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RESEARCH ARTICLE

NUTRITIVE AND PHYTOCHEMICAL ANALYSIS OF BAY LEAF (*LAURUS NOBILIS*), NUTMEG SEED (*MYRISTICA FRAGRANS*) AND SHEPHERD'S PURSE SEED (*CAPSELLA BURSA-PASTORIS*)

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ABSTRACT

Spices are parts of plants like leaves, puds, stalks or roots that are used for organoleptic purposes, preservative in food, however some of them have therapeutic properties necessary for optimal health of humans, hence, this study investigated the chemical composition of bay leaf (*Laurus nobilis*), nutmeg (*Myristical fragrans*) and shepherd's purse seed (*Capsella bursa-pastoris*) locally sourced from Offa, Kwara state and Ife-wara, Osun State. The proximate analysis of these species, bay leaf, nutmeg and sheperd purse reveal the presence of protein(2.04% - 4.7%), carbohydrate(4.5% - 32.6%), fiber (2.4% - 69.5%), moisture contents(7.8% - 12.5%), fat(7.5% - 50.5%), and ash(2.0% - 6.5%)respectively in all the spices. Likewise, the fatty acid analysis showed high values of saturated fatty acid such as oleic (5.3%-6.2%), linoleic (1.1% - 10.7%), lauric (0.7% - 36.6%), myristic(1.8% - 71.2), palmitic (14.8% - 21.3%) and stearic acid (1.3% - 3.5%) in bay leaves, nutmeg and Shepherd's purse seed samples respectively. Also, the phytochemical analysis of bay leaves, nutmeg seed and shepherd purse seed were carried out revealed that among the phytochemicals analysed, quinone was absent in bay leaf and sherperd purse while present in nutmeg. However, the presence of the phytochemical constituents and nutritive properties of these spices shows that they can be used for therapeutic purposes.

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INTRODUCTION

Spices are leaves seed, fruit, puds, buds, back, bulbs, stalks or root used in various forms such as dried, powdered, broken, fresh, ripe primarily for the purpose of adding to the flavour, taste, appearance (colour) or preservation of food. Some examples include garlic, ginger, hyssop, juniper berry, mustard, pepper, pomegranate, thyme, vanilla, bay leaves, nutmeg, to mention a few (Akeem *et al*., 2016). *Laurus nobilis (*Bay leaf) is an evergreen tree widely cultivated for the commercial value of its aromatic leaves. It grows up to 30ft high and are widely cultivated in many countries such as Spain, France, Italy, Mexico, Algeria, Turkey, Morocco, and Portugal (Chmit and Kanaan, 2014). Bay leaf usually gives off a sweet aroma when broke and added to dishes especially when witted and dried. It improves flavor for soup, meat, fish, vinegars and beverage. It is also used in drugs and cosmetics (Alaa and Sawsan, 2016). Aside its aromatic use, bay leaf (*Laurus nobilis*) has been found to have antibacterial property (Chmit *et al*., 2014), and also beneficial for people with type-2-diabetes (Abdulrahim, 2011), it is a good source of antioxidant with antimicrobial activity (Alaa and Sawsan, 2016), anti-diarrhoea, anticancer (inhibiting melanoma cell growth) (Yashin *et al*., 2017), it has also reported for its anticonvulsant (Sayyah and Kamalinejab, 2002), and antifungal property (Yashin *et al*., 2017). Another spice widely used in food flavouring is nutmeg *Myristica fragrans*. Nutmeg commonly called mace, magic, musedier, nuxmoshata, pyritic oil, muskabaum, is widely known for its aromatic, aphrodisiac, and curative properties (Lee *et al*., 2005). Nutmeg is an evergreen tree, native to the rain forest Indonesian. It belongs to the family Myristicaceae also known as Myristica. Nutmeg seed is used in powdered form as flavouring agent in cake, candy, cake, meat, biscuit and sausages. It has been found to be traditionally helpful in increasing blood circulation and stimulating the cardio-vascular system. It also promotes digestion, gets rid of both stomach gas and ache, reliefs flatulence, vomiting, diarrhoea as well as encourages appetite. Nutmeg can also help with respiratory problems such as cough associated with common cold. Hence, it is sometimes found as an ingredient in cough syrups. Literature reveals that nutmeg is an antioxidant and antimicrobial (Yilmaz *et al*., 2013), antibacterial (Yashin *et al*., 2017), has cytotoxic and apoptotic

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effects (Lee *et al*., 2005), and anti-diarrhoea (Olaleye *et al*, 2006). Further, it is used in soap, perfume and shampoos. Shepherd's Purse (*Capsella bursa-pastoris*) is an annual plant that grows from a taproot with stems that can be erect, simple or branched, and 8 to 45cm tall. Shepherd purse seed are oblung and dull orange in colour (Sarifah *et al*., 2017). The name "Shepherd purse" come from the supposed likeness of its seed pod to a type of 16th century purse suspended from a cord worn around the waist of shepherds and country people. Because shepherd purse seed is a vasoconstrictor, styptic, astingent, blood coagulant, diuretic, and anti-scorbutic, it is very homostatic (i.e. it can stop bleeding). Shepherd purse is therefore effective towards alleviating nose bleeding and blood in urine. It is also used in treating fibroid tumors, muscles problems, circulatory issues. Further, it can be used in treating common eye sight problems such as blurriness, skin diseases like eczema, and rashes (Akeem *etal*., 2016). Having these background information, it is prerogative to study the nutritive and phytochemical properties of these seeds.

MATERIALS AND METHODS

Plant materials: Bay Leaves (*Laura Nobilis*), Nut meg (*Myristica fragrans*) seed and Shepherd purse seed (*Capsella bursa-pastoris)* were locally sourced in Offa, Kwara State, and Ife-wara, Osun state, Nigeria. The plants were dried until constant weight was reached.

Chemicals: All the chemicals used were of analytical grade.

Chemical composition: The ash content, moisture content, crude fibre, crude fat, crude protein, vitamin C, fatty oil were determined according to AOAC, 2003.

Preparation of alcoholic and distilled water extract: Bay leaves were air dried and coarsely powdered while, nutmeg (*Myristica fragrans*) seed were grated. 10g of the dried powder were soaked separately into 100ml of ethanol and distilled water and shaken occasionally well for five (5) hours and kept undisturbed for 24 hours and 48 hours respectively. Shepherd purse seeds were also sorted and air dried for many days and crushed using mortal and pestle into powder then 20g of the powder were weighed and soaked in 50ml of butanol, hexane and ethanol. The extracts collected was then concentrated in a water bath to obtain a thick mass of the respective extract.

Phytochemical composition: The phytochemical analysis of bay leaves, nutmeg seed and Shepherd purse seed were carried out following standard procedure reported by Archana *et al*. (2012) to determine the presence of phenol, tannin, flavonoid, sterol, saponin, anthraquinone, quinone, terpinoid, carbohydrate.

Oil extraction: Oil was extracted from the leaves of *Laurus nobilis* (bay leaves) with n-hexane using Soxhlet apparatus as described by Archana *et al*., (2012). The oil was further evaporated using rotary evaporator at 50^{o}c. The liquefied extract thus obtained was concentrated and the percentage was calculated with the weight of the bay leaves powder taken.

Fatty acids anaylsis: The oil was extracted from the leave using the n-hexane in soxhlet extractor. Then it was filtered and evaporated using a rotary evaporator at 50oc. The fatty oil was then stored,The fatty acid componenet was converted to the simplest convenient volatile derivative.

So 50 microns of fatty oil sample was taken and extended to 2 micron by n-hexane, it was mixed then the free fatty acid was esterify by using methanol sodium hydrate solution (29g of NAOH in 250ml methanol). The solution was centrifuged for 2min at 400rpm. The upper layer (hexane) was taken and washed with water and was dried on anhydrous sodium sulphate. The resulting solution was subjected to analysis by gas chromatography under the following conditions. Capillary column (60m × 0.32mm) the column temperature was held at 175^{o}C for 2min and then raised at 225^{o}C with rate of 3^{o}C at 1min, injector and detector temperature were 240^{o}C and 250^{o}C respectively, the carrier gas flow rate (nitrogen) was 1.0ml 1min, split ratio was 1:60. The content each fatty acid was calculated by internal regulated service

RESULTS AND DISCUSSION

The chemical composition of bay (*Laura nobilis*), nutmeg seed (*Myristica fragrans*) and shepherd purse seed (*Capsella bursa-pastoris*) are represented in tables 1, 2 and 3 below respectively. The nutrient values present in Bay leaves as indicated in table1 below, revealed that it is good for consumption and contains little or no adulterant, moisture content (10.0%) indicate the water holding capacity of the leaves, the high value of crude fiber suggest that bay leaf can be used to aid digestion and can serve as a good source of roughage.

Table 1. **Chemical composition of bay leaf samples**

Nutrient	Value
Ash content	6.5%
Moisture content	10.0%
Crude fibre	69.5%
Crude fat	7.5%
Crude protein	2.04%
Carbohydrate	4.46%
Vitamin C	0.013g/ml
Vitamin A	3.1g/ml
Vitamin E	0.018g/ml

Values are mean of dublicate determinats.

Table 2. Chemical composition of nutmeg seed samples

Nutrient	Value
Ash content	4%
Moisture content	12.5%
Crude fibre	22.5%
Crude fat	25.4%
Crude protein	4.55%
Carbohydrate	32.6%
Vitamin A	1.3g/ml
Vitamin C	3.5g/ml
Vitamin E	1.2mg/ml

Values are mean of dublicate determinats.

Table 3. Chemical composition of Shepherd purse seed samples

Nutrient	Value
Ash content	2%
Moisture content	7.8%
Crude fibre	2.4%
Crude fat	50.5%
Crude protein	4.7%
Carbohydrate	32.6%
Vitamin C	31 mg/ml
Vitamin A	22 mg/ml
Vitamin E	10mg/ml

Values are mean of dublicate determinats.

Table 4. Phytochemical analysis of bay leaves (*Laurus nobilis*)

Chemical group	Ethanol extract	Water extract	Butanol extract	n-Hexane extract
Alkaloid	+	+	+	+
Glycoside	+	+	+	+
Phenol	+	+	+	+
Tannin	+	+	+	+
Flavonoid	+	+	+	+
Sterol	+	+	+	+
Saponin	+	+	_	+
Anthraquinone	+	+	+	+
Quinine	-	-	-	-
Terpenoid	+	+	+	+
Carbohydrate	+	+	+	+

Key: + present,- absent

Table 5. Phytochemical composition of Nutmeg seed (*Myristica fragrans*)

Chemical group	Ethanol extract	Water extract	Butanol extract	n-Hexane extract
Alkaloid	+	+	+	+
Glycoside	+	+	+	+
Phenol	+	+	+	+
Tannin	+	+	+	+
Flavonoid	+	+	+	+
Sterol	+	+	+	+
Saponin	+	+	+	+
Anthraquinone	+	+	+	+
Quinine	+	-	+	+
Terpenoid	+	+	+	+
Carbohydrate	+	+	++	+

Key: + present,- absent

Table 6. Phytochemical composition of Shepherd purse seed (*Capsella bursa-pastoris*)

Chemical group	Ethanol extract	Butanol extract	n-Hexane extract
Alkaloid	-	+	++
Glycoside	-	-	-
Antraquinone	++	+	-
Saponin	+	++	++
Phenol	-	-	-
Tannin	+	++	++
Quinine	-	-	-
Flavonoid	-	-	-
Sterol	++	++	++

Key:++ =abundant,+= present,- =absent

Table 7. Fatty acids content of bay leaves oil samples

Fatty acid (Composite)	Bay leaves oil (%)	Nutmeg oil (%)	Shepherd purse seed oil (%)
Lauricacid (C_{12}:O)	36.61	0.7	5.7
Myristic (C_{14}:O)	1.82	71.2	29.6
Palmitic (C_{16}:O)	17.90	14.8	21.3
Stearic (C_{18}:O)	2.34	1.3	3.5
Oleic (C_{18}:O_1)	5.36	5.5	6.2
Linoleic (C_{18}:O_2)	10.77	1.1	10.1
Linolenic (C_{18}:O_3)	25.20	4.6	17.1

Values are mean of dublicate determinats.

The crude fat (7.5%) values gives an insight to the amount of crude fat present in the leaves which suggest that it contain low fat level compared with other plants. The values of crude protein (2.40%) and carbohydrate (4.46%) are however relatively low. The vitamin content also shows that Bay leaf is rich in vitamin C, A and E which are good antioxidants and can be used to cure scurvy or prevent it (Bayan *et al.,* 2016). Research have shown that high intakes of phenols, Vit. C, Vit. E and carotenoid rich vegetables is associated with decreased incidence of some cancers and cardiovascular diseases. Thus, these spices have the potential of contributing to the nutritional and health needs of their consumers. The result of chemical composition of Nutmeg seed samples shown in table 2below, reveals that nutmeg contains low ash and as such is rich in nutrient.

Nutmeg also contains a moderately high level of crude fibre which suggests that nutmeg can also be helpful in aiding digestion. Nutmeg is low in protein but high level of carbohydrate thus indicate that the sample (nutmeg) is a good source of energy. The result obtained is comparable to that of Agbogidi and Azagbaekwe (2013). Likewise, the nutritive values of shepherd purse seed in table 3 below, it indicates that shepherd purse seed is a good source of energy with its values of fat and carbohydrate (25.0.5% and 32.6%) respectively, while protein (4.6%), fibre (22.5%), moisture (12,5%)and ash contents (4.0%) are relatively low.Its Antioxidant property is twice as potent as Vitamin A and ten times as effective as Vitamin E, thus, It participates in a host of chemical reactions that are believed to prevent carcinogenesis and atherosclerosis (Slattery *et al., 2000*).

In shepherd purse seed, vitamins A,C, and E were detected at the following values 22mg/ml,30mg/ml and 10mg/ml respectively.

Qualitative analysis of bay leaves: The phytochemical tests done showed the different chemical groups that exist in bay leaves from the different solvents used. It showed that bay leaf is rich in alkaloid, flavonoid, tannin, anthraquinone, saponin, steroids, carbohydrate and terpenoids. However,quinone is absent in bay leaves as shown in Table 4 below.

Qualitative analysis of dried nutmeg seed: The phytochemical test carried out on nut meg shows that the ethanolic extract contain alkaloid, flavonoids, tannin, anthraquinones, saponin, steroid, quinone, phenols, glycosides, sterols and carbohydrate while water extract contains all except quinone. The result obtained are comparable to that of Akeem *etal*. (2016) as indicated in table 5 below. Extracts of Shepherd purse seed contains alkaloid, antraquinone, saponin, tannin and sterol as shown in table 6 below. The abundance of these phytochemicals are varied in the solvents used as shown in alkaloids, saponin and tannin whose abundance increased from ethanol to hexane while the abundance of antraquinone decreased from ethanol to hexane, sterol showed approximately equal amount in all solvents. On the other hand, glycoside, phenol, quinine, and flavonoid were absent in the extracts.

The results obtained as indicated in table 7 below, showed that bay leaf had the highest value for lauric acid(36.6%), linoleic acid(10.7%) and linolenic acid (25.2%) compared to other spices studied. However, linoleic acid content (10.77%) is due to transformation of oleic acid into linoleic acid by the oleatede saturase activity which is active during triglycerol biosynthesis (Alaa and Sawsan, 2016). The highest fatty acid content was found in lauric acid (36.61%) while the lowest was found in myristic acid (1.82%). Variation in fatty acid composition in bay leaves may be related to environmental condition during development of fruit and gender factors and this is reflected organoleptic properties of the fat. However, in nutmeg, 99.2% of the total fatty acids are saturated with only 0.8% of unsaturated fatty acids. The fatty acid composition is as follows: lauric acid 0.7%,myristic acid 71.2%, palmitic acid 14.5%, stearic acid 1.3%, oleic acid 5.2%, linoleic acid 1.5% and linolenic 4.6%. For Shepherd purse seed, 93.5% of the total fatty acids are saturated with only 6.5% of unsaturated fatty acids. The fatty acid composition isas follows: lauric acid 5.7%, myristic acid 29.6%, palmitic acid 21.3%, stearic acid 3.5%, oleic acid 6.2%, linoleic acid 10.1% and linolenic 17.1%.

Conclusion and Recommendation

Leaves of the plant laurus, Nutmeg seed and shepherd purse seed were locally sourced from Offa for this study. The result obtained showed that bay leaves and nutmeg are high in fibre while shepherd purse seed is low. Nutmeg seed and shepherd purse seed are also high in fat and carbohydrate hence can serve as a good source of energy. The presence of phytochemicals and fatty acid were also discovered in the plants and bay leaves respectively. This suggests that they can play a non- negotiable role in medicine, pharmacy and food industry.

REFERENCES

Abdulrahim A. 2011. Effects of Bay leaves on the patients with diabetes mellitus, *Research Journal of Medicinal Plant* 5(4): 471-476.

Agbogidi A. E. and Azagbaekwe E. K. 2013. Health and Nutritional Benefits of Nut Meg (*Mysticafragranshoutt*.). *ScientiaAgriculturae*, 1 (2): 40-44.

Akeem S, Joseph J, Kayode R and Kolawole F. 2016. Comparative phytochemical analysis and use of some Nigerian spices. *Croatian Journal of Food Technology, Biotechnology and Nutrition* 11(3-4): 145-151.

Alaa G. A. and Sawsan A M. 2016. The Nutritional Value and Antioxidant Activity of Bay Leaves (*Laurusnobilis L.*) *Bashra.Journal of Veterinary Research*. (15):246-258

AOAC Official methods of analysis of the Association of Official Analytical ChemistsWashington, DC. (2003)

Archana P.,Banala M, Samatha Tand Chamundeswari N, 2012. Preliminary phytochemical screening from leaf and seed extracts of Senna alata L. Roxb-an Ethnomedicinalplant "*International Journal of Pharmaceutical and Biological Research (IJPBR)"*.3 (3): 976-285

Bayan Y., Yilmar M., Onaran A. 2016. Antifungal effect of Bay Laurel (*Laurus nobilis*) and Myrtle (*Myrtuscommunis L.*) Essential oil on chickpea blight (*Acsochyta rabiei*). *Sch. Bull*, 3(12);625-629.

Chmit M. & Kanaan H. 2014. Determination of the Chemical and Genetic Difference of *Laurus* Collected from three different geographic and climatic areas in lebanon, *European Scientific Journal*, 2:412-419.

Chmit M., Hussein K., Jean H., Mustafa A., Ali M., Ali C. 2014. Antibacterial and antibiofilm activities of polysaccharides, essential oil, and fatty oil extracted from *Laurusnobilis* growing in Lebanon. *Asian Pacific Journal of Tropical Medicine*, 7(1):546-552.

Lee B. K., Kim J. H., Jung J. W., Choi J. W., Han E. S., Lee S. H. 2005. Myristicin-induced neurotoxicity in human neuroblastoma SK-N-SH cells. *Toxicol. Lett*. 157:49-56.

Olaleye M. T., Akinmoladun A. C., Akindahunsi A. A. 2006. Antioxidant properties of*Myristicafragrans* (Houtt) and its effect on selected organs of albino rats. *Afr. J. Biotechnol.* 5(13):1274-1278.

Sarifah N., Indira L. P., and Dwi P. S. 2017. Antibacterial Activity of Nutmeg Oil, in 2nd InternationalConference on Sustainable Agriculture and Food Security: A Comprehensive Approach, *KnE Life Sciences*: 563–569.

Sayyah M., Valizadeh J. and Kamalinejad M. 2002. Anticonvulsant activity of the leaf essential oil of *Laurus nobilis* against pentylene tetrazole and maximal electroshock-induced seizures, *Phyto-medicine,* 9(3):212-216.

Slattery M. L., Benson J., Ma K. K., Curtin N., Schaeffer D. and Potter J. D. 2000. "Carotenoids and Colon Cancer," *American Journal of Clinical Nutrition*, (71) : 575-582.

Yashin A., Yashin Y., Xia X and Nemzer B. 2017. Antioxidant activity of spices and their impact on Human Health: A review, *Antioxidants,* 6, 70:1-18

Yilmaz E. S., Timur M. and Aslim B. 2013. Antimicrobial, antioxidant activity of the essential oil of bay Laurel from Hatay, Turkey, *TOEP* 16(1): 108-116.

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