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Lipids profile of bitter melon (*Momordica charantia* L.) fruit and ebony (*Diospyros mespiliformis* Hochst ex A. DC.) tree fruit pulp

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Abstract

There are several underexploited plant seeds or fruits in Nigeria with little information about their chemical composition. To this end a comprehensive study on fatty acid, phospholipids and phytosterols composition of bitter melon (*Momordica charaantia*) fruit and ebony tree (*Diospyros mespiliformis*) fruit pulp were determined using standard analytical techniques. The most concentrated fatty acid (%) was linoleic acid in *Momordica charantia* fruit (45.47) and 44.82 in *Diospyros mespiliformis* fruit pulp. The increasing order of the concentrated fatty acids in *Momordica charantia* fruit were: linolenic acid (2.38) < stearic acid (7.52) < oleic acid (20.18) < palmitic acid (23.64) < linoleic acid (45.47) while that of *Diospyros mespiliformis* fruit pulp were: linolenic acid (5.73) < stearic acid (8.62) < oleic acid (18.95) < palmitic acid (20.88) < linoleic acid (44.82). Arachidonic, arachidic, palmitoleic, margaric, behenic, erucic, lignoceric, myristic, lauric, capric and caprylic acids were present in small quantities with none of them recording up to 1.0% in both of the two samples. The results also showed low concentration of monounsaturated fatty acids (MUFA) (20.41%) in *Momordica charantia* fruit and 19.13% in *Diospyros mespiliformis* fruit pulp, and values of polyunsaturated fatty acid (PUFA) were 2.44 and 5.78% for the two samples, respectively. The respective phospholipids composition showed a highest concentration of phosphatidylcholine in *Momordica charantia* and *Diospyros mespiliformis* (100.31and 88.12 mg/100 g) while lysophosphatidylcholine and phosphatidic acid were the least concentrate values of 12.62 and 14.52 mg/100 g in *Momordicacharantia* and *Diospyros mespiliformis,* respectively. The concentrations of phytosterols were of low values except in sitosterol with values of 153.28 and 119.46 mg/100 g in *Momordica charantia* and *Diospyros mespiliformis,* respectively. This study provides an informative lipid profile that will serve as a basis for further chemical investigations and nutritional evaluation of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp.

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Introduction

Plants with their roots, stems, leaves, flowers, fruits and seeds serve as a primary source of foods, fibres, medicines, shelters and other items used in everyday life by humans (Achinewhu, 1998). A large number of plant species are cultivated worldwide as ornamentals, living fences and firebreaks. They are also cultivated as green manures, fodder for livestock, forage for honey bees, food for humans in agro forestry, soil binders and reforestation (for nitrogen fixation), as pulp for paper production, timber, fuel woods and as sources of chemicals and oils (Aremu *et al.,* 2009). They serve as indispensable constituents of human diet supplying the body with mineral salts, vitamins and certain hormone precursors, in addition to protein and energy (Oyenuga, 1968). Nutritive and calorific values of seeds make them necessary in diets (Odoemelam, 2005; Aremu *et al*., 2010). Plants also represent a major direct source of food for man and livestock, and make a critical contribution to increase food security of subsistence farmers. Apart from inadequate food storage, production, and processing, the demand on food as industrial feed stock by local upcoming industries has

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also posed serious problem of food insecurity in such regions of the world. Over the years, a number of researchers have investigated the potential suitability of plant seed species in serving as replacement for some of these well-known conventional seed oils. A few of these oil-bearing plant seeds have fruits which have been documented for their nutritional importance (Ihekoronye and Ngoddy, 1985).

Recently, interest has been on the search for lesser known underutilized oil bearing seeds that can serve as source of oil to replace or serve as alternative for the well known conventional seed oils in market which are expensive to afford (NRC, 2008). To address this problem of food insecurity there is need to screen the lesser-known plant seeds for their possible use. In this regard, attention has been focused on underutilized local seeds for possible development and use (Aremu *et al.,* 2017).

Momordica charantia L., known as bitter melon, bitter gourd, bitter squash, or balsam-pear, is fast-growing plant in the wild and abandoned in some villages in Nigeria. *Momordica charantia* is an herbaceous, tendril-bearing vine grows up to 5 m in length. It bears simple, alternate leaves 4-12 cm (1.6-4.7 inch) across, with three to seven deeply separated lobes. Each plant bears separate yellow male and female flowers (Ali *et al.,* 2008). The bitter melon fruit has an oblong cucumber-like shape, ranging from 9 to 60 cm long. But in contrast to cucumbers, it has a very warty-looking exterior. Bitter melon is widely cultivated in tropical and subtropical grown in Asia, Africa and the Caribbean for its edible fruit (Lucas *et al*., 2010) (Fig 1). *Diospyros mespiliformis* Hochst ex A. DC. is also known as monkey guava or jackal berry, West Africa ebony. It is an evergreen tree that reaches up to 20 m in height, or up to 45 m in forests with a trunk circumference of more than 5 m. It is characterized by a wide spreading and dense canopy and dark grey bark and it is commonly found in tropical Africa, south of the Sahara. It has a dense evergreen canopy. The bark is black to grey, with a rough texture. The fresh inner skin of the bark is reddish. Leaves are simple, alternate, leathery and dark green. The margin is smooth and new leaves in spring are red, especially in young plants. Flowers are cream-coloured and bell-shaped. The fruit is a fleshy berry, with an enlarged calyx, yellow to orange when ripe. *Diospyros mespiliformis* is dioecious and pollinated by bees. Flowering take place in the rainy season while fruit ripening, which coincides with the dry season takes 6-8 months after flower fertilization. In southern Africa, flowering occurs from October to November and fruiting from April to September (Chivandi *et al.,* 2008) (Fig. 2).

Fig. 1. Dry fruit of bitter melon (*Momordica charantia*)

Fig. 2. Dry fruit pulp of ebony tree (*Diospyros mespiliformis*)

Bitter melon (*Momordica charantia)* is rich in nutrients like thiamine, beta-carotene, folate, riboflavin and minerals like calcium, iron, phosphorus, manganese, potassium, magnesium, zinc and dietary fiber. Regular use of bitter gourd juice boosts body stamina and prevents chronic fatigue. The beta-carotene content in bitter melon helps in controlling eye disorders and enhances eye light (Leatherdale *et al.,* 1981). Bitter melon stimulates a sluggish digestive system and treats dyspepsia. However, since it promotes secretion of acid, it may make an existing ulcerous condition worse. Scientific studies show that fresh juice of bitter melon can lower blood sugar values and keep insulin under check. The hypoglycemic (blood sugar lowering) action is due to the presence of a unique phyto-constituent called *charantia,* insulin like peptides, and alkaloids, all of which act together to improve glucose tolerance without increasing blood insulin levels (Lucas *et al,* 2010; Leatherdale *et al.,* 1981).The leaves, bark and roots of ebony tree (*Diospyros mespiliformis)* contain tannin, which can be used as a styptic to staunch bleeding. The leaves, roots, bark and fruits contain antibiotic qualities and have many medicinal uses in West Africa. Bark and roots are used to treat some infections such as malaria, pneumonia, syphilis, leprosy, dermatomycoses, and to facilitate child birth. Different parts of the plant are used against diarrhea, headache, tooth ache and as a psycho-pharmacological drug (Lucas *et al.*, 2010). The plant is widely used in traditional medicine in parts of Africa, and a number of medically active constituents have been isolated. The principle constituent appears to be plumbagin, which has been shown to have antibiotic, anti-haemorrhagic and fungistatic properties. It is found in the root-bark to a concentration of 0.9% and but a trace in the leaves (Lajubutu *et al.,* 1995). Tannin, saponin and a substance probably identical to scopolamine are also present. There is a high fluoride content. The leaves are astringent, febrifuge, haemostatic, mildly laxative, stimulant and vermifuge, such reliance is placed on this drug-plant that it is usually prescribed alone (TPD, 2018). The specific objective of this paper is to document the data on fatty acids, phospholipids and phytosterols composition of fruit of bitter melon (*Momordica charantia*) and ebony tree (*Diospyrosmespiliformis*) fruit pulp cultivated in north–east Nigeria. This may improve information on food composition table.

Materials and methods

Sample collection

Matured fruits of bitter melon (*Momordica charantia*) and ebony tree (*Diospyrosmespiliformis*) were collected from a Farmer at Zing local government area of Taraba State, Nigeria.

Sample preparation and treatment

Bitter melon (*Momordica charantia*) was prepared by sundried and ground into powder using pestle and mortar, sieved and stored in a well labeled air tight plastic container and taken for analyses. Ebony tree (*Diospyros mespiliformis*) fruit pulp was prepared by removal of the seeds from the ripe fruit, dried in an air-draught oven at 150^{0}C for 6 h. The dried sample of fruit prepared was ground into powder using pestle and mortar, sieved and stored in well labeled air tight plastic container before taken for analyses.

Extraction of oils

A quantity of 5 g each of Oven dried sample of bitter melon (*Momordica charaantia*) fruit and ebony tree (*Diospyros mespiliformis*) fruit pulp was extracted for 5 h in Soxhlet apparatus with 250 ml of petroleum ether (40–60^{0}C boiling range) of analytical grade (British Drug Houses, London). The extraction flask was removed from the heating mantle when it was almost free of petroleum ether, Oven dried at 105^{0}C for 1 h, cooled in a desiccator and used for further analyses (AOAC, 2005).

Fatty acid analysis

The oil extracted from each sample was converted to the methyl ester using the method described by Adeyeye and Adesina (2015); Aremu *et al.* (2017). A 50 mg aliquot of the dried oil was saponified for 5 min at 95^{0}C with 3.4 ml of 0.5 M KOH in dry methanol. The mixture was neutralized by 0.7 M HCl and 3 ml of 14 % boron trifloride in methanol was added. The mixture was heated for 5 min at 90^{0}C to achieve complete methylation. The fatty acid methyl esters were analyzed using a HP gas chromatograph [HP gas chromatograph powered with HP ChemStation rev a09.01 (1206) software (GMI, Inc., Minnesota, USA)] fitted with a flame FID and a computing integrator while nitrogen was used as the carrier gas. The injection port and the detector were maintained at 310°C and 350°C, respectively while the column initial temperature was 250°C rising at 5°C/min to a final temperature of 310°C. A polar (HP INNO Wax) capillary column (30 m × 0.53 mm × 0.25 μm) was used to separate the esters. The peaks were identified by comparison with standard fatty acid methyl esters obtained from Sigma Chemical Co. (St. Louis MO, USA) (Aremu *et al.*, 2016). However, the quantitative evaluation was carried out on the base of gas chromatography peak areas of the different methyl esters. The heptadecanoic ester was used to calculate the response factor for fatty acids which was found to be 0.96. Three determinations were made for each sample.

Phospholipid analysis

The phospholipids content of bitter melon (*Momordica charantia*) fruit and ebony tree (*Diospyros mespiliformis*) fruit pulp oils was determined by gas chromatography (GC) as it was earlier described by Aremu *et al.* (2017). 0.01 g of the extracted fats was added to the test tube. To ensure complete dryness of the oil for phospholipids analysis, the solvent was completely removed by passing the stream of the nitrogen gas on the oil. 0.04 mL of chloroform was added to the content of the tube and it was followed by the addition of 0.10 mL of chromogenic solution. The content of the tube was heated at a temperature of 100°C in a water bath for about 1 min. The content was allowed to cool, 5 mL of the hexane was added and the tube with its content shook gently several times. The solvent and the aqueous layers were recovered and allowed to be separated. The hexane layer was recovered and allowed to be concentrated to 1.0 mL for gas chromatography using flame photometric detector. The conditions for phospholipid analysis include H.P 5890 powered with HP ChemStation REV. A 09.01 (1206) and split injection ratio of 20:1; nitrogen as carrier gas; inlet temperature, 250°C; column type, HP5; column dimension: 30 m ×0.25 mm × 0.25 µm; oven program: Initial temperature at 50°C; first ramping at 10°C/min for 20 min, maintained for 4 min while second ramping at 15°C/min for 4 min, maintained for 5 min. Detector: PFPD Detector temperature was 300°C; hydrogen pressure, 20 psi; compressor air: 35 psi (Aremu *et al.*, 2017).

Phytosterol analysis

The phytosterol analysi was done as described by AOAC (2005) supported by Aremu *et al.* (2017). The aliquots of the extracted fat were added to the screw – capped test tubes. The samples were saponified at 90°C for 30 min, using 3 ml of 10% KOH in ethanol, to which 0.20 mL of benzene had been added to ensure miscibility. Deionized water (3 mL) was added and 2 mL of hexane was added in extracting the non – saponifiable materials. Three different extractions, each with 2 mL of hexane were carried out for 1 h, 30 min and 30 min, respectively. The hexane was concentrated to 1 mL in the vial for gas chromatography analysis and 1 µL was injected into the injection pot of GC. The GC conditions of analyses were similar to the GC conditions for methyl esters analyses (Aremu *et al.*, 2016).

Results and discussion

The fatty acid composition (%) of bitter melon (*Momordica charantia*) fruit and ebony tree (*Diospyros mespiliformis*) fruit pulp are shown in Table I. The results showed that linoleic acid (C18:2) and palmitic acid (C16:0) formed the first and second most abundant fatty acids in *Momordica charantia* fruit whereas in the case of *Diospyros mespiliformis* fruit pulp the values are lower. This is in agreement with the report of Grosso *et al*. (1997) that oleic (C16:0) which is third in concentration in Table I. in both samples are the major fatty acids in many plant seeds such as peanut, soybean and chide pea. Oleic acid has been regarded as monounsaturated fatty acid and has been shown to decrease cholesterol concentrations which affect positively cardiovascular disease risk (Kris-etherton *et al.,* 1999). It is increasingly recognized that an insufficient intake of omega-6 acid such as linoleic causes growth retardation in children, heart attack risk and skin ailments (Baird *et al*., 2005). It has been reported that many lipids contain substantial amounts of saturated fatty acids especially palmitic acid (Aremu *et al.*, 2007). Stearic acid (C18:0) (7.52 and 8.62%) takes the fourth position in both samples of *Momordica charantia* and *Diospyros mespiliformis*. Lignoceric, behenic, arachidic, arachidonic, margaric, erucic, myristic, lauric, capric, caprylic and butyric acids contained some fatty acids content which is less than 1%.

The fatty acid distribution according to saturation and unsaturation was shown in Table I. The total saturated fatty acids (TSFA) were 31.69 and 30.28% for *Momordica charantia* and *Diospyrosmespiliformis*, these values are greater than TSFA values of 28.15 and 24.05% reported for *Albizia lebbeck* and *Caesalpinia pulcherrima* fruits, respectively (Chivandi *et al.,* 2008). However, the respective values recorded for the total unsaturated fatty acid (TUFA) were 68.31 and 69.72% for *Momordica charantia* and *Diospyros mespiliformis*as shown in Table I. They are higher than that of *Albizia lebbeck* and *Caesalpinia pulcherrima* fruits with values of 54.00 and 56.20%, respectively (Chivandi *et al.,* 2008). Total unsaturated fatty acid (TUFA) in this study is of good concern because report has shown that fats and oils with high unsaturation are particularly susceptible to oxidation and intakes of food containing oxidized lipid increase the concentration of secondary proxidation products in liver (Hegested *et al.,* 1993). However, high amount of the total unsaturated fatty acid (TUFA) makes *Momordica charantia and Diospyros mespiliformis* as a special fruit for nutritional applications. These findings imply that *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp are good in the supply of essential fatty acids. Linoleic and alpha-linolenic acids called omega-6-and omega-3-fatty acid, respectively are the most important essential fatty acids required for growth, physiological functions and body maintenance (Salunkhe *et al.,* 1985; Aremu *et al.,* 2017). These two fatty acids work together in competitive balance to regulate blood clotting, immune response and inflammatory processes. Deficiency of linoleic acid leads to dry hair or hair loose and poor wound healing (Cunnane and Anderson, 1997). It also leads to poor growth, fatty liver, skin lesion and reproductive failure. It has been reported that linoleic acid plays a role in lowering the risk of cardiovascular disease. It has also been found that the intake of linoleic acid in the diet protects against fatal schemic heart disease (Aremu *et al.,* 2017). *Diospyros mespiliformis* had the highest TEFA (50.55%) content. The oleic/linoleic (O/L) level is 0.44 in *Momordica charantia* fruit and 0.40 in *Diospyros mespiliformis* fruit pulp. Monounsaturated fatty acid (MUFA) values were 20.41 and 19.13% in *Momordica charantia* fruit and *Diospyros*

Table I. Fatty acids composition of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp and distribution into the degree of saturation and unsaturation of the component

Fatty acid	*Momordica charantia*	*Diospyros mespiliformis*
Caprylic acid (C8:0)	0.000	0.000
Capric acid (C4:0)	0.000	0.000
Lauric acid (C12:0)	0.000	0.000
Myristic acid (C14:0)	0.000	0.000
Palmitic acid (C16:0)	23.64	20.88
Palmitoleic acid (C16:1)	0.11	0.09
Margaric acid (C17:0)	0.01	0.01
Stearic acid (C18:0)	7.52	8.62
Oleic acid (C18:1)	20.18	18.95
Linoleic acid (C18:2)	45.47	44.82
Linolenic acid (C18:3)	2.38	5.73
Arachidic acid (C20:0)	0.22	0.53
Arachidonic acid (20:4)	0.06	0.04
Behenic acid (22:0)	0.09	0.07
Erucic acid (C22:1)	0.12	0.09
Lignoceric acid (C24:0)	0.22	0.17
TSFA	31.69	30.28
TSFA (%)	31.69	30.28
MUFA	20.41	19.13
DUFA	45.47	44.82
PUFA	2.44	5.78
TUFA	68.31	69.72
TUFA (%)	68.31	68.31
TEFA	47.85	50.55
TNEFA	52.15	49.45
O/L	0.44	0.44

TSFA = Total saturated fatty acid, MUFA = Monounsaturated fatty acid, DUFA= Diunsaturated fatty acid, PUFA = Polyunsaturated fatty acid, TUFA = Total unsaturated fatty acid, TEFA = Total essential fatty acid, TNEFA = Total nonessential fatty acid, O/L= Oleic/ Linoleic ratio

mespiliformis fruit pulp, respectively while polyunsaturated fatty acid (PUFA) values were 2.44 and 5.78%. Diunsaturated fatty acid (DUFA) values for both the samples were 45.47 and 44.81%. Linoleic acid constituted the DUFA while total nonessential fatty acid (TNEFA) gave 52.15 and 49.51% for *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp, respectively.

The phospholipids content of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp is presented in Table II. From the result phosphatidylcholine showed greater concentrations in *Momordica charantia* fruit (100.31 mg/100 g) and *Diospyros mespiliformis* fruit pulp (88.12 mg/100 g). Phosphatidylserine came second with values of 69.37 and 50.14 mg/100 g for both *Momordica charantia* and *Diospyros mespiliformis*. Phosphatidylinsitol in the case of

Table II. Phospholipids composition (mg/100 g) of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp

Phospholipids	*Momordica charantia*	*Diospyros mespiliformis*
Phosphatidylethanolamine	22.57	16.02
Phosphatidylcholine	100.31	88.12
Phosphatidylserine	69.37	50.14
Lysophoshatidylcholine	12.62	20.54
Phosphatidylinsitol	40.77	17.10
Phosphatidic acid	20.68	14.52

Momordica charantia followed phosphatidylserine with the value (40.77 mg/100 g) but it was lysophosphatidylcholine (20.54 mg/100 g)in *Diospyros mespiliformis* (Table II). The fourth and fifth most concentrated phospholipids in *Momordica charantia* were phosphatidylethanolamine and phosphatidic acid with concentrations of 22.57 and 20.68 mg/100 g while fourth and fifth most concentrated phospholipids in *Diospyros mespiliformis* were phosphatidylinsitol and phosphatidylethanolamine whoseconcentrated values were 18.00 and 16.02 mg/100 g. Lysophosphatidylcholine and phosphatidic acid were the least concentrated values of 12.62 and 14.52 mg/100 g in *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp, respectively. Contrary to report of Wirtz (1991) that phosphatidylethanolamine is usually the most abundant phospholipids in animals and plants, often amounting to almost 50% of the total phospholipids, and as such they are building block of membrane bilayer and being the reason researchers have recommended daily supplementation of phosphatidylcholine as a way of improving brain functioning memory capacity (Chung *et al.,* 1995). Therefore, consumption of any of these samples in the present study may not require supplementation of phosphatidylcholine because of sufficient concentration of this phospholipid. The US Food and Drug Administration (USFDA) has reported that consumption of phosphatidylserine may reduce the rate of dementia and cognitive dysfunction in the elderly people and in young people it reduces mental stress and increases mental accuracy and stress resistance (Wang and Jones, 2004). Phosphatidylserine supplementation promotes a desirable hormonal balance for athletes and might reduce the physiological deterioration that accompanies over training and /or overstretching (Starks *et al.,* 2008). Phosphatidic acid mediates cellular functions through different modes of action, such as membrane tethering, modulation of enzymatic activities and structural effects on cell membranes. The regulatory processes in which phosphatidic acid plays a role include; signaling pathways in cell growth, proliferation, reproduction and responses to hormones in biotic and abiotic stress (Wang and Jones, 2004). Therefore, consumption of these plant fruits particularly *Momordica charantia* may participate well in these functions. From the result *Momordica charantia* fruit has more total concentrated value of phospholipids than *Diospyros mespiliformis* fruit pulp, consequently *Momordica charantia* fruit can be regarded as a better source of phospholipids as compared to *Diospyros mespiliformis* fruit pulp.

The compositions of phytosterols in *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp are displayed in Table III. in which sitosterol in both samples carried the highest concentrations (153.28 and 119.46 mg/100 g) followed by campesterol (17.80 and 9.62 mg/100 g) in *Momordica charanta* fruit and *Diospyros mespiliformis* fruit pulp. The third and fourth most concentrated phytosterols in *Momordica charantia* were 5–avenasterol and cholesterol with values of 0.83 and 0.79 mg/100g while that of *Diospyros mespiliformis* were cholesterol and stig-masterol (0.73 and 6.000 mg/100 g). The values for stig-masterol, cholestanol and ergosterol in *Momordica charantia* were 4.133, 1.75 x 10^{-6} and 1.71 x 10^{-6} mg/100 g while cholestanol, ergosterol and 5avenasterol in *Diospyros mespiliformis* were 2.92 x 10^{-6}, 1.78 x 10^{-6} and 1.15 mg/100 g. The result showed that *Momordica charantia* fruit can be regarded as a better source of phytosterols when compared with *Diospyros mespiliformis* fruit pulp. Phytosterols are natural components of plant origin forming cell membrane and occur in small quantities in many fruits, cereals, legumes and other plants. Plant phytosterols have also been described as anti-inflammatory and anti-cancer compound (Rao and Koratkar, 1997) while daily intake of phytosterols helps to prevent heart disease by lowering high density lipoprotein cholesterol levels by as

Table III. Phytosterols composition (mg/100 g) of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp

Sterols	*Momordica charantia*	*Diospyros mespiliformis*
Cholesterol	0.79	0.74
Cholestanol	1.75 x 10^{-6}	2.92 x 10^{-6}
Ergosterol	1.71 x 10^{-6}	1.78 x 10^{-6}
Campesterol	17.80	9.62
Stigmasterol	4.13	6.00
Savenasterol	0.83	1.15
Sitosterol	153.28	119.46

much as 14% (Normen *et al*., 2005). Systematic reviews studying the efficacy of phytosterols have shown that phytosterols enriched foods can significantly lower low density lipoprotein cholesterol (Law, 2000). Phytosterols have been found useful in treating other conditions, including rheumatoid arthritis, but their widest application is in protecting the heart. However, reports also suggest that excessive intake of dietary phytosterols and stanols in plasma and tissues may contribute to an increase in blood pressure (Chen *et al.,* 2010).Through competition of phytosterols with cholesterol absorption and uptake in the small intestine, the supply of cholesterol reduction as a result of uptake of phytosterols in turn reduces the risk of heart disease (coronary heart disease) since high blood total cholesterol and low-density lipoprotein (LDL) cholesterol levels are the main risk factors for coronary heart disease (Aremu *et al.,* 2016)

Conclusion

The present work has focused on the lipid composition of *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp. The work revealed that the fruit and fruit pulp contained high proportion of unsaturated fatty acids and significant contents of phospholipids and phytosterols. This study further reveals that *Momordica charantia* fruit has high lipid content compared to *Diospyros mespiliformis* fruit pulp and therefore could be exploited as a natural source of relevant lipid content. *Momordica charantia* fruit was rich in unsaturated fatty acids with potential beneficial therapeutic activities. This study provides an informative lipid profile that will serve as a basis for further chemical investigations and nutritional evaluation of the *Momordica charantia* fruit and *Diospyros mespiliformis* fruit pulp.

Conflict of Interest

Authors have declared that there are no conflicts of interest in the study.

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