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Phytochemical Analysis of Medicinal Plants Used in the Treatment of Malaria Infection in Billiri and Funakaye Local Government Areas of Gombe State

Daniel J. L. [1]*, Vandi P.[2], Chessed, G.[2], Umar, M.[1] and Yusuf, A. I.[1]

[1]Department of Science Laboratory Technology, Gombe State Polytechnic, P.M.B. 0190, Bajoga, Gombe State

[2]Department of Zoology, School of Life Sciences, Modibbo Adama University of Technology, P.M.B. 2076, Yola, Nigeria.

Corresponding Author: joicedaniellawiye@gspb.edu.ng

ABSTRACT

The survey research was carried out to identify the plants used in the treatment of malaria fever in Funakaye and Billiri Local Government Areas of Gombe state, Nigeria. Traditional healers and elderly people of these areas were visited and interviewed on medicinal plants used by them. A semi structured questionnaire and open ended conversation was employed. The interview and discussions was conducted in Hausa language being a common language used by the people in the study areas. Several trips was made to the sites where they usually go to harvest the plants. Data on the common names of the plants and parts used was recorded on the field. Plants names were identified using a field key to the Savannah trees of Nigeria. A total of nine (9) plants were identified based on the usage, availability and acceptability in these wards. *Carica papaya* (Paw paw/Gwanda) and *Khaya grandifoliola* (Mahogany/Madachi) was common to the locals in Billiri Local government area, while the other plants are common in both local governments areas. All plant samples were air dried at room temperature for three weeks after which, they were taken to an electric grinding machine where the engine was properly washed and dried to avoid contamination. The plant samples were grounded to the required texture. Phytochemical analysis using aqueous and ethanol extractions revealed the presence of tannins, alkaloids, saponins glycosides, terpenoids, flavonoids, steroids and phenols in various quantity. These medicinal plants are common and qualitative analysis showed that they contained properties which has antimicrobial effects.

Keywords: Phytochemical, medicinal plants, Billiri, Funakaye, Qualitative, Quantitative

INTRODUCTION

The various types of plants used in herbalism which possess medicinal activities are called medicinal plants. These medicinal plants are considered as a rich resources of ingredients which can be used in drug development and synthesis. These plants play a critical role in the development of human cultures around the whole world (Shankar *et al*., 2016). Medicinal plants represent the most ancient form of medication, used for thousands of years in traditional medicine in many countries around the world. The empirical knowledge about their beneficial effects was transmitted over the centuries within human communities (Khan, 2014).

Traditional medicinal plants were for long established in African countries to be effective in curing malaria (Dike et al. 2012). According to Dike *et al*. (2012), ethnobotanical study is the major foundation for the development and selection of medicinal plants for therapeutic purpose. Many developing countries utilize plants as the major sources of therapeutic agent for the treatment of various ailment (Abdulrahman *et al*., 2018). As reported by the

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World Health Organization [WHO] 2001, more than 70% of the world population relied on traditional herbal medicine and Nigeria is inclusive (Abdulrahman *et al.* 2018).

It has been established that the abundant plant diversity of Nigeria will provide a promising novel compound of antimalaria agent if explored. Though, quite a number of studies have been carried out in the southern, and also by Mahmoud *et al.* (2020) in Mubi, Adamawa State. But not much similar studies have been embarked upon in these local government areas of Gombe State, considering the differences in the plants cover. This study was aimed at documenting the important medicinal plants used in the treatment of malaria infection in these parts of Gombe State of Northeast Nigeria through quantitative and qualitative ethnobotanical data sampling

MATERIALS AND METHODS

The Study Area

The survey research was carried out in Funakaye and Billiri Local Government Areas of Gombe State, Nigeria. The area has a tropical climate being marked by dry and rainy season. The rainy season starts late May and ends mid-October. August and September are the wettest months with about 25% of the total annual rainfall. The dry season begins in late October and ends in April.

Survey

Traditional healers and elderly people of these areas were visited and interviewed on medicinal plants used by them. A semi structured questionnaire and open ended conversation was employed. The interview and discussions was conducted in Hausa language being a common language used by the people in the study areas. Several trips was made to the sites where they usually go to harvest the plants. Data on the common names of the plants and parts used was recorded on the field.

Identification of Plant Species

Plants names were identified using a field key to the Savannah trees of Nigeria (Stanfield and Hopkins 1996). Herbarium press was prepared for plants that could not be identified on the field and the press was taken to Department of Plant Science, Modibbo Adama University, Yola for proper identification by a plant taxonomist.

Phytochemical Screening

All plant samples were air dried at room temperature for three weeks after which, they were taken to an electric grinding machine where the engine was properly washed and dried to avoid contamination. The plant samples were grounded to the required texture.

Quantitative Analysis

For aqueous extraction, the weighing balance was zeroed and the filter papers was placed on the weighting balance, a quantity 0.5 g of the sample was weighed and poured into a reagent bottle. 10 ml of distilled water was added to soak and facilitate extraction. After some minutes, proper filtration was carried out using filter paper after which the filtrate was tested with several reagents to determine the presence and quantity of tannins, alkaloids, saponins glycosides, terpenoids, flavonoids, steroids and phenols. For ethanol extraction, the weighing balance was zeroed and the filter paper was place on weighting balance. The sample was weighed 0.5 g into 250 ml beaker; 100 ml of 10 % acetic acid in ethanol was added to the sample and covered. The extraction was done in closed system for proper extraction.

Test for Tannin

This was based on utilization of standard conventional protocols as illustrated by Harborne (1998). A quantity, 0.5 g of sample was weighed out and stirred with 10 ml of distilled water and then filtered. To the 2 ml of filtrate measure out in the test tube, few drop of

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1% ferric chloride solution was added formation of blue green precipitate was confirmed indicating the presence of tannins.

Test for Alkaloids

The method of Trease and Evans (1989) was adopted in testing for alkaloids in the plant samples. A quantity of 0.5 g of sample was dissolved in hydrochloric acid and filtered using filter paper to the 2 ml of filtrated was treated with dragendroff's reagent (solution of potassium Bismuth iodide) formation of red precipitate confirmed indicating the presence of alkaloid the test is called dragendroff's test. To 2 ml of filtrates was treated with Hager's reagent, formation of yellow colour confirmed the presence of alkaloid.

Test for Saponins

The method of Harborne (1998) was adopted in testing for saponins in the plant samples. A quantity of 0.5 g of sample was boiled with 50 ml of distilled water and filtered. To 5 ml of each filtrate, 3 ml of distilled water was added and shaken vigorously for about 5 minutes, formation of frothing was confirmed showing the presence of saponins.

Test for Glycosides

The method of Sofowora (1993) was adopted in testing for glycosides in plant samples. A quantity of 0.5 g of sample was dissolved in ethanol for about 10 minutes for proper extraction and filtered. To 5 ml of each filtrate, 0.3 ml of Fehlings solution A and B was added until it turn to alkaline indicating the presence of glycoside.

Test for Terpenoids

The method of Sofowora (1993) was adopted in testing for terpenoids in the plant samples. A quantity of 0.5 g of sample was dissolved in ethanol for about 10 minutes for proper extraction and filtered. To 5 ml of each filtrate was added 1 ml of acetic anhydride followed by addition concentrated H_2SO_4. A change in colour from pink to violet showed presence of terpenoid.

Test for Flavonoids

The method of Trease and Evans (1989) was adopted in testing for flavonoids in the plant samples. A quantity, 0.5 g of the sample dissolve in distilled water and filtered to 5 ml of filtration, 3 ml of lead ethanoate solution was added. Appearance of pale yellow-brown (buff-coloured) confirmed the presence of flavonoid.

Test for Steroids

The method of Trease and Evans (1989) was adopted in testing for steroids in the plant samples. A quantity of 0.5 g of the sample dissolved in distilled water and filtered to 4 ml of the filtrate, 2 ml of acetic acid was added and allowed the solution to cool well in refrigerator followed by the addition of concentrated H_2SO_4 carefully. Colour change from violet to bluish green indicated the presence of steroidal ring.

Test for Phenol

The method of Trease and Evans (1989) was adopted in testing for phenol in the plant samples. A quantity of 0.5 g of the sample was boiled with 15 ml of distilled water and filtered. To 2 ml of the filtrate, few drops of 10% ferric chloride solution was then added. Formation of violet colour confirmed the presence of phenolic hydroxyl group.

Quantitative Analysis

Determination of Alkaloids

A quantity, 1.0 g of the powdered sample was weighed using electric weighing balance into a 250 ml beaker and 100ml of 10% acetic acid in ethanol. The mixture was allowed to stand for four hours for proper extraction to take place. The sample was filtered with filter paper and the extract was concentrated on a water bath to one quarter of the original volume. A volume, 20ml of ammonium hydroxide (NH_4OH) was

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added drop wisely to form precipitate of the alkaloid in the filtrate. The filtrate was weighed with the NH_4OH and filtered. After filtering, the filter paper and the precipitate was dried in an oven at 40 ^{0}C and weighed. The alkaloid content was determined using the following formula.

$$\text{Concentration of Alkaloid} = \frac{w2-w1}{w3}$$

Where,

W1 = weight of empty filter paper
W2 = weight of the alkaloid and filter paper,
W3 = weight of sample used

Determinations of Saponins

A quantity, 1.0g of the powdered sample was weighed using electric weighing balance into a 250 ml beaker and soaked with 100 ml of 20 % ethanol for three (3) minutes and heated for three (3) hours at 55 ^{0}C for proper extraction then filtered. The residue was re-extracted with another 100 ml of 20% ethanol. The two extracts was combined and heated to 40 ml at 90 ^{0}C on a water bath. The concentrate was transferred into a 500 ml separating funnel and 20ml of diethylether was added and shaken vigorously, the upper layer was discarded. The purification process was repeated and 60ml of n-batanol was added, the lower layer was discarded while the upper layer was collected. The combined n-butanol extract was washed with 10ml of 5% aqueous NaCI and the lower layer was discarded while the upper layer was collected in a weighed beaker and heated to dryness. The beaker was allowed to cool in a desiccators and re-weighed. The saponin content was determined using the following formula.

$$\text{Concentration of saponin} = \frac{w2-w1}{w3}$$

Where W1 = weight of empty beaker
W2 = weight of beaker + sample heating
W3 = weight of sample used

Determination of Tannins

A quantity, 1.0 g of the sample powder was weighed into a plastic bottle and 50ml of distilled water was added and shaken for 3 hours in a vibrator. The sample was filtered into a 50ml volumetric flask and made up to mark. A volume, 5ml of the filtrate was dispensed into a test tube and mixed with 2 ml of 0.1M $FeCI_2$ in 0.1NHCI and 0.008 M potassium ferrocyanide, the absorbance was measured at 720nm for 10 minutes. The tannin concentration was determined using the following relation

$$\text{Concentration of tannin} = \frac{Abs\ x\ D.F}{1000\ X\ weight\ of\ sample\ used}$$

Where, Abs = value of absorbance read, D.F = dilution factor

Determination of Flavonoids

A quantity, 1.0g of the powdered sample was repeatedly extracted with 100 ml of 80% aqueous methanol at room temperature. The solution was shaken for 30 minutes and filtrate was transferred into a weighed beaker and evaporated to dryness over a water bath and weighed again. The time for the first extraction was 1 hour, 45minutes for the second extraction and 30 minutes for the third extraction. Flavonoid was determined using the following formula.

$$\text{Concentration of flavonoid} = \frac{w2-w1}{w3}$$

Where, W1 = weight of empty beaker.

W2 = weight of beaker + sample after drying

W3 = weight of sample used

Determination of Steroids

A quantity, 1.0 g of the powdered sample was dispersed in 100ml of distilled water into a conical flask, the mixture was shaken for 3 hours and allowed to stand overnight. It was

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then filtered and the filtrate was eluted with 10ml normal ammonium hydroxide solution. A volume, 2ml of the elute was put into a test tube and mixed with 2 ml of chloroform and 3ml acetic hydride added to the mixture, followed by 2ml of concentrated H_2SO4 drop wisely. The absorbance was measured in a spectrophotometer at 420 cm. The steroid concentration will be determined using the following relationship.

$$\text{Concentration of steroids} = \frac{Abs\ x\ path\ length}{1000\ X\ weight\ of\ sample\ used}$$

Determination of Terpenoid

A quantity, 0.1g of the extract was weighed out separately, macerated with 20 ml of ethanol and filtered through Whatman No.1 filter paper. The filtrates (1 ml) was pipette out and 1 ml of 5% phosphomolybdic acid solution was added and shaken. Gradually 1 ml of concentrated H_2SO_4 was added to each. The mixtures was left to stand for 30 minutes. A volume, 2 ml of ethanol was added and absorbance was measured at 700 nm.

$$\text{Concentration of terpenoid} = \frac{Abs\ x\ path\ length}{1000\ X\ weight\ of\ sample\ used}$$

RESULTS

From the respondents in various wards (five wards per local government area) on the medicinal plants used in the treatments of malaria parasites; either in combination with other plants or those that can be used alone. A total of nine (9) plants were identified based on the usage, availability and acceptability in these wards. *Carica papaya* (paw paw) and *Khaya grandifoliola* (Mahogany) was common to the locals in Billiri Local government area, while the other plants are common in both local governments areas (Table 2).

The qualitative analysis of these plants using both aqueous and ethanolic extract showed that they contained the various essential oils which are responsible for their usage in the treatment of malaria parasites. The analysis revealed that same essential oils was found in both aqueous and ethanolic extracts when *A. indica* was analysed, but the qualitative analysis of the other plants revealed the presence of different essential oils when they were subjected to aqueous and ethanolic extract (Table 3)

Six (6) plants were identified by the locals that can be used alone for the treatments of malaria parasites, which are readily available in their surroundings (Table 4). On these six (6) plants; a quantitative analysis was carried out using ethanolic extract to determine the quantity of these active ingredients in them. Phenol, glycosides and saponins were found to be in high contents in *A.indica, A. digitata* and *K. grandifoliola* (Table 5).

DOI: 10.56892/bima.v8i1.635

Table 1: Coordinates of the wards in the study areas

Billiri Local Government Area	Coordinates	Funankaye local government area	Coordinates
Banganje South	9°51′59.55″N 11°09′21.68″E	Ashaka/Magaba	10°53′17.35″N 11°29′27.11″E
Banganje North	9°54′12.33″N 11°05′36.85″E	Jillahi	10°46′26.31″N 11°23′55.57″E
Todi	9°45′59.65″N 11°08′15.77″E	Bodor/Tilde	10°45′15.90″N 11°16′8.12″E
Kalmia	9°55′37.38″N 11°07′44.52″E	Bajoga east	10°51′20.48″N 11°26′28.30″E
Bare	9°53′21.77″N 11°13′50.25″E	Bajoga west	10°50′50.34″N 11°25′5.71″E

Table 2: Medicinal plants used in combination for malaria treatment in the study areas

Plants	Family name	Local names	Common names	Area
Azadirachta indica A. Juss	Meliaceae	Dogonyaro	Neem	Billiri and Funankaye
Carica papaya Linn.	Caricaceae	Gwanda	Pawpaw	Billiri
Citrus aurantium Linn.	Rutaceae	Lemutsami	Sour lime	Billiri and Funankaye
Magnifera indica Linn.	Anacardiaceae	Mangoro	Mango	Billiri and Funankaye
Khaya grandifoliola C.DC.	Meliaceae	Madachi	Mahogany	Billiri
Psidium guajava Linn.	Myrtaceae	Gwaba	Guava	Billiri and Funankaye
Cymbopogon citratus	*Poaceae*	Lemutsami Ciyawa	Lemon grass	Billiri and Funankaye
Tamarindus indica Linn	Caesalpiniodae	Tsamia	Tamarin	Billiri and Funankaye
Adansonia digitata Linn	Malvaceae	Kuka	Baobab	Billiri and Funankaye

Table 3: Qualitative analysis of medicinal plants used for malaria treatment in the study areas

Plants	*A. digitata*		*A. indica*		*C. papaya*		*C. aurantium*		*C. citratus*		*K. grandifoliola*		*M. indica*		*P. guajava*		*T. indica*	
	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth	Aq	Eth
Phenol	+	+	+	+	-	-	-	-	-	+	-	-	-	+	-	+	+	+
Tannins	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Glycosides	-	+	-	-	-	-	-	-	+	+	+	-	-	-	+	-	+	+
Alkaloides	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
Saponins	+	+	+	+	+	-	+	-	-	-	+	+	-	-	-	-	-	+
Steroids	-	-	+	+	-	+	-	+	-	-	-	-	+	+	+	+	-	-
Flavonoids	+	+	+	+	+	+	-	+	+	+	-	+	+	+	-	-	+	+
terpenoid	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	+	-	-

Key: Aq=Aqueous; Eth= Ethanol; +=present; - = absent

DOI: 10.56892/bima.v8i1.635

Table 4: Medicinal plants used alone for malaria treatment in the study areas

Plants	Family name	Local names	Common names	Parts used
Adansonia digitata Linn	Malvaceae	Kuka	Baobab	Leaves
Azadirachta indica A. Juss	Meliaceae	Dogonyaro	Neem	Bark, leaves
Carica papaya Linn.	Caricaceae	Gwanda	Pawpaw	Leaves, fruits
Khaya grandifoliola C.DC.	Meliaceae	Madachi	Mahogany	Bark
Magnifera indica Linn.	Anacardiaceae	Mangoro	Mango	Bark, leaves
Psidium guajava Linn.	Myrtaceae	Gwaba	Guava	Bark, leaves

Table 5: Quantitative analysis of medicinal plants used alone for malaria treatment in the study areas

Plants	Phenol	Tannins	Glycosides	Alkaloides	Saponins	Steroids	Flavonoids	Terpenoid
Adansonia digitata	0.33±0.03	2.16±0.11	-	1.74±0.46	2.56±0.33	-	0.44±0.03	-
Azadirachta indica	2.48±0.41	1.50±0.34	0.14±0.03	0.24±0.07	2.53±0.12	-	1.28±0.15	1.37±0.17
Carica papaya	0.13±0.06	-	-	0.25±0.03	0.13±0.03	0.21±0.02	0.37±0.05	-
Khaya grandifoliola	-	0.70±0.18	0.32±0.11	1.19±0.17	2.26±0.27	-	0.15±0.04	-
Magnifera indica	-	1.12±0.11	-	1.55±0.22	-	0.40±0.17	0.99±0.13	-
Psidium guajava	0.47±0.04	0.51±0.02	0.13±0.02	0.28±0.02	-	0.28±0.05	-	0.09±0.02

DISCUSSION

The array of common medicinal plants used for malaria therapy in the study areas of the present study showed some similarity with those reported by Kunle *et al.* (2013) in Rukuba, Bassa Local Government Area of Plateau State, and in other parts of Nigeria (Adebayo and Krettli, 2011). The most frequently used plants used included plants like *Azadirachta indica* A Juss, *Carica papaya* L. and *Khaya grandifoliola* C.D.C. More than 60% of the plants corresponded with those also reported for malaria ethno-therapy in Ogun State (Idowu *et al.*, 2010), and in Ondo State (Odugbemi *et al.*, 2007), the slight differences could be due to the differences in these regions.

Qualitative analysis

The phytochemical screening assay of *Adansonia digitata* (baobab) was conducted, the group recorded in the present study was similar when compared with the report of Abebe *et al.* (2023) who found flavonoids and saponins as part of the phytochemical groups detected. Flavonoids and saponins, are important phytochemical constituents with high antioxidant properties and many other therapeutic uses, they are also known for their antimicrobial properties (Tembo *et al.,* 2017; Baky *et al.,* 2021). Alkaloids and saponins were recorded in the presents study; Alkaloids have a wide range of pharmacological activities (including antimalarial and antibacterial) (Zahra'u, *et al.,* 2014; Zhabinskii *et al.,* 2015). Saponins have antimicrobial and immune-stimulating properties (Drewnowski and Gomez-Carneros, 2000; Barbehenn and Constabel, 2011)

A. indica phytochemical analysis bears similarities to what was obtained by Dash *et al.* (2017), in their analysis of neem leaf aqueous extracts, where it was reported that; saponins occurred the most, tannins and glycoside are moderate while alkaloid and flavonoids are low. In the analysis of their methanolic extract however, Saponin was very low while glycoside was present in highest concentration. A different report was recorded by Itelima *et al.* (2016) who observed that much of the protective effects of herbal plants have been attributed to their

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phytochemicals constituents. Alkaloids, flavonoids, glycosides, saponins for examples exert multiple biological effects like antimicrobial activity (Singh and Chauhan, 2014),

The results of phytochemical screening of *C. papaya* in the present study revealed the presence of alkaloids, flavonoids, saponins and steroids. These metabolites have been reported to possess antimicrobial activity (Cowan, 1999). In particular the flavonoids were reported to be responsible for antimicrobial activity associated with some ethnomedicinal plants (Singh and Bhat, 2003). Also, Olanitola *et al.* (2018) reported that among the alkaloid, tannin, phenol, flavonoid and glycosides phytochemicals contained in *C. papaya;* Alkaloids are the most important secondary metabolites and have a therapeutic potential of curing diseases

The phytochemical studies of *K. grandifoliola* in the present studies revealed the presence of alkaloids, tanins, and glycosides. This corroborate the previous studies done by Oyeleke *et al.* (2008) and Omonkhelin *et al*. (2009). The antimicrobial activity of this plant may be due to the presence of alkaloids (Ebana *et al.,* 1991; Oyeleke *et al*., 2008) and flavonoids (Alan and Miller, 1996). More so, pure isolated alkaloids and their synthetic derivatives have been used as analgesic (Okwu and Okwu, 2004). Flavonoids have been shown to have antiallergic activity (Alan and Miller, 1996). Also, flavonoids are of immense medicinal values (Okwu, 2004; Okwu and Josiah, 2006).

The qualitative analysis of *M. indica* in the present study revealed similar findings with that of Pintu and Arna (2014) who reported that water extract of *M. indica* young leaves contain tannins, alkaloids, steroid, glycoside and flavonoid. Therefore the antimicrobial activity observed in *M. indica* extracts may be attributable to the presence of the above phytochemicals. As such, Harborne and Williams (2000) revealed that, flavonoids in *M. indica* have been reported to possess many useful properties, including anti-microbial. Flavonoids have been referred to as nature's biological response modifiers. It possesses various pharmacological roles including anti-microbial activities (Duraipandiyan *et al.,* 2006). Tannins bind to produce rich protein and interfere with protein synthesis. They are known to exert anti-microbial activities by iron deprivation, hydrogen bounding or specific interactions with vital proteins such as enzymes in microbial cells

The phytochemical screening of *P. guajava* extract revealed a similar report to that of Lone and Jain, (2022) who recorded the presence of lipids, alkaloids, sterols and tannins. While, saponins is absents. Offor (2015) recorded high concentrations of saponins, glycosides, moderate concentrations of flavonoids and tannins. This agrees with earlier studies which also found that not all phytochemicals are present in all plant parts in large amount and that those present differ according to the type of the extracting methods used (Olayemi, 2011). According their result obtained in the determination of lipids in a guava leaf extract complete dissolution of extract indicates the presence of alkaloids. Alkaloids are the most effective and important plant compound for healing (Njoku and Akumefula, 2007).

Quantitative Analysis

In the analysis of *Adansonia digitata* in the present study, there was a sharp difference with the study of Ogunleye *et al.* (2020) on the extract of Nigerian baobab, which showed; flavonoids (16.14 mg/g), saponins (100.00 mg/g), tannins (51.0 mg/g), and alkaloids (70.00 mg/g). Another study on the extract of Senegalese baobab yielded; total flavonoids

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(5.66 ± 0.18 μg/mg), total tannins (103.09 ± 0.63 μg/mg) and total polyphenols (27.21 ± 0.26 mg/g) (Ndiaye *et al.,* 2021). A chemical analyses study with the extracts of Saudi Arabian baobab fruit reported; flavonoid (42.70 ± 0.43 mg/g) and phenolic contents (48.08 ± 1.08 mg/g) (Osman, 2004).

As for what was recorded in *A. indica* in the present studies, the quantity of the phytochemicals was similar with the reports of Khanal (2021), who recorded that alkaloids was observed as 1.07ml/mg, flavonoids was 1.38ml/mg, saponins had 0.25ml/mg, while terpenoids was 1.31ml/mg

In the analysis of *C. papaya* in the present study, it showed a strong similarities with the report of Kanmani *et al.* (2023) who recorded; Phenols (0.21±0.01), Flavonoids (0.50±0.01) and Alkaloids (0.470±0.01), while Michael *et al.* (2021) recorded; Alkaloids (0.05ml/mg), Tannins (2.32 ml/mg), Flavonoids (0.51 ml/mg), Phenols (0.06 ml/mg) and Saponins (9.44 ml/mg). As for the analysis of *K. grandifoliola* recorded in the present study; it is lower when compared to the report of Agbo *et al.* (2023), who recorded; alkaloid (7.32 ± 0.14), phenolic (37.49 ± 1.40), flavonoid (6.54 ± 0.55) and terpenoids (10.16 ± 1.41)

The report of *M. indica* recorded in the present study showed some differences with the report of Alhaji *et al.* (2022), who recorded Tannins (0.35 ± 0.02), Saponins (2.14 ± 0.02), Flavonoids (13.53±0.25), Phenols (0.15±0.04) and Alkanoids (1.17±0.00), while, Scalbert (1991) reported that the levels of tannin and saponin in the plant extracts tested are 2.65mg/ml and 3.57mg/ml respectively. The analysis of *P. guajava* in the present study showed a close similarity with the reports of Offor (2015), who recorded; alkaloid (0.12 ± 0.01), saponins (3.00 ± 0.10), flavonoid (0.48 ± 0.23), tanins (0.56 ± 0.11), glycosides (3.75 ± 0.10), phenols (0.25 ± 0.01) and steroids (0.22 ± 0.10). Suresh *et al.* (2008) recorded 0.21ml/mg for phenols in their phytochemical investigation of *P. guajava* L.

CONCLUSION

This study highlighted the various medicinal plant claimed to be used or associated with malaria therapy in some communities in Billiri and Funankaye Local Government Areas as prescribed or suggested by individuals or groups. These medicinal plants are common with what is obtained in some communities in Nigeria, qualitative analysis showed that they contained properties which has antimicrobial effects.

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