Research Article INDONESIAN CHIMICA LETTERS

DOI: 10.19184/ICL.v2i1.344

Assessment of Proximate and Phytochemical contents of Some Herbal Snuffs Sold in Sokoto Metropolis, Nigeria

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Abstract: There is current rise in use of herbal stuffs for medicinal purposes due to accessibility, cheapness, and other reasons. But information about their contents is limited and therefore it is imperative to unveil it. The objective of this work was to carry out determination of phytochemicals, and proximate compositions of the selected herbal snuffs in Sokoto, Nigeria.The three different herbal snuffs namely, Hajiya Aisha, Hajiya safiya, and Dr Lambo were purchased from Sokoto market, Sokoto City, Sokoto State, Nigeria. The determination of phytochemicals, and proximate compositions was performed by the methods of Association of Analytical Chemists. Alkaloids, tannins, flavonoids, cardiac glycosides, glycosides steroids, and terpenoids were determined. In terms of ash, the range determined is 23.00 ± 0.05 to 25.00±0.1 %. The lipid assessed was 9.10 ± 0.5 to 13.00 ± 0.05 %. 5.00 ± 0.3 to 8.20± 0.02 % was the range of protein determined. Fibre values of 6.60 ±0.02 to 10.10± 0.5 % were reveled and 41.00± 0.1 to 48.10± 0.5 % is the range of carbohydrate assessed in the snuffs. Nevertheless, owing to the nutritional proximate values, and medicinally useful phytochemicals determined in these snuffs (Dr Lambo, Hajiya Aisha, and Hajiya Safiya) selected from sokoto, Nigeria; the snuffs are of benefits to the users in that regards. However, other scientific quality measurement studies should be done to ascertain the safety of the snuffs on human subjects.

Keywords: Snuff, carbohydrate, oral, herbs, alkaloids, tannins, steroids.

INTRODUCTION

In contrast to the western medicine, another mode of medicine that uses natural products for healing purposes is a long historic method that is currently on the rise [1]. Some of these alternative forms of medicine include Ayurveda, yoga, naturopathy, acupuncture, and herbal medicine (herbalism) [2]. The use of herbal medicine is on the growing course all over the world, with about 80% of the people on the earth depending on herbal materials because of accessibility, tradition, religion, cheapness, and safety belief [3]. Herbal materials are utilized in various forms such as concoction, drinks, dried leaves, pills, capsule, powder, teas, fresh, and snuffs among others.

However, snuff is usually produced from plant products to be taken through the oral or nasal cavity by humans. Various components and parts of plants that can be from a single plant source or mixtures are on the rise and getting acceptance both among the young ones and older population [4, 5, 6]. There are several types of herbal snuff in the market being sold virtually without empirical evidence showing the constituents therein [5]. And there is little information on the phytochemical composition of herbal snuff in the country and across the world, despite the need of the public to be informed [3]. Parable, an Indian study by Mathew etal., 2021 [7] evaluated metals in herbal preparations and observed that the stuff involved contains toxic levels of lead, arsenic, and mercury. Saeed et al., (2011) [8] reported heavy metal content of Pakistani herbal stuff and reiterated that some the studied products contain metals at elevated levels. Quds et al., (2021) [9] in a study of heavy metals in frequently used herbal stocks said all the metals were below the limits set by WHO. In Ondo state, Nigeria, a study of six herbal plants shows presence of rich phytochemicals and rich proximate contents that support the utilization of the plants in medicine as found by Olanipekun et al., (2016) [10]. In similar vein, a study of famous *Moringa* herb in Kano (northern Nigeria) shows presence of phytochemicals elements and varied proximate compositions as observed by Ali et al., (2019) [11]. However, based on our preliminary observation and to the best of our knowledge, this is the first study to establish a data on phytochemical and proximate contents of herbal snuff in Sokoto and country at large. Thus, this would invariably help in giving a baseline information for further studies and taking appropriate measures or making policies. It will also indeed provide a source of awareness to herbal practitioners and the public.

Nevertheless, proximate and phytochemical studies of herbal stocks are methods aimed at showing the classes of basic chemical and components present, that in turn determine the functions and applications of the herbal stuff by the public [5]. Moreover, the public knowledge, and application can be enhanced and improved on the ways to collect, handle, process, store, and use herbal medicines and safety, medicinal beliefs are also improved through informed information about herbal stocks [3]. The evaluation of phytochemicals in snuff points to their role in therapeutics and in making synthetic drugs that make physiological and morphological functions in human body [6].

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The objective of this study was to determine the types of phytochemicals present in herbal snuffs in Sokoto, and conduct a proximate analysis therewith.

METHODS

Herbal snuffs are widely sold in Sokoto city. They are powdered materials (usually of plant origin) stocked in small containers that are snuffed by users to get some feelings of therapy on various issues affecting them. The name of each herbal powdered snuff is denoted mostly by name of its company or manufacturer which is boldly written on the containers. Since the snuffs are from different companies/ manufacturers they may differ in effect and compositions, likewise their price and consumer preferences. The three different herbal snuffs namely, Hajiya Aisha, Hajiya safiya, and Dr Lambo (shown in Figures 1-3) were purchased from Sokoto Market, Sokoto City, Sokoto State, Nigeria. The determination of phytochemicals, and proximate compositions was performed by the methods of Association of Analytical Chemists (AOAC) descried in Aborisade et al., (2017)[6].

Figure 1: Dr Lambo Herbal Medicine

Figure 2: Hajiya Aisha Herbal Snuff

Figure 3: Hajiya Safiya Herbal Snuff

Procedure for digestion

Fifty 50cm^3 of each sample was transferred into a beaker and 5cm^3 of concentrated HNO_3 was added into each beaker. The samples were heated on a hot plate until the solution appears pale yellow colored indicating the digestion was completed. After which solution allowed to cool and transferred to a 50cm^3 volumetric flask and distilled water was added to the mark and transferred into a sample bottle for atomic absorption spectroscopy (Umar et al., 2022)[12].

Principle of atomic absorption spectroscopy

In Atomic Absorption Analysis, the absorption of light uses an instrument called Atomic Absorption Spectrophotometer (AAS). In This process, flame system is generally employed to dissociate element from their chemical bonds. The atoms absorb light at characteristic wavelength chemical bonds. The atoms absorb light at characteristic wavelength when present in their ground state. A mixture of air and acetylene produce a flame which is of a sufficient high temperature to ensure the presence of free atoms of most elements. The use of nitrous oxide in place of air result in a higher temperature and this is necessary for the estimation of certain elements. The narrow spectral line of the sample necessitates the use of line source as well as high resolution monochrometer. This help to prevent interference from adjacent spectral lines of other species on the sample matrix. AAS in conjugation with flame atomizer will be used to determine specific metals in a liquid sample, the availability of a spectrometer equipped with a lamp turret will facilities the measurement of multiple metals in a sample (Umar et al., 2022).

Procedure for atomic absorption spectroscopy (AAS)

After the digestion has been completed, the AAS machine was used to determine the present and concentration in the sample containing the metals analyze is aspirated into air-acetylene flame causing evaporation of the solvent and vaporization of free metal atoms this method is called atomization, a line source (hallow cathode lamp) operating in the Uv-visible spectra region is used to cause electronic excitation of the metal and the absorbance is measured with a conventional Uv-visible dispersive spectrometer with photomultiplier detector (Umar et al., 2022)[12].

The descriptive statistics and one-way analysis of variance (ANOVA) were carried out at ($p<0.05$) significance level using Microsoft excel version 7.

RESULT AND DISCUSSION

The results for this work were shown in Tables 1 and 2. Table 1 indicates the amount of proximate values in three types herbal snuff in Sokoto, Nigeria. And Table 2 indicates the presence of phytochemicals in three different herbal snuffs in Sokoto, Nigeria.

Table 1 shows the proximate contents of three types of snuffs commonly consumed in Sokoto City, Nigeria. The aimed of proximate analysis of plant-based materials is to unveil their contents and their links with functions because the nutritional values and functions of products are due the presence of these proximate contents and quasi. It is a way to improve quality, divulge evidence-based information to users, and guard safety among the consumers as well [13]. No known standard values set by constituted authorities regarding phytochemicals and proximate contents in herbal stocks, so the results are compared with the findings of past studies.

Table 1. Showing the result of phytochemical contents of three different types of herbal snuff sold in Sokoto City, Nigeria

Parameters	Hajiya Safiya	Hajiya Ayisha	Dr Lambo	P-value
Moisture	8.26 ± 0.05	10.10 ± 0.04	8.11 ± 0.05	0.996005
Ash	25.00 ± 0.05	27.12 ± 0.05	23.00 ± 0.05	
Lipid	13.00 ± 0.05	11.00 ± 0.5	9.10 ± 0.05	
	6.60 ± 0.02	10.10 ± 0.5	7.00 ± 0.15	
Fibre	5.11 ±0.02	8.20 ± 0.02	5.00 ± 0.3	
Protein	47.10 ± 0.05	41.00 ± 0.1	48.10 ± 0.5	
Carbohydrate				

Key: Values are expressed as mean ± standard deviation

Table 2. Showing the result of phytochemical contents of three different types of herbal snuff sold in Sokoto City, Nigeria

Phytochemicals	Hajiya Safiya	Hajiya Ayisha	Dr Lambo
Tannins	+	+	+
Alkaloids	+	+	+
Flavonoids	+	+	+
Cardiac Glycosides	+	+	+
Glycosides	+	+	+
Steroids	+	+	+
Terpenoids	+	+	+
Saponins	-	-	-
Anthraquinones	-	-	-

Nevertheless, in Table 1, the proximate analysis of the three herbal stocks is below 15% and is a good portend that does not support microbial growth in the stocks. It is indeed also similar to results of a study in five medicinal plants in Nigeria conducted by Quadri et al., (2021) [13]. The presence of moisture also enhances surface area during digestion of fibre containing materials [13]. In terms of ash, the range determined (as in Table 1) is 23.00 ± 0.05 to 25.00 ± 0.1 % and it indicates that the stuffs contain reasonable amount of mineral elements that are required by the human body for various functions in the maintenance of health and wellness [13, 14]. Likewise, the ash content help in digestion, and negatively affect microbial growth [13]. This ash content determined in this study is similar to the results obtained from three different medicinal plants in Nigeria performed by Quadri et al., (2021) [13]. The lipid assessed was 9.10 ± 0.5 to 13.00 ± 0.05 % which is lower than that determined from Moringa as reported by Quadri et al., (2021) [13]. The lipid is also comparatively higher than the reported values in spices and herbs in Nigeria [15]. 5.00 ± 0.3 to 8.20 ± 0.02 % was the range of protein determined in Table 1. It was lower than values obtained in herbs used for alternative medicines in Ondo state, Nigeria by Olagbemide et al., (2016) [1] and higher than most of these values reported by Abolaji et al., (2007) [16] in three medicinal plants in Western part of Nigeria. Fibre values of 6.60 ±0.02 to 10.10± 0.5 % revealed in Table 1 is lower compared to the leaves shown in herbs used for alternative medicine as reported from Ondo Olagbemide et al., (2016) [1]. 41.00± 0.1 to 48.10± 0.5 % is the range of carbohydrate assessed in the snuffs as shown by Table 1 and are higher than the reports in common herbal medicines in Ondo, Nigeria Olagbemide et al., (2016) [1] Table 2 Shows the results of determination of phytochemicals present in three types of herbal snuff collected in Sokoto, Nigeria; which is similar to phytochemicals shown in a study of herbs and spices in Nigeria [15]. No known standard values set by constituted authorities regarding phytochemicals and proximate contents in herbal stocks, so the results are compared with the findings of past studies. Enitan et al., (2022) [3] also found flavonoids, tannins, alkaloids, cardiac glycosides in herbal medicine called bio-clean herbal remedy in Ogun state, Nigeria [3]. About 800 medicinal plants or their products are becoming more popular in the course of alternative and orthodox medicine especially in African states and other developing countries worldwide [17]. Herbal products are becoming popular in the treatment of various ailments and diseases such as cardiovascular disorder, neurological disorder, antimicrobial diseases etc [15, 17].

However, many of the herbal stuffs had not gained proper and enough momentum because studies showing standardized contents of these materials are scarce. It is now imperative to unveil the standard nature of the phytochemical contents of herbal snuff in Sokoto, Nigeria. This proper action and investigation would make these herbal snuff to serve as a source of modern compounds needed in modern drugs [6, 17]. And it can also be used to synthesize appropriate analogue for the modern drugs in various fields and circumstances as well, because in developing countries utilization of herbal stuff has considerably helped in substituting imported drugs and has economically helped the citizens in many respects [3, 17]. In Table 2, the three different herbal stuffs used in Sokoto contain tannins, alkaloids, flavonoids, glycosides, cardiac glycosides, steroids, and terpenoids; but, there were no saponins and anthraquinones. This is a portend that shows why these stuffs are utilized in various therapeutic purposes by the public. The ability of the herbal stuffs to be effective or utilized in alternative medicine was borne-out of their capacity to contain phytochemicals of different kinds [13, 17]. The phytochemicals present in any part of plants such as roots, leaves, stem, flowers, etc are non-nutrient bioactive substances made by plants in minute amount to protect the plant against invading microbes and consumers. On the other hand, these phytochemicals are important in man for protection/ reduction against diseases [17].

Nevertheless, the proteins present in these herbal stuffs are required by the body for synthesis of new and worn-out tissues and other useful activities in the body. Carbohydrates are energy giving foods that serve in the running of activities of the body and play roles as structural components of the body/ Lipids are needed to provide twice energy as carbohydrates and for synthesis of useful materials such as hormones and membranes.

Fibre is useful to aid digestion, and ash serve as a portend of minerals that are required for body functioning [18]. In the same vein, the phytochemicals determined in snuffs are useful in the sense that they act to inhibit the growth of diverse array of microbes that affect human life [5, 19,20, 21, 22, 23, 24, 25].

CONCLUSION

Herbal stuffs are commonly taken in Sokoto state, but there is a scarcity of information about the contents of the stocks. Therefore, this study was motivated to unveil information about the phytochemical and proximate contents of herbal snuff sold in Sokoto Metropolis. The three common herbal stocks (Dr Lambo, Hajiya Aisha, and Hajiya Safiya) contain alkaloids, tannins, flavonoids, terpenoids, steroids, glycosides, and cardiac glycosides. Additionally, they are rich in ash, fibre, protein, lipid, and carbohydrate. Nevertheless, owing to the nutritional proximate values, and medicinally useful phytochemicals determined in these snuffs (Dr Lambo, Hajiya Aisha, and Hajiya Safiya) selected from sokoto, Nigeria, the snuffs are of benefits to the users in that regards. However, other scientific quality measurement studies should be done to ascertain the safety of the snuffs on human subjects.

ACKNOWLEDGEMENT

We are grateful to the Department of Biochemistry, Sokoto State University Sokoto, especially the Head of Department, Dr Aminu Umar Imam, and Lab. Technologist Malam Hassan for their support during the conduct of the study.

REFERENCES

[1] P.T Olagbemide, T.I. Ojiezeh, and M. I. Adarabioyo, "Proximate analysis of some extracts used in alternatice medicine," *Int. J. Curr. Res*, vol. 8, no. 8, pp. 35513-35519, 2016.

[2] R.M. Mathew, J.J. Fleming, J.D. Bondu, and A. Jose. "Measurement of concentrations of six metals in Indian traditional medicine preparations and sindoor powder," *Asia Pacific J. Medi. Toxicol*, vol. 10, no.2, pp. 61-64 2021.

[3] S.S. Enitan, I.N. ibeh, C.C. Isitua, M.o. Dada, G. Oluwatoyin, R.Y. Itodo, R.Y. akele, and p.O Idris. "Phytochemical screening, proximate analysis and microbiological quality of bio-clean herbal remedy." *Sch. Int. J. Tradi. Complement. Med.*, vol. 5, no.9, pp. 175-183, 2022.

[4] B.Y. Muhammad, S.A. Barau, M.Z. Zaruwa, and R. Maikefi. "Herbal snuff (AK-47 and HAM) induce oxidative stress and increase acetylcholinesterase enzyme activity in rat brain," *GSC Biol. Pharm. Sci.*, vol. 17, no. 03, pp. 171-176, 2021.

[5] L.G. Hassan, A.M. Sokoto, M.A. Ngaski, S.A. Anka, B.M. Chanchangi, K.J. Umar, and C. Ogbiko. "Nutritional and ant-nutritional analyses of *Hura Crepitans* seeds cultivated in Sokoto North L.G.A. North Western Nigeria," *Bayero J. Pure Appl. Sci.*, vol. 11, no.1, pp. 126-130, 2018.

[6] A.B. Aborisade, A. Adetutu, and A.O. Owoade. "Phytochemical analysis and proximate analysis of some medicinal leaves," *Clin. Med. Res.*, vol. 6, no. 6, pp. 209-214.

[7] R.M. Mathew, J.J. Fleming, J.D. Bondu, and A. Jose. "Measurement of concentrations of six metals in Indian traditional medicine preparations and sindoor powder," *Asia Pacific J. Med. Toxicol.*, vol. 10, pp. 2, pp. 61-64, 2021.

[8] M. Saeed, N. Muhammad, H. Khan, and I. Zakiullah. "Assessment of heavy metals content of branded Pakistani herbal products," *Trop. J. Pharma. Res*., vol. 10, no. 4, pp. 499-506, 2011.

[9] T. Quds, M. Ahmed, S. Shakeel, N. Jalbani, F. Mazhar, and I. Azhar. "Determination of the heavy met contents of frequently used herbal products in Pakistan," *Trop. J. Pharma. Res*., vol. 20, no. 2, pp. 371-382, 2021.

[10] M. K. Olanipekun, S. Arowesegbe, J.O. Kayode, and T.R. oluwole. "Ethnobotanical survey of medicinal plants used in the treatment of women related diseases in Akoko region of Ondo, state, Nigeria," *J. Med. Plants Res*., vol. 10, no. 200, pp. 270-277, 2016.

[11] A.M. Ali, S.T. Tajo, A.U Zage, and M. Ali. "Phytochemical screening, proximate and mineral analysis of Moringa Oleifera leaf in Kano, Northern Nigeria," *J. Alli.Phama. Sci*., vol. 1, no. 1, pp. 1-6, 2019.

[12] A.I. Umar, Y. Sarkingobir, and M. Dikko. "Spectro-analytical research of selected heavy metals (Cu, Cd, Cr, and Pb) in four different single-use plastics commonly in contact with food from Sokoto, Nigeria," *Jurnal Teknokes*,. vol. 15, no. 1, pp. 76-80, 2022.

[13] A.I. Quadri, N.S. Njinga, A.T. Kola-Mustapha, T.O. Amusa, O. Atolani, A.T. Oladiji, M.T. Bakare-Odunola, and L. Kambizi. "Elemental composition and proximate analysis of five commonly used African medicinal plants," *Plant Archi*., vol. 21, no. 1, pp. 1360-1366, 2021.

[14] A.U. Adamu, E.D. Paul, C.E. Gimba, and L.G. Ndukwe. "Phytochemical and proximate analysis of Aspillia Kotschyi (Sch. Bipex Hochst) Oliv.'" *Nigerian J. Technol*., vol. 36, no. 4, pp. 1135-1137, 2017.

[15] M.S. Abu, R.L. Mashi, J.I. Onuche, and S.I. Shuaibu. "Proximate and phytochemical screening of some selected herbs and spices commonly used in Nigeria," *GSC Biol. Pharm. Scie.*, vol, 22, no. 01, pp. 015-024, 2023.

[16] O.A. Abolaji, A.H. Adebayo, and O.S. Odesanmi. "Nutritional qualities of three medicinal plant parts commonly used by pregnant women in Western part of Nigeria," *Pakistan J. Nutri.*, vol. 6, no. 6, pp. 665-668, 2007.

[17] H.K. Njoya, C.E. Onyeneke, C.U. Okwuomu, and G.O. Erifeta. "Phytochemical, proximate and elemental analysis of the African mistletoe (*Tapinanthus preussii*) crude aqueous and ethanolic leaf extracts," *J. Medi. Plants Stud*., vol. 6, no. 6, pp. 162-170, 2018.

[18] A.B. Sylvia, M. RoseAnn, and B.K. John. "Hygiene practices and food contamination in managed food service facilities in Uganda," *African J. Food Sci.*, vol. 9**,** pp. 31-42, 2015.

[19] A.I. Umar, I. Garba, M.U. Iduh, A.I. Umar, and O. Owoicho. "*Invitro* Antibacterial activity of aqueous and methanol extracts of *Garcinia kola* Seeds *Gashua*," *J. of Sci. and Human*, vol. 1, no. 2, pp. 1-8, 2016.

[20] S.A. Ayuba, Z.M. Kilgori, F. Bashir, A.I. Umar**,** Z.H. Bello, and H. Hussaini. "Comparative nutritional and antinutritional composition of processed sorghum food product (gruel)," *Harvard Research and Publications. Int. J. Agri. Agricul. Tech*., vol. 12, no. 1, 2020.

[21] A. Hamza, A.M. Gumi, A.I. Umar, Y. Sarkingobir, U. Tambari, and M. Sahabi. "Effects of mango leaves utilization during postharvest storage of tomatoes on some macroelements (Na, K, Ca, M, and P) concentrations in Sokoto, Nigeria," *J. Food Safe. Hyg*., vol. 9, no. 1, pp. 50-60, 2023.

[22] Y. Sarkingobir, A. Hamza, M. Dikko, M. Abubakar, A.G. Yabo and B.I. Muhammad. "Antibacterial study of guava leaves on some enteric bacteria *(E. coli and Shigella dysentriae)* from Sokoto, Nigeria," *International Research Journal of Science, Technology, Education, and Management*, vol. 2, no. 4, pp. 1-7, 2022.

[23] A. Hamza, A.M. Gumi, A.A. Aliero, A. Umar, Y. Sarkingobir and U. Tambari. "Potential of neem leaves on preservation of selected elemental compositions in two tomato cultivars from Sokoto, Nigeria," *J. Biore. Environ. Sci.*, vol. 2, no. 1, pp. 15-20, 2023.

[24] A.I. Umar, Y. Sarkingobir, U. Tambari, I.A. Salau, A. Aliyu, and S.S. Gobir. "Extent of cyanide, nitrate, and flavonoids goitrogens in Fadama soils and tobacco plant in Sokoto, Nigeria," *GeoECo*, vol. 9, no. 2, pp. 148-159, 2023.

[25] A.I. Umar, Y. Sarkingobir, Y.Y. Miya, R. Livinus, M. Abubakar, and Z.A. Ladan. "Iodine, and select6ed goitrogens measured in some common grains from Sokoto Zones, Nigeria," *Thu Dau Mot UNi. J. Sci*., vol. 5, no. 2, pp. 210-219, 2023.