human diets and for ethno-therapeutic purposes; similarly, the anti-nutritional contents of the plant was considerably low and hence considered to be safe.

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