



Comparative study on proximate analysis of *Syzygium aromaticum* bud and *Hunteria umbellata* seed in management of diabetes mellitus

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Abstract

The nutritional compositions of *Hunteria umbellata* (HU) seed and *Syzygium aromaticum* bud (SA) were examined in this study using standard procedures described by Association of Analytical Chemistry. The proximate composition (%) of the HU seed and SA bud are as follows; crude protein (12.03) and (7.53), crude fibre (13.30) and (27.91), crude fat (4.40) and (27.00), ash (3.49) and (5.22), moisture (6.50) and (25.93) and carbohydrate (60.28) and (6.41) which was significantly difference from each other. *Hunteria umbellata* seed is considered as a good source of dietary protein and contain low amount of crude fat compare to *Syzygium aromaticum* bud, which can aid in management of diabetes whereas SA bud also contributes via low amount of dietary carbohydrate and high amount of crude fiber which aids in digestibility of starch. In view of these attributes, both plants can work synergetically to aid in management of diabetes condition.

Keywords: *Hunteria umbellata*, *Syzygium aromaticum*, diabetes, nutritional composition

Introduction

Medicinal plants are important part of natural wealth and serve as food. Some offers an important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines. Since ancient times, plants with therapeutic properties have secured an important place in the healing practices and treatment of diseases. *Syzygium aromaticum* and *Hunteria umbellata* fall into these categories of less recognized and under-exploited bud and seed despite their promising economic value.

Syzygium aromaticum (clove) is a member of myrtaceae family, which grows up to a height of 8-12 m. It is locally used as an addictive or spice in food most especially in Nigeria and other parts of the world (Kamatou *et al.*, 2012) [5]. The bud of this plant is locally used in treatment of ailments such as chest congestion, cough and cathar. However, eugenol present in this plant is responsible for aroma and has antioxidative and antimycotic ability. *Hunteria umbellata* belongs to Apocynaceae family and it has been established that the plant has contributed immensely in treatment of diabetes mellitus as reported by Momoh, (2014). The aim of the study was to conduct a comparative study on proximate analysis of *Syzygium aromaticum* bud and *Hunteria umbellata* seed in management of diabetes mellitus.

Materials and Methods

Collection and Identification of Plant Materials

Syzygium aromaticum bud and *Hunteria umbellata* seed were bought from *Oja-Tuntun*, Ilorin, Kwara State Nigeria. The plants were deposited and authenticated at herbarium, Department of Plant Biology, University of Ilorin with voucher number, UILH/001/1107/2021 and UILH/001/1152/2021 respectively.

Preparation of Sample

The buds of *Syzygium aromaticum* and *Hunteria umbellata* seeds were properly scrubbed under running clean water, sliced into more modest pieces and subjected to drying for a period of seven (7) days at room temperature. The sample after drying was then pulverized to coarse powder and afterward kept for subsequent use.

Proximate Analysis

Proximate analysis of clove and *H. umbellata* seed powders for moisture, ash, crude fat, crude protein, carbohydrate and crude fibre was carried in accordance with Association of Official Analytical Chemists methods A.O.A.C. (2005) [1].

Determination of Moisture Content

Two grams (2 g) of *Syzygium aromaticum* bud and *Hunteria umbellata* seed powder were placed in dried crucible and sample was heated for 3 hours at 105°C in moisture extraction oven. The dried sample was then placed in desiccator and reweighed after cooling. The percentage of moisture content was calculated as follows:

$$\text{Moisture (\%)} = (\text{Loss in weight (g)} / \text{Original weight of sample (g)}) \times 100$$

Determination of Ash Content

Two grams (2 g) of *Syzygium aromaticum* bud and *Hunteria umbellata* seed powder were placed in dried crucible and heated in oven for 3 hours at 100°C. Then, it was placed in a muffle furnace at 550°C and heated until it turned white and carbon free. The crucible was taken out from the muffle furnace. After that it was kept in desiccator and reweighed after cooling. The weight of the residue ash was calculated as:

$$\text{Ash (\%)} = (\text{Weight after ignition (g)} / \text{Weight of sample (g)}) \times 100$$

Determination of Crude Fat Content

Five gram of *Syzygium aromaticum* bud and *Hunteria umbellata* seed powder were weighed in thimble wrapped in filter paper and placed in soxhlet extraction apparatus. It was extracted with petroleum ether at 40-60°C for 6 hours and solvent was distilled off. The residue left behind after distillation represented the fat content and was calculated by the following formula:

$$\text{Fat (\%)} = (\text{Weight of extract (g)} / \text{Weight of sample (g)}) \times 100$$

Determination of Protein Content

Two grams (2 g) of *Syzygium aromaticum* bud and *Hunteria umbellata* seed powder were placed in Kjeldahl flask and added 25 ml concentrated (98 %) H₂SO₄, digested till the colour of the solution turned clear. The solution was transferred into a 100 ml volumetric flask and the volume made up to the mark with distilled water. Ten milliliters of the solution was distilled and titrated against 0.1 M hydrochloric acid against a blank. Titre values of duplicate samples were recorded and percentage nitrogen calculated.

Percentage nitrogen (% N) was converted to percent crude protein by multiplying by a factor of

$$6.25. \% \text{ N} = \frac{(\text{Volume of acid} \times \text{Molarity of standard acid}) \times 0.014}{\text{Weight of sample (g)}} \times 100$$

Determination of Crude Fiber Content

Five gram (5 g) of *Syzygium aromaticum* bud and *Hunteria umbellata* seed powder were mixed with 200 ml of H₂SO₄ (1.25 %) and heated for 30 minutes. The mixture was filtered through a Buchner funnel and washed with distilled water until it became acid free. Then, the residue was boiled with 200 ml of NaOH (1.25 %) for half an hour. It was filtered and washed many times with distilled water to make it alkali-free. After that the residue was rinsed with HCl (10 %) solution followed by two times with ethanol and then three times with petroleum ether. The residue was placed in a dried crucible and heated overnight in oven at 105°C. After cooling in a desiccator, it was ignited in a muffle furnace for 90 minutes at 550°C to obtain the weight of residue.

$$\text{Crude fibre (\%)} = \left[\frac{(\text{Weight of crucible} + \text{dried residue before ashing}) - (\text{Weight of crucible} + \text{contents of ashing})}{\text{weight of sample}} \right] \times 100$$

Determination of Available Carbohydrate Content

Available carbohydrate content was calculated by difference [(100- total of M)] where M is moisture + crude fat + ash + crude fiber + crude protein.

Result and Discussion

Table 1: Proximate analysis of *Syzygium aromaticum* bud (SA) and *Hunteria umbellata* seed (HU)

| S/N | Sample | % Moisture | % Crude Protein | % Total Ash | % Crude fat | % Crude Fibre | % Carbohydrate |
|-----|--------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| 1 | SA | 25.93±0.50 ^b | 7.53±0.18 ^a | 5.22±0.35 ^b | 27.00±0.28 ^b | 27.91±0.28 ^b | 6.41±0.04 ^a |
| 2 | HU | 6.50±0.05 ^a | 12.03±0.00 ^b | 3.49±0.01 ^a | 4.40±0.01 ^a | 13.30±0.00 ^a | 60.28±0.03 ^b |

Mean ± standard error of mean (SEM) of triplicate readings with different lowercase superscript letter along the same row are significantly different ($p < 0.05$).

Moisture content of clove powder was 29.47 % as reported by Kaur *et al.* (2019) ^[6] which is higher than % moisture content of *Syzygium aromaticum* bud (SA) of this present study. The moisture content was found to be 6.50 % in *Hunteria umbellata* seed (HU) and this was smaller compare to 9.57% value reported for Dehulled *Hunteria umbellata* seed (DHUS) and 10.95 % value reported for Whole *Hunteria umbellata* seed (WHUS) by Onawunmi *et al.* (2017). Low amount of moisture content in food increase the shelf life and prevent the growth of microorganism (Onwuka, 2005) ^[10]. Crude protein content of clove powder was found to be 6.91% as reported by Kaur *et al.*, (2019) ^[6], 5.60% as stated by Gbadamosi *et al.* (2011) ^[4] which are inconformity with present result. The present study was similar with report of Onawunmi *et al.* (2017) which realized 13.65% for protein content in DHUS. Proteins are building blocks of amino acids that participate in several biological roles as an enzyme, hormone and structural component (Mercy *et al.*, 2015).

The total ash content of SA is 5.22% which is in agreement with ash content of clove powder (5.29 %) as reported by Kaur *et al.* (2019) ^[6] and 5.00% as reported by Gbadamosi *et al.* (2011) ^[4]. The total ash content of HU is 3.49 % and this is in agreement with total ash content of DHUS value 3.89% and WHUS value 3.45% as

reported by Onawunmi *et al.* (2017). Ash content is an inorganic matter obtained from complete oxidation of organic matter along with removal of moisture content (Dalhat *et al.*, 2018). The crude fat content was reported in this study to be 27.00 % for *Syzygium aromaticum* which was higher than the value (5.86%) reported by Kaur *et al.* (2019) ^[6] and 12.1% by Sulieman *et al.* (2007).

The fat content reported in DHUS was 2.87% which was smaller compare to the present study and this current research was not in agreement to Onawunmi, (2017) who reported 14.97% of WHUS. Low amount of fat content and high fiber content are important risk factors which enhance the application of medicinal plants in management of diabetes and other degenerative diseases such as cancer and atherosclerosis (Ajayi *et al.*, 2013) ^[3].

Crude fibre content of SA was 27.91% in this study and this is greater than the value (14.37%) reported by Kaur *et al.*, (2019) ^[6], 12.00% by Gbadamosi (2011) ^[4]. Crude fibre content in H U was seen to be 13.30% which is higher to WHUS crude fibre content 2.74% and lower than DHUS crude fibre content 26.79% reported by Onawunmi, (2017). High amount of fibre content facilitates digestion and aid conversion of starch to simple sugars which is an important factor in the management of diabetes (Adeneye, 2009) ^[2]. Carbohydrate content of clove powder was 32.10 % as reported by Kaur *et al.* (2019) ^[6], which is higher than the present study. The carbohydrates content was found to be 60.28% in *Hunteria umbellata* seed (HU) and this was similar with report of Onawunmi (2017).

Conclusion

Medicinal plants are important part of natural wealth which serves as important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines. Since ancient times, plants with therapeutic properties have secured an important place in the healing practices and treatment of diseases. *Hunteria umbellata* seed and *Syzygium aromaticum* bud have contributed in management of diabetes via their nutritional assessment.

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References

1. A.O.A.C. Official methods of analysis. Gatherburg MD USA, 2005, 1121-1180.
2. Adeneye AA, Adeyemi OO. International Journal of Applied Research in Natural Product,2009:2:9-18.
3. Ajayi A, Ibrionke, Olusola O, Ojelere. Journal New York Science,2013:6:1-7.
4. Gbadamosi I, Akere A. J. Appl. Science,2011:44:2967-2971.
5. Kamatou GP, Vermaak I, Viljoen AM. Molecules,2012:17:6953-6981.
6. Kaur K, Kaushal S, Rani R. Journal of Essential Oil Bearing Plants,2019:22:1195-1217.
7. Mercy EA, Sunday ON. IOSR. J. Appl. Chemistry,2012:10:42-45.
8. Momoh J, Akoro SM, Godonu KG. Sci. J. Biochemistry,2014:194:7.
9. Onawunmi OOE, Olagunju EO, Afolabi SO. Elixir Appl. Chemistry. 2017, 109;48056-48058.
10. Onwuka GI. Naphtali Prints, 2005, 95-96.
11. Suleiman AME, Boshra IMO, El Khalifa EAA. Res. J. Microbiology,2007:2:266-271.