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ETHNOBOTANICAL SURVEY AND PHYTOCHEMICAL ANALYSIS OF MEDICINAL PLANTS USED IN SOUTH-WESTERN PART OF NIGERIA AS ANALGESICS

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ABSTRACT

The gradual threat to plants and the inevitable disappearance of the aged Traditional Medical Practitioner are posing an impending time limit for people to learn, acquire, and document the rich medical cultural endowment. This cultural endowment is essential for the benefit of all Africans and indeed the entire mankind. Hence, the urgent need for continual ethno-botanical survey of medicinal plants in Nigeria. Ethnobotanical survey was carried out using structured questionnaire to obtain information from trado-medical practitioners from Ogun, Oyo, Ondo and Lagos States. Samples of eleven commonly used plants were collected and authenticated at the Forest Herbarium Ibadan, where voucher specimens were deposited. Extracts of each plant (leaf, root or seeds) were obtained by soxhlet extraction using methanol, diethyl ether and water, concentrated and screened for phytochemical constituents using standard procedures. Thirty-one plant species belonging to 24 families are being used as analgesics, of which *Macrosphyra longistyla*, *Strophanthus hispidus*, *Buchholzia coriacea*, *Calliandra portoricensis*, *Secamone afzeli*, *Chasmanthera dependens*, *Spilanthes filicaulis*, *Moringa oleifera*, *Clerodendrum volubile*, *Petiveria alliacea*, *Carpolobia lutea* were prevalent. Methanol and diethyl ether extracts of the plants contained alkaloids, saponins, tannins, phenols, anthraquinones and glycosides while, aqueous extracts contained alkaloids, saponins and glycosides.

Keywords: Ethnobotanical, Herbal remedy, pain management, southwestern Nigeria

INTRODUCTION

Nature has been a rich source of medicinal agents for thousands of years and an appreciable number of natural drugs have been generated from natural sources (Haidan *et al*., 2016). Many of these isolations were pivoted on the uses of the agents in traditional medicine (Cragg and Newman 2001; Vaghasiya, 2009). It is not an overstatement that medicinal plants have been known for millennia and are highly esteemed generally all over the world as a rich and acceptable source of therapeutic agents for the prevention and cure of human diseases and other health conditions such as pains (Akinyemi *et al*., 2018). The search for continuous good health and longevity of life, and for remedies

to relieve pain and discomfort drove early man to explore his immediate natural environments, leading to the vast use of many plants and animal products (Zwawua *et al.*, 2020). The use of these products has led to the discovery and development of a variety of therapeutic agents (Nair and Chanda, 2007; Vaghasiya 2009).

Usage of herbal products in traditional African medicine is spreading largely in virtually many African communities, most especially in the rural areas and many medically isolated villages in Africa where there were no established and functioning medical centers (Ebomoyi, 2009). In Nigeria, herbs and traditional medicine remain a popular and sometimes the only source of remedy open to millions of people. This particularly holds true for the poor, the uneducated, semi-literate and the rural dwellers who lack access to orthodox medicine or could not afford the prohibitive cost of Western medications (Herbert, 2012).

The search for alternative remedy to meet the health challenges of people in southern part of Nigeria, coupled with the increasing awareness that the more common analgesics are falling out of favour because of their side effects occasioned by chronic use and abuse, has increased tremendously among the populace, Ogun, Ondo, Oyo, and Lagos States not excluded (Barkin. 2008; Zwawua *et al.*, 2020). The present work was conducted to highlight the medicinal plants used in traditional preparations for pain treatment. Used parts, methods of preparation, and route of administration were investigated. Further study was done to identify the phytoconstituents of these medicinal plants.

MATERIALS AND METHODS

Four States of the Southwestern part of Nigeria, namely Lagos (situated between Latitude 6.5°N, Longitude 3.5° E), Ogun (Latitude 6.2^0N and 7.8^0N Longitude 3.0^0E), Ondo Latitude 7.1^0N, Longitude 4.83^0E) and Oyo (Latitude 7.85^0, Longitude 3.93^0E) were selected for the study. An ethno-botanical survey was done following the approaches of Michael, (2003) and Fatima *et al.*, (2021). Structured questionnaires were drawn up to explore the exactitude of their practices and local claims. Questions were asked to obtain the demographic factors of the respondents such as age, sex, educational profile, and earnings among others. Altogether, total of 408 questionnaires were distributed and proper arrangement and contact were later made with individual respondents to help them complete the form personally. Those that appeared to add incantations or other treatment(s) that could not be scientifically proved were excluded from the list. The frequency of use of the Medicinal plants was the number of times the particular plant is mentioned in a recipe or used wholly as a remedy. Data collected were subjected to analysis of variance (ANOVA) and means were separated using Duncan's Multiple Range Test (DMRT) at $p < 0.05$.

Qualitative and Quantitative Phytochemical assay

Chemical tests were carried out to identify the presence of phytochemicals like Alkaloids, Tannins, Saponins, Phlobatannins, Terpenoids, Flavonoids, using standard method of Harbone (1973); Brunner (1984); Trease and Evans (1989) and Sofowora (1993).

Test for Alkaloid

An aliquot containing 1 ml of the extract was stirred with 5 ml of 1% aqueous Hydro-

chloric acid on steam bath. Mayer and Wagner's reagent was then added to extract. Turbidity of the resulting precipitate was taken as an evidence for the presence of Alkaloid.

Test for Saponins

An aliquot containing 5 ml of the extract was boiled in 20 ml of distilled water in a water bath and filtered. Ten ml of the filtrate was mixed with 5 m of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously, then observed for the formation of emulsion which confirms a positive presence of Saponin.

Test for Phlobatannins

Deposition of a red precipitate when 2 ml of extract of each plant samples was boiled with 1% aqueous Hydrochloric acid was taken as evidence for the presence of phlobatannins.

Test for Tannins

An aliquot containing 1 ml of extract was boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% Ferric chloride was added to the filtrate and observation recorded. A green or a blue – black coloration confirms the presence of tannin (Trease and Evans, 1989).

Test for Flavonoids

An aliquot of 3 ml of 1% aluminum chloride solution were added to 5 ml of each extract. A yellow coloration was observed indicating the presence of flavonoids. Five ml of dilute Ammonia solution were added to the above mixture followed by addition of concentrated H_2SO_4. A yellow coloration disappeared on standing (Boham and Kocipai, 1974).

Test for Terpenoids

An aliquot containing 5 ml of each extract was mixed with 2 ml of chloroform, and 3 ml concentrated H_2SO_4 was carefully added to form a layer. A reddish brown coloration of the interface was formed to show positive results for the presence of terpenoids.

Test for Anthraquinones

An aliquot containing 5 ml of extract was mixed with 10 ml Benzene, filtered and 5ml of 10% NH_3 solution was added to the filtrate. The mixture was shaken and the presence of pink, red or violet colour in the ammoniac (lower) phase indicated the presence of anthraquinones.

Test for Chalcones

A known amount of 2 ml of ammonia solution were added to 5 ml of extract of each plant part. Formation of a reddish colour confirmed presence of chalcones.

Test for Cardiac Glycosides and Cardenolides (Keller – Killani Test)

An aliquot of 5 ml of each extracts was treated with 2 ml of glacial acetic acid containing one drop of Ferric chloride solution. This was underplayed with 1ml of concentrated sulphuric acid. A brown ring at the interface indicates deoxysugar characteristics of cardenolides which confirms a positive presence of cardenolides. A violet-green ring appearing below the brown ring, in the Acetic acid layer, indicates the positive presence of glycoside.

Test for Steroids

An aliquot of 2 ml of acetic anhydride was added to 2 ml extract of plant sample followed by careful addition of 2 ml H_2SO_4. The colour changed from violet to blue or green indicating the presence of steroids.

RESULTS

Out of the 408 respondents interviewed, highest percentage of the respondents was male (52.94%) among which 58.09% belonged to the working class (20 - 39 years age range) and 16.91% to 40 - 59 years age range. Age greater than 60 years gave the least percentage of respondents of 5.15% (Table 1).

There was no significant association between age and people living with pains, this is because pains were experienced by all age range of the respondents (Table 1). The result confirms the occurrence of pain in both genders though with the highest percentage of occurrence among the male gender (52.94). Among the four States surveyed (Ondo, Ogun, Oyo and Lagos,) all the age groups were represented, an indicator that pain cuts across all ages, irrespective of location **(**Table 2**).** In addition, both genders were well represented in the four States where the study was carried out confirming that pain experienced by respondents is not limited by gender (Table 3).

The occupation of the respondents included civil service, medical practitioning, artisans, and factory works, with the artisans having the highest percentage among the respondents 29.41%, followed by civil service workers (28.68%). There was a significant association between the types of work done by the respondents and the musculoskeletal pains experienced (Table 4). The respondents in order to maintain their sources of income engaged in different vocations that exposed them to stress which consequently result into pains. An attempt to alleviate such health conditions results in the regular usage of analgesics. Consequently, as observed, high percentage of the respondents (89.6%) preferred to take acetaminophen, followed by Ibuprofen (63.8%), herbal remedies (60.5%), and Aspirin (30.8%) -Fig.1.

The ethnobotanical survey identified thirty one (31) medicinal plant species belonging to twenty-four (24) families reported to be used traditionally in the management of headache, rheumatism, back pains, joints pains and stomach ache (Table 5). Their local names, botanical names, families, frequency of use (which ranged from 6 to 32) and the parts used were identified. Plant parts used were majorly the leaves (Table 6). Other parts used were: whole plants; plant roots; seeds or stem bark. The methods of recipe preparations include: squeezing, boiling or grinding the leaves. The dried leaves may be boiled or the roots cut in pieces (Table 6).

The phytochemical analysis revealed the various phyto constituents present in the identified plants species. Most of the phytoconstituents were absent in water extract except for alkaloids, saponins and glycosides that were present in moderate amount in some of the plant extracts (Table 7). The methanol plant extracts possessed alkaloids, tannins, phenols and anthraquinones in appreciable amount but phlobatannin and flavonoid were present in trace amount while cardenolides and chalcones were completely absent (Table 8). In diethyl ether extracts, most of the phyto constituents were present in appreciable amount (Table 9)

The quantitative analysis showed that there was a significant difference between the quantities of alkaloids, saponins and anthraquinone present in all the studied plants (Table 10) with the exception of the trend observed in methanol extract with *C. depedens* (1.224)*, M. oleifera* (1.119)*, and C. volubile* (1.104) demonstrating pronounced quantities

(Table 11) when compared to *S. hispidus* (0.397). This same trend observed in methanol extract was repeated in diethyl ether extract (Table 12).

DISCUSSION

In terms of gender distribution, it was revealed through this study that pain is not restricted to a specific gender as previously reported by Akodu and Ashalejo, (2019); Sandul and Paramasivan, (2014). However, certain pain conditions are associated with specific gender; for instance, Tsang *et al.* (2008), reported that back pain and shoulder pain were more consistently common among males than females. This, however, could be attributed to the nature of work done by the male gender. Findings from the respondents who engaged in different jobs and suffered headaches, joint pains, lower back pains and waist pain supported the observations made by Ayanniyi *et al.* (2016), and Akodu and Ashalejo (2019). The differences in pains experienced by people could be attributed to their varying postures at work. The survey revealed highest frequency of sitting posture among computer operators, followed by the artisans and bankers the medical practitioners being the least. This trend of result is understandable since most computer operators are most of the time restricted to their seats while working on their computer systems. In Nigeria, as in other African countries, the most common forms of pain management identified are rest and the use of analgesics (Adegoke *et al.*, 2018). In the present survey, 87 preferred the use of paracetamol (acetaminophen) while 30 used Ibuprofen and 23, employed herbal remedies for the management of their pain. This survey result, confirms the previous works done by Herbert *et.al.* (2012) as well as Saxhaug and Lundqvist, (2014) on the misuse of paracetamol and other over- the counter (OTC) analgesics.

Herhert *et al.* (2012), in their work, revealed that paracetamol is a potential drug of abuse and overdose. The appreciable amount of people that opted for choice for herbal remedies could be attributed to the side effects of synthetic or orthodox medicines (Evans, 2018). This agrees with the submission of Fakeye *et al.*, (2009), who worked on the use of herbal medicines among pregnant women in Nigeria.

Thirty-one different species of angiosperm were found to be used for the management of pains within the studied area. Prominent among these are the members of Asteraceae family. The ethnobotanical survey revealed the different traditional uses of these plant species as analgesics, particularly *Moringa oleifera*. This is in line with the findings of Garima *et al.* (2011) who reported that this plant is used in the management of different ailments such as malaria, rheumatism, headache, and eye diseases. Also, a decoction of *Clerodendrum volubile* leaves is taken as remedy for rheumatism, arthritis, and stomachache according to the respondents. Probably owing to these uses, the leaves are ground with pepper and cooked for women after delivery. The nutritional and antioxidant studies of Erukainure *et al.* (2011) and Ogunwa *et al.* (2015) confirmed some of these traditional uses of this plant by the respondents.

The qualitative analysis done in this study was in support of the finding of Prashant *et al.* 2011 that the choice of solvent is significant in plant extraction. It was observed that *Moringa oleifera* leaf extract (MO) had many of its phytochemical constituents absent in water extracts except alkaloid, glycoside (moderate amount) and saponin (appreciable

amount). This was also observed with the phytochemical analysis of the leaf extract of *M. oleifera* using methanol, ethyl acetate and hexane. Ojiako (2014) reported the presence of tannins, and alkaloids in the three extracts aforementioned. Phlobatannins were found to be present only in n-hexane extract while they were absent in both ethanol and diethyl ether extracts. Alkaloids are known for their ability to inhibit pain perception (Okwu and Josiah, 2006, Uche and Aprioku, 2008). According to Uche and Aprioku (2008), alkaloids contained in plants are used in medicines as anesthetic agents. This same trend was observed in the saponin constituents with different percentage constituents. The presence of flavonoids, saponins and tannins has been shown to exert analgesic effect on acetic acid induced writhing test (Calixto *et al.,* 2000). The present study is in conformity with the report of Chindo *et al.* (2010) who provided evidence that saponins are implicated in the analgesic and anti-inflammatory effects of *Ficus platyphylla* stem bark. The selected plants possess saponins in different quantities; therefore, all the study plants could be a good source of saponins, particularly *Chasmanthera dependens* and *Petiveria alliacea.*

Most of the plants possessed phlobatannin in very low quantities. This is in line with the work of Kwaghe and Ambali (2009) which reported only the presence of tannins, saponins, flavonoids, and alkaloids in ethyl acetate fraction and n-butanol fraction of *Moringa oleifera* leaf extract while anthraquinones and phlobatannins were completely absent. In the present work, *M. oleifera* diethyl ether leaf extract contained phlobatannins and anthraquinones, respectively. The presence of phlobatannins and anthraquinones in the present work is in contrast with the study of Kwaghe and Ambali (2009) who reported the anthraquionones of the later in the leaf extract even though it was in trace amount.

Similar results were observed in methanol extracts of respective selected plants, except for the results obtained in water extracts with reduced phytochemical constituents. This could be attributed to the non-polar nature of water though it is said to be a universal solvent. Most of the phyto-nutrients of the selected plants are better extracted with polar or semi-polar solvents. This agrees with Prashant *et al.* (2011) who opined that though traditional healers use primarily water as solvent, plant extracts from organic solvents have been found to give more consistent yield and activities. The study has shown that water soluble flavonoids (mostly anthocyanins) have no antimicrobial significance and water soluble phenolics are only important as antioxidant compounds.

Diethyl ether extract possess alkaloids, saponins, tannins, phenols, anthraquinones, terpenes, phlobatannins, steroids, glycosides, and flavonoids. The methanol phyto-constituent was similar. *Clerodendrum volubile* water extract had alkaloids, saponins, tannins, phlobatannins, phenols, and glycosides and this is almost similar to the report of Erukainure *et al.* (2011). However, the alkaloids content was higher than that reported by Erukainure *et al.* (2011). Alkaloids are used in the pharmaceutical industries in the production of analgesics due to its analgesic properties (Okwu and Ndu, 2006; Erukainure *et al.*, 2011).

CONCLUSION

Clerodendrun volubile, *Macrosphyra longistyla*, *Carpolobia lutea, Chasmanthera depedens* among other plants identified in the survey are rich

source of secondary metabolites such as alkaloids, saponins, tannins, phenols, anthraquinones, terpenes, cardenolides, and flavonoids. The phytoconstituents can be further synthesized as plant-derived drugs and these secondary metabolites have been found useful in alleviating both human and animal health problems.

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Table 1: **Gender and Age Distribution of people living with pains**

Age Range (Years) of people living with Pains	Gender Distribution				Total	
	Male		Female			
	N	(%)	N	(%)	N	(%)
<19	42	(19.44)	39	(20.31)	81	(19.85)
20-39	123	(56.94)	114	(59.38)	237	(58.09)
40-59	36	(16.67)	33	(17.19)	69	(16.91)
≥60	15	(6.94)	6	(3.13)	21	(5.15)
Total	**216**	**(52.94)**	**192**	**(47.06)**	**408**	**(100.00)**

χ^2 =1.141., P= 0.2854, df =3, P>0.05
Key: N= Frequency

Table 2: **Age distribution of people living with pains in the study area**

Age Ranges	Study Areas				Total
	Ondo	Ogun	Oyo	Lagos	N
<19	18	23	18	22	81
20-39	55	67	67	48	237
40-59	16	15	17	21	69
≥60	10	01	05	05	21
Total	**99**	**106**	**107**	**96**	**408**

Key: N= Frequency

Table 3: **Gender distribution of people living with pains in the study area**

Gender	Study Areas				Total
	Ondo	Ogun	Oyo	Lagos	
Male	54	64	52	46	216
Female	46	44	48	54	192
Total	**100**	**108**	**100**	**100**	**408**

Table 4: Job titles and musculoskeletal disorders among people living with pains

Body Parts	Job Titles														Total	
	Medical		Civil Service		Banking		Artisans		Farming		Computer Operation		(Factory Works)			
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Head	6	(6.5)	27	(29.03)	0	(0.00)	12	(12.90)	0	(0.00)	18	(19.25)	30	(32.26)	93	(22.79)
Shoulder	0	(0.0)	9	(7.41)	0	(0.00)	9	(7.41)	0	(0.00)	9	(7.41)	0	(0.00)	27	(6.62)
Joints	6	(7.1)	18	(22.22)	6	(7.41)	30	(37.04)	6	(7.41)	6	(7.41)	9	(11.11)	81	(19.85)
Kneel	0	(0.0)	12	(26.67)	0	(0.00)	18	(40.00)	0	(0.00)	6	(13.33)	9	(20.00)	45	(11.03)
Lower Back	6	(7.1)	21	(25.93)	6	(7.41)	30	(37.04)	0	(0.00)	6	(7.41)	12	(14.81)	81	(19.85)
Abdomen	3	(25.00)	3	(25.00)	0	(0.00)	3	(25.00)	0	(0.00)	0	(0.00)	3	(25.00)	12	(2.94)
Waist	0	(0.00)	24	(38.10)	0	(0.00)	18	(28.57)	3	(4.76)	12	(19.05)	6	(9.52)	63	(15.44)
Neck	0	(0.00)	3	(50.00)	0	(0.00)	0	(0.00)	0	(0.00)	0	(0.00)	3	(50.00)	6	(1.47)
Total	**21**	**(5.15)**	**117**	**(28.68)**	**12**	**(2.94)**	**120**	**(29.41)**	**9**	**(2.21)**	**57**	**(13.95)**	**72**	**(17.65)**	**408**	**(100.00)**

N= Frequency, χ^2 =116.99 , P < 0.0001

Table 5: Plants commonly used in Southern part of Nigeria for the management of pains

S/N	Botanical Name	Local Name (Yoruba)	Frequency of use	Family	Mode of Preparation
1	*Chasmanthera dependens* Hochst	Atò	14	Menispermaceae	Infusion
2	*Chenopodium abrosioides* Linn.	Awogba	10	Chenopodiaceae	Decoction/ Infusion
3	*Calliandra portoricensis* (Jacq.) Benth.	Túdè	18	Mimosaceae	Decoction/ Infusion
4	*Riccinus cammunis* Linn.	Làá funfun	12	Euphorbiaceae	Decoction
5	*Clerodendrum volubile* P. Beauv.	Márúgbó	14	Verbernaceae	Poultice
6	*Adenia venenata* Forssk	Arọkẹkẹ	08	Passifloraceae	Decoction
7	*Peperomia pellucida* (L.) HBK	Rẹnrẹn	10	Piperaceae	Poultice
8	*Strophanthus hispidus* DC	Ṣàgéré	14	Apocynaceae	Decoction
9	*Phyllanthus amarus* Schum. & Thonn.	Fẹhìnbísowó	06	Euphorbiaceae	Infusion
10	*Secamone afzeli* K.Schum.	Àílù	20	Ascepiadaceae	Infusion/Decoction
11	*Spilanthes filicaulis* Schum.&Thonn.(C.D.Adams)	Ṣawẹrẹpẹpẹ	12	Asteraceae	Decoction/ Poultice
12	*Chromolaena odorata* Linn.	Akíntọlá	16	Asteraceae	Poultice/ Decoction
13	*Petiveria alliacea* Linn	Arùnpàlẹ	10	Phytolacaceae	Poultice/ Infusion
14	*Moringa oleifera* Lam.	Ewé Ìgbálẹ	32	Moringaceae	Infusion
15	*Buchholzia coriacea* Eng.	Ùwóró Wonderful cola	12	Capparaceae	Decoction/ Poultice
16	*Carpolobia lutea* G. Don	Ọṣúnṣún	16	Polygalaceae	Decoction
17	*Acanthospermum hispidum* DC.	Dágunró-gogoro	12	Compositae (Asteraceae)	Decoction
18	*Aframomum melegueta* (Loskoe) K.Schum.	Atare	24	Zingiberaceae	Decoction
19	*Bidens pilosa* (Linn.) Wild	Abẹrẹ olóko	14	Asteraceae (Compositae)	Infusion
20	*Crinum jagus* (Thomps.) Dandy	Ọgẹdẹ-odò	06	Amaryllidaceae	Poultice
21	*Dioscorea bulbifera* Linn.	Iṣu-emìnà	10	Dioscoraceae	Poultice/ Decoction
22	*Gloriosa superba* Linn.	Àkàlàmàgbò /Ewé ajé	11	Colchicaceae	Poultice/ Decoction
23	*Mikania cordata* (Burm. F) B.L.Rob	Ìyáwá, ẹjọn	09	Asteraceae	Decoction
24	*Carica papaya* Linn.	Ìbẹpẹ	10	Caricaceae	Decoction/ Infusion
25	*Vernonia amygdalina* Del.	Ewúro	07	Compositae	Infusion
26	*Enantia chlorantha* Oliver	Awọpa	12	Annonaceae	Decoction
27	*Khaya grandifoliola* C.D.C.	Ọganwó	10	Meliaceae	Decoction/ Infusion
28	*Alstonia congensis* De wild	Awùn	10	Apocynaceae	Decoction
29	*Macrosphyra longistyla* (DC.) Hook. f. ex. Hiern.	Àgbọsá	10	Rubiaceae	Decoction/ Infusion
30	*Ageratum conyzoides* Linn.	Imí-esú	10	Compositae	Infusion
31	*Adansonia digitata* Linn.	Oṣè	08	Bombacaceae	Decoction

Table 6: Medicinal uses of plant species in the selected States of Southwestern Nigeria.

S/N	Plant	Uses	Part Used	Method of use
1	*Chasmanthera dependens*	Rheumatism	Leaves	Grind the leaves with shear butter, camphor. Rub the body with the paste after bath morning and night.
2	*Chenopodium abrosiodes*		Leaves	Soak the dried leaves in hot water and allow to steep for thirty minutes. Drink a glass cup twice daily.
3	*Calliandra portoricensis*	General body pain	Leaves and root	Boil the leaves and root with water. Drink half glass twice daily
		Body pains	Leaves	Boil freshly/dried leaves and boil to make a decoction and allow to cool. Take twice daily.
4	*Riccinus cammunis*	General body pains	Leaves	Boil the leaves with water and drink once in a day
5	*Clerodendrum volubile*	Rheumatism,	Leaves	The fresh leaves are grinded, cooked with pepper and palm oil and taken regularly.
		Stomach-ache	Leaves	The fresh leaves are grinded, cooked with pepper and palm oil and taken hot thrice a day.
6	*Adenia venenata*	Body pains	Root	Cut the root tiny pieces and boil with water. Take once in a day.
7	*Peperomia pellucid*	Rheumatism/ body pain	Leaves	Boil freshly/dried leaves and boil to make a decoction and allow to cool. Take twice daily.
		Measles / persistent high body temperature in children	Whole plant	Rinse the freshly collected whole plant and cut in pieces. Grind into paste and cook with little palm oil. Give the child thrice daily.
		Abdominal pain/malaria	Leaves	Squeeze the leaves to extract the liquid and mix with honey in ratio 3: 7. Take one spoon thrice daily.
8	*Strophanthus hispidus*	General body pains	Root	Cut the root into pieces and boil in water. Drink a glass cup twice daily.

9	*Phyllanthus amarus*	Typhoid	Whole plant	Rinse the whole plant and boil in water, allow to cool. Drink thrice daily.
		Malaria/body pains	Whole plant	Boil with water and drink thrice daily.
10	*Secamone afzeli*			
11	*Spilanthes filicaulis*	Headache	Leaves	The leaves and the flower are rinsed properly and then chewed as a remedy for headache.
12	*Chromolaena odorata*	Body pains	Leaves	Soak the leaves in hot water and allow to steep for 30 minutes. Sieve and twice in a day.
13	*Petiveria alliacea*	Headache	Leaves	The leaves are squeezed and placed on the forehead to relieve headache
		Body pain	Leaves	Soak the dried leaves in hot water and allow to steep. Drink twice daily.
14	*Moringa oleifera*	Remedy for rheumatism and headache	Leaves, stem - bark	The leaves and stem bark are boiled and allow to cool. The decant is taken three times a day for headache or rheumatism
		Anti- malaria	Leaves	Fresh leaves are collected and properly dried under shade. The dried leaves are grounded to powder. The powder can then be taken with pap/tea thrice a day
15	*Buchholzia coriacea*	Malaria / body pains	Seed	Fresh/ dried seeds are grated and soaked in water over night. Decant and drink thrice daily
16	*Carpolobia lutea*	Rheumatism	Stem	Boil with water and drink once daily.
17	*Acanthospermum inspidum*	Rheumatism	Leaves	Boil the leaves for some hours and drink like tea twice daily.
18	*Aframomum melegueta*	Rheumatism	Leaves	Soak the leaves in hot water and allow to steep for a couple of minutes. Drink as tea twice daily.
		Toothache	Seeds	Grind the seeds with *Nicotiana Tabacum* dried leaves and mix with alcohol. 1 tablespoonful to be taken thrice daily.
19	*Bidens pilosa*	Malaria	Seed	Soak the seed in water for three hours and drink the water twice daily
20	*Crinum jagus*	Rheumatism	Root	Cut the leaves into pieces and boil with water. Drink thrice daily.
21	*Dioscorea bulbifera*	Rheumatism	Leaves	Boil the leaves with water and drink thrice daily.
22	*Gloriosa superba*	Rheumatism	Leaves	Take thrice daily

23	*Mikania cordata*			
24	*Carica papaya*	Malaria	Leaves	Boil leaves of male plant, unripe pineapple and grape fruits with pap water. Drink twice daily.
25	*Vernonia amygdalina*	Diabetes	Leaves	Dry the leaves under shade and grind to fine powder. Mix the powder with water and drink thrice daily.
26	*Enantia chlorantha*	Malaria	Stem bark	Cut the stem bark into pieces, soak in water or seven up over night. Drink a glass cup thrice daily.
27	*Khaya grandifoliola*	Rheumatism/ malaria	Stem bark	Cut the fresh/dried stem bark into pieces and boil with water. Drink thrice daily.
28	*Alstonia congensis*	Body pain/ malaria	Stem bark	Cut the dried stem bark into pieces and boil with water for some hours and allow to steep. Drink thrice daily.
29	*Macrosphyra longistyla*	Headache	Leaves	The dried/fallen off leaves are boiled with water or pap water properly. The decant can then be taken thrice a day.
		Malaria	Leaves	(a) Boil the leaves, orange leaves, lemon grass leaves together with 2-3 litres of water. Drink 1 cup thrice daily. (a) Boil the leaves with leaves of *Nuclea latifolia,* dried leaves of Almond plant and *Ficus capensis* leaves with 2-3 litres of water. Take 1 cup in the morning and night.
		General body pain		Boil the leaves with other recipes (*Cymbopogon citrullus*), lime (*Citrus aurantifolia*) seeds, *Nuclea latifolia* leaves with 2-3 litres of water and drink a glass cup thrice daily.
30	*Ageratum conyzoides*	General body pains/ rheumatism	Leaves	Collect dried leaves and soak in hot water. Allow to steep for 1 hour, take 1 glass cup thrice daily.
31	*Adansonia digitata*	Malaria. General body pains	Stem bark	Cut the fresh or dried stem bark into tiny pieces and boil with water or pap water. Take 1 glass cup thrice daily.

Table 7: Qualitative Phytochemical Constituents of Water Extracts of Studied Plants

Sample	Alkaloids	Saponins	Tannins	Phlobatannins	Phenols	Anthraquinones	Terpenes	Cardenolides	Steroid	Glycosides	Chalcones	Flavonoids
MOL	++	+++	-	-	-	-	-	-	-	++	-	-
CVL	++	+++	+	+	++	-	-	-	-	++	-	-
PAL	+	+++	+	+	++	-	-	-	-	++	-	-
SHR	++	+++	-	-	-	-	-	-	-	+	-	-
CDL	++	+++	+	+	++	-	-	-	-	++	-	-
BCS	+	+	-	-	-	-	-	-	-	+	-	-
SFL	+	++	-	-	-	-	-	-	-	++	-	-
CPL	+	++	+	+	++	-	-	-	-	++	-	-
SAL	+	++	+	+	++	-	-	-	-	++	-	-
CLL	++	+++	+	+	++	-	-	-	-	++	--	-
MLL	++	+++	+	+	++	-	-	-	-	++	-	-

Key:

Moringa oleifera (MOL), *Clerodendrum volubile* (CVL), *Petiveria alliacea* (PAL), *Strophantus hispidus* (SHR), *Chasmanthera depedens* (CDL), *Buchholzia coriacea* (BCS), *Spilanthes filicaulis* (SFL), *Calliandra portoricensis* (CPL), *Secamone afzeli* (SAL), *Carpolobia lutea* (CLL), *Macrosphyra longistyla* (MLL)

+++ = present in an appreciable amount.

++ = present in a moderate amount.

+ = present in a minute or trace amount.

- = completely absent.

Table 8: Qualitative Phytochemical constituents of Methanol Extracts of Studied plants

Sample	Alkaloids	Saponins	Tannins	Phlobatannins	Phenols	Anthraquinones	Terpenes	Cardenolides	Steroid	Glycosides	Chalcones	Flavonoids
MOL	+++	++	++	+	+++	+++	-	-	-	++	-	+
CVL	+++	++	++	+	+++	++	+	-	+	+	-	+
PAL	++	++	++	+	+++	+	+	+	+	++	-	+
SHR	+++	+++	++	+	+++	+++	+	-	+	++	+	+
CDL	+++	+++	++	++	+++	+	-	-	+	++	-	-
BCS	+++	+++	+	+	+++	+++	-	-	-	++	-	-
SFL	++	+++	++	+	+++	-	-	-	-	++	-	-
CPL	+++	++	+	+	+++	+	-	-	+	+	-	+
SAL	+++	+++	++	+	+++	-	-	-	-	++	-	-
CLL	+++	+++	++	+	+++	+	+	+	+	++	-	-
MLL	+++	++	++	+	+++	++	+	-	+	+	-	+

Key:

Moringa oleifera (MOL), *Clerodendrum volubile* (CVL), *Petiveria alliacea* (PAL), *Strophantus hispidus* (SHR), *Chasmanthera depedens* (CDL), *Buchholzia coriacea* (BCS), *Spilanthes filicaulis* (SFL), *Calliandra portoricensis* (CPL), *Secamone afzeli* (SAL), *Carpolobia lutea* (CLL), *Macrosphyra longistyla* (MLL)

+++ = present in an appreciable amount.

++ = present in a moderate amount.

+ = present in a minute or trace amount.

- = completely absent

Table 9: Qualitative Phytochemical Constituents of Diethyl ether Extracts of Studied Plants

Sample	Alkaloids	Saponins	Tannins	Phlobatannins	Phenols	Anthraquinones	Terpenes	Cardenolides	Steroid	Glycosides	Chalcones	Flavonoids
MOL	+++	+++	++	+	+++	++	-	-	-	++	-	-
CVL	+++	+++	+++	++	+++	+++	++	+	++	+++	+	+
PAL	+++	+++	+++	++	+++	+++	++	+	++	++++	+	+
SHR	+++	+++	++	+	+++	++	-	-	-	++	-	-
CDL	+++	+++	+++	++	+++	+++	++	+	++	+++	+	+
BCS	+++	+++	+	+	+++	+	-	-	-	+	-	-
SFL	+++	+++	++	+	+++	++	++	+	-	++	-	-
CPL	+++	+++	+	+	+++	+	-	-	-	++	-	+
SAL	+++	+++	++	+	+++	++	-	-	+	++	-	-
CLL	+++	+++	++	+	+++	+	+	+	+	++	-	-
MLL	+++	+++	+++	++	+++	+++	++	+	++	+++	+	+

Key:

Moringa oleifera (MOL), *Clerodendrum volubile* (CVL), *Petiveria alliaceae* (PAL), *Strophantus hispidus* (SHR), *Chasmanthera depedens* (CDL), *Buchholzia coriacea* (BCS), *Spilanthes filicaulis* (SFL), *Calliandra portoricensis* (CPL), *Secamone afzeli* (SAL), *Carpolobia lutea* (CLL), *Macrosphyra longistyla* (MLL)

+++ = present in an appreciable amount.

++ = present in a moderate amount.

+ = present in a minute or trace amount.

- = completely absent.

Table 10: Quantitative phytochemical Constituents of water extracts of selected medicinal plants used as analgesic in Southwestern Nigeria

Alkaloids										
Phytochemical					**Selected Plant**					
Constituent	**SF**	**CP**	**BC**	**SA**	**PA**	**SH**	**CL**	**CV**	**MO**	**CD**
Alkaloids	0.1637[a]	0.1667[a]	0.1673[a]	0.1757[a]	0.2017[a]	0.2497[a]	0.2603[a]	0.2823[a]	0.3013[a]	0.3057[a]
Saponins										
Phytochemical					**Selected Plant**					
Constituent	**BC**	**CP**	**SF**	**SH**	**SA**	**MO**	**CL**	**PA**	**CV**	**CD**
Saponin	0.2403[a]	0.2497[a]	0.2617[a]	0.3677[a]	0.3830[b]	0.3840[b]	0.4290[b]	0.4450[b]	0.4687[b]	0.6147[c]
Tannins										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**SF**	**PA**	**CV**	**CP**	**CL**	**SA**	**CD**
Tannins	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.0043[a]	0.0062[a]	0.0072[a]	0.0090[a]	0.0112[a]	0.0122[a]
Phenols										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**SF**	**PA**	**CV**	**CL**	**CP**	**CD**	**SA**
Phenols	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.0190[b]	0.0230[b]	0.0237[b]	0.0297[b]	0.0327[b]	0.0337[b]
Phylobatannins										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**BC**	**SF**	**SH**	**PA**	**CV**	**CP**	**CL**	**SA**	**CD**
Phylobatannins	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.0014[a]	0.0023[a]	0.0037[a]	0.0041[a]	0.0047[a]	0.0050[a]
Glycosides										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**CP**	**CV**	**SF**	**PA**	**SA**	**SA**	**CD**
Glycosides	0.0120[a]	0.0150[a]	0.0240[a]	0.0257[a]	0.0270[a]	0.0277[a]	0.0303[a]	0.0340[a]	0.0367[a]	0.0400[a]

Key:
SH=*Srophanthus hispidus*; SF=*Spilanthes filicaulis*; CP=*Calliandra portoriensis*; *BC=Buchholzia cariacea*; CL=*Carpolobia lutea*; PA=*Peticeria alliacea*; SA=*Secamone afzeli*; CV=*Clerodendrum volubile*; MO=*Moringa oleifera*; CD=*Chasmanthera depedens*
Means with the same letter in the same column are not significantly different at p>0.05

Table 11: Quantitative phytochemical constituents of methanol extracts of selected medicinal plants used as analgesic in Southwestern Nigeria

Alkaloids										
Phytochemical					**Selected Plant**					
Constituent	**SH**	**SF**	**CP**	**BC**	**CL**	**PA**	**SA**	**CV**	**MO**	**CD**
Alkaloids	0.3973[a]	0.6710[b]	0.8267[c]	0.9840[d]	1.0073[e]	1.0657[f]	1.0940[g]	1.1037[h]	1.1197[i]	1.2237[j]
Saponins										
Phytochemical					**Selected Plant**					
Constituent	**BC**	**CL**	**SF**	**CP**	**SH**	**MO**	**CV**	**SA**	**PA**	**CD**
Saponins	0.0393[a]	0.0447[b]	0.0730[c]	0.0930[d]	0.1467[e]	0.2017[f]	0.3853[g]	0.3943[h]	0.5810[i]	0.6873[j]
Tannins										
Phytochemical					**Selected Plant**					
Constituent	**CP**	**MO**	**BC**	**SF**	**SH**	**CL**	**SA**	**PA**	**CV**	**CD**
Tannins	0.0110[a]	0.0140[a]	0.0150[a]	0.0233[b]	0.0250[b]	0.0407[c]	0.0457[d]	0.0600[e]	0.0673[f]	0.0817[g]
Phenols										
Phytochemical					**Selected Plant**					
Constituent	**CP**	**BC**	**MO**	**CL**	**SH**	**SF**	**SA**	**PA**	**CV**	**CD**
Phenols	0.0037[a]	0.0047[a]	0.0080[b]	0.0097[b]	0.0120[c]	0.0133[c]	0.0167[d]	0.0280[e]	0.0337[f]	0.0523[g]
Antraquinones										
Phytochemical					**Selected Plant**					
Constituent	**CP**	**BC**	**MO**	**SF**	**SH**	**SA**	**CL**	**CV**	**PA**	**CD**
Antraquinones	0.0533[a]	0.0653[b]	0.0730[c]	0.0773[d]	0.0797[e]	0.0897[f]	0.9593[g]	0.9797[h]	1.0840[i]	1.1070[j]
Terpenes										
Phytochemical					**Selected Plant**					
Constituent	**CL**	**MO**	**CP**	**SH**	**BC**	**CV**	**SF**	**PA**	**SA**	**CD**
Terpenes	0.0147[a]	0.0170[a]	0.0210[B]	0.0220[b]	0.0250[c]	0.0270[c]	0.0310[d]	0.0350[e]	0.0367[f]	0.0407[g]

Table 11 Cont'd.: Quantitative phytochemical constituents of methanol extracts of selected medicinal plants used as analgesic in Southwestern Nigeria

Phylobatannins										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**CP**	**SA**	**CL**	**CV**	**SF**	**PA**	**CD**
Phylobatannins	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0067[b]	0.0110[c]	0.0110[c]	0.0140[d]	0.0170[d]
Steroid										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**SF**	**CP**	**SA**	**CL**	**CV**	**PA**	**CD**
Steroids	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0040[b]	0.0080[c]	0.0160[d]	0.0257[e]	0.0330[f]
Glycosides										
Phytochemical					**Selected Plant**					
Constituent	**BC**	**SH**	**MO**	**SF**	**SA**	**CP**	**CV**	**PA**	**CL**	**CD**
Glycosides	0.0197[a]	0.0280[b]	0.0323[c]	0.0370[d]	0.0393[d]	0.0443[e]	0.0470[e]	0.0547[f]	0.0573[f]	0.0587[f]
Chalcones										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**SF**	**CP**	**SA**	**CL**	**CD**	**CV**	**PA**
Chalcones	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0057[b]	0.0090[c]	0.0120[d]
Flavonoids										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**SF**	**SA**	**CL**	**CD**	**CV**	**PA**	**CP**
Flavonoids	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0090[b]	0.0130[c]	0.0167[d]	0.0187[d]
Cardenolides										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**SH**	**BC**	**CP**	**SA**	**CL**	**SF**	**CV**	**PA**	**CD**
Cardenolides	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0002[a]	0.0033[a]	0.0053[b]	0.0077[c]	0.0100[d]

Key:

SH=*Srophanthus hispidus*; SF=*Spilanthes filicaulis*; CP=*Calliandra portoriensis*; *BC=Buchholzia cariacea*; CL=*Carpolobia lutea*; PA=*Peticeria alliacea*; SA=*Secamone afzelia*; CV=*Clerodendrum volubile*; MO=*Moringa oleifera*; CD=*Chasmanthera depedens;*

Means with the same letter in the same column are not significantly different at p>0.05

Table 12: Quantitative phytochemical constituents of diethyl ether extracts of selected medicinal plants used as analgesic in Southwestern Nigeria

Alkaloids										
Phytochemical					**Selected Plant**					
Constituent	**SH**	**SF**	**CP**	**BC**	**CL**	**PA**	**SA**	**CV**	**MO**	**CD**
Alkaloids	0.3973[a]	0.6710[b]	0.8267[c]	0.9840[d]	1.0073[e]	1.0657[f]	1.0940[g]	1.1037[h]	1.1197[i]	1.2237[j]
Saponins										
Phytochemical					**Selected Plant**					
Constituent	**BC**	**CL**	**SF**	**CP**	**SH**	**MO**	**CV**	**SA**	**PA**	**CD**
Saponins	0.0677[a]	0.0810[b]	0.0977[c]	0.1050[d]	0.1650[e]	0.2150[f]	0.4237[g]	0.4670[h]	0.6800[i]	0.8237[j]
Tannins										
Phytochemical					**Selected Plant**					
Constituent	**CP**	**MO**	**BC**	**SH**	**SF**	**CL**	**SA**	**PA**	**CV**	**CD**
Tannins	0.0170[a]	0.0207[b]	0.0257[c]	0.0370[d]	0.0410[e]	0.0463[f]	0.0550[g]	0.0810[h]	0.0880[i]	0.0953[j]
Phenols										
Phytochemical					**Selected Plant**					
Constituent	**CP**	**BC**	**MO**	**SH**	**SF**	**SA**	**CL**	**CV**	**PA**	**CD**
Phenols	0.0653[a]	0.0773[b]	0.0850[c]	0.0857[c]	0.0880[c]	0.0957[d]	1.0150[a]	1.0950[f]	1.1067[g]	1.1147[h]
Antraquinones										
Phytochemical					**Selected Plant**					
Constituent	**SF**	**SA**	**CP**	**PA**	**MO**	**BC**	**CL**	**CV**	**CD**	**SH**
Antraquinones	0.0000[a]	0.0000[a]	0.0057[a]	0.0073[a]	0.0160[b]	0.0273[c]	0.0303[c]	0.0357[c]	0.0497[d]	0.0587[e]
Terpenes										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**CD**	**BC**	**SF**	**CP**	**SA**	**CV**	**SH**	**PA**	**CL**
Terpenes	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0037[b]	0.0070[b]	0.0070[c]	0.0070[c]
Phylobatannins										
Phytochemical					**Selected Plant**					
Constituent	**SH**	**BC**	**MO**	**SF**	**CP**	**CV**	**CL**	**CD**	**SA**	**PA**
Phylobatannins	0.0047[a]	0.0060[a]	0.0077[a]	0.0137[b]	0.0153[b]	0.0167[b]	0.0200[c]	0.0237[d]	0.0273[e]	0.0297[e]

Table 12 Cont'd.: Quantitative phytochemical constituents of diethylether extracts of selected medicinal plants used as analgesic in Southwestern Nigeria

Steroids										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**BC**	**SF**	**SA**	**CV**	**CP**	**CL**	**PA**	**CD**	**SH**
Steroids	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0130[b]	0.0137[b]	0.0170[c]	0.0197[c]	0.0237[d]	0.0267[e]
Glycosides										
Phytochemical					**Selected Plant**					
Constituent	**SF**	**CP**	**CV**	**MO**	**SH**	**BC**	**CL**	**SA**	**PA**	**CD**
Glycosides	0.0303[a]	0.0347[b]	0.0403[c]	0.0447[d]	0.0470[d]	0.0507[e]	0.0527[e]	0.0560[f]	0.0597[g]	0.0667[h]
Chalcones										
Phytochemical					**Selected Plant**					
Constituent	**MO**	**CV**	**PA**	**SH**	**CD**	**BC**	**SF**	**CP**	**SA**	**CL**
Chalcones	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]
Flavonoids										
Phytochemical					**Selected Plant**					
Constituent	**CD**	**BC**	**SF**	**CP**	**SA**	**CL**	**MO**	**CV**	**PA**	**SH**
Flavonoids	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	0.0000[a]	d1.0057[b]	0.0097[c]	0.0127[i]	0.0220[e]

Key:
SH=*Srophanthus hispidus*; SF=*Spilanthes filicaulis*; CP=*Calliandra portoriensis*; *BC=Buchholzia cariacea*; CL=*Carpolobia lutea*; PA=*Peticeria alliacea*; SA=*Secamone afzeli*; CV=*Clerodendrum volubile*; MO=*Moringa oleifera*; CD=*Chasmanthera depedens;*
Means with the same letter in the same column are not significantly different at p>0.05

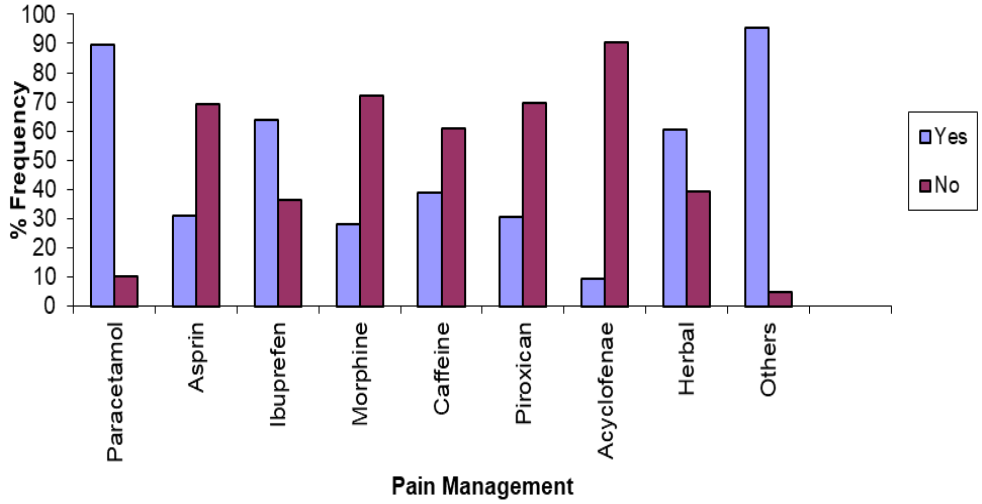

Figure 1: Choice of people living on Pain Management Therapy

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