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Survey and Documentation of Botanicals in the Management of Hypercholestrolemia in Ado – Odo Ota, Ogun State, Nigeria

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Abstract: A new working and leisure standards have been adopted by most of the populace in low and medium income countries, including Nigeria. In view of this, significant changes in the quality and quantity of food consumed especially with the proliferation of fast food outlets posed serious attendant risk to their health from unhealthy nutrition. One of such risks is hypercholesterolemia. The indigenous people of Ado - Odo Ota community are blessed with rich vegetation and are known for their vast knowledge in the use of plants for the treatment and management of several ailments. However this knowledge of hypercholesterolemia. has not been fully harnessed. This study therefore surveyed and recorded plants used in the management of hypercholesterolemia in Ado Odo Ota, Ogun State southwest Nigeria. Ethnobotanical information were obtained using semi structured questionnaire and oral interview from 156 respondents living in Ado Odo Ota and conversant with plant uses. Data were analyzed with descriptive statistics and expressed in tables and figures. A total of 50 medicinal plants, belonging to 33 families were identified. The family Malvaceae, Rutaceae and Solannaceae represented by four species each were identified as the leading families. The dominant life forms of all plants reported was herbaceous form while the preferred method of utilization was decoction. Among the various plant parts used, leaf is the most sourced. *Triumfetta cordifolia, Sida acuta, Phylanthus amarus, Phylanthus muellerians, Zingiber officinales, Justica secunda* were the most frequently used plants.The surveyed plants used in the management of hypercholesterolemia in Ado Odo Ota revealed the indigenous practice and reliance of the people on plants. This can also serve as scientific baseline information for future pharmacological studies and development of plant based drugs.

Keywords: *Medicinal Plants, Hypercholesterolemia, Ethnobotanical Survey*.

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I. INTRODUCTION

Herbal medicine is typically the most accessible primary healthcare for a large proportion of the people in Nigeria. However, its potential remains under-explored, especially with regards to their documentation [11].

The use of plants remain an integral part of various cultures and traditions globally[2] The therapeutic claims of these plants can be validated to guarantee their innovative and sustainable use in drug development. Innovative opportunities abound in Africa, to leverage on the expertise in natural products and traditional medicines[3].

There is a huge investment in the research-based pharmaceutical industry in developing new medicines and vaccines that prevent and treat diseases and improve the lives of patients, especially in African countries. It is therefore essential that appropriate strategies be developed for phytomedicine and phytomedicine research in which stakeholders, including academia, pharmaceutical companies, and entrepreneur partners, play pivotal roles. Phytomedicine still holds large reserves of hit targets and practices to support the efforts of the industry and create new enterprises. However, the challenges remain that phytomedicine, in its current state in Africa, cannot appropriately integrate into the standard pharmaceutical practice and business opportunities in which entrepreneurs can participate[4]. Phytomedicine can be defined as the herbal medicine with therapeutic and healing properties.[5]

The term hypercholesterolemia mean high cholesterol level in the blood [6].Cholesterol level in blood is considered high when the value is greater than 240mg/dL or (6.2mmol/L). Cholesterol is a fat like nutrient found in animal food. Cell acquire cholesterol from two main sources, either through dietary cholesterol or intracellular synthesized cholesterol [7].

Over one-third of people worldwide suffer from hypercholesterolemia, and it poses a significant risk for heart-related diseases (affecting 37% of men and 40% of women) [8]. Disease conditions like stroke, acute myocardial infarction. and hypertension has been successfully linked to high blood cholesterol[9].

➢ *Objectives*

The Objectives are:

- Carry out a survey of plants used by the Ado-Odo Ota communities in the management of hypercholesterolemia.
- Collect and identify plants claimed to reduce blood cholesterol.
- Evaluate and determine the plant with the highest inhibitory potentials against β-Hydroxy-β-methylglutaryl-CoA (HMG–CoA).
- Determine botanicals which could further be research on with the aim of drug discovery.

II. MATERIALS AND METHODS

➢ *Survey and Data Collection*

An ethnobotanical survey was carried out in the Ado-Odo Ota Local Government Area of Ogun State from August 2017 to April 2018 to collect significant data on medicinal plants used to manage hypercholesterolemia. Respondents completed semi-structured questionnaires, which served as the basis for the data collection. The plant specimens included in the recipes were gathered, preserved, displayed, recognized, and verified using standard text and local nomenclature [10]. Three components made up the questionnaires. Section 1 addresses demographic information such as sex, age, education level, occupation, and religion. While Section 2 contains information regarding medicinal plants, this contains the plant's name, components that are utilized, availability, and source of information, along with any associated adverse effects. The third section covers preparation techniques, which include extraction solvent, extraction mode, delivery techniques, dose, and therapy duration. Respondents were given an oral translation and interpretation of the questionnaire in the native language, and they then reported the answers.

➢ *Study Area*

Six locations Agbara, Igbesa, Ado Odo, Atan, Iju, and Ota were used for the survey with falls within Longitude: 3° 40' 59.99" E and Latitude: 6° 40' 59.99" N. The Awori people, a subgroup of the Yorubas were the area's original occupants, they make up the majority of the populate.[11].

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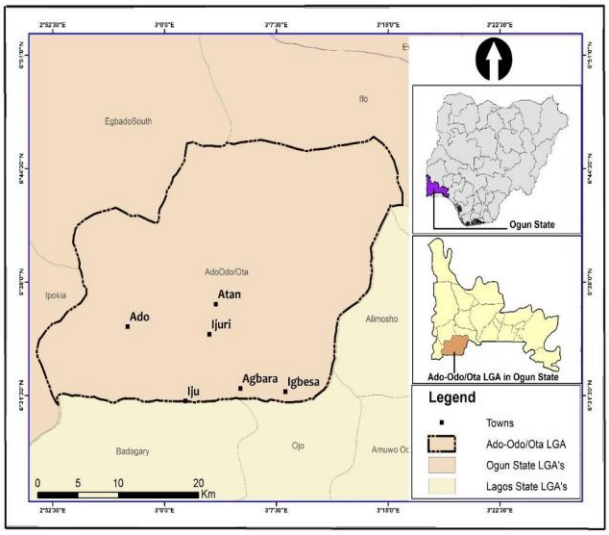

Fig 1: Map Showing the Location of the Study Area

➢ *Ethical Approval*

Informed consent were gained from 156 respondents once the research's goal was presented to them in the study region prior to performing the interview.

➢ *Collection, Identification and Preservation*

Plant samples were gathered, compressed, mounted, identified, and verified through the use of standard text and local names (Gbile, 2002).

➢ *Data Analysis.*

Quantitative data were coded, and entered into Statistical Package for Social Science (SPSS) version 23 for analysis. Descriptive statistics were used to examine additional valuable data on plant habits, preparation techniques, and administration routes of medicinal plants in addition to frequency distribution analysis.

➢ *Procedure for HMG CoA Inhibitory Assay*

The experiment began with the plate reader set to 37^0 C and 340 nm. The plant samples were mixed with 181 µl of assay buffer. After that, 4 µl of NADPH and 1 µl of pravastatin (inhibition) were added. After giving the Microplate holding the reaction mixtures a good shake for ten seconds, 12 µl of HMG-Co A was added to the samples of inhibition and activity (the six plant extracts). Subsequently, there was another intense shaking for a minimum of 10 seconds, and the absorbance was measured at 1-minute intervals for four minutes.

Table 1 Reaction Volume of Plant Samples for 96 Well Plate

Sample	1x Assay buffer	Pravastatin	NADPH	HMG-Co A	HMGR
Blank	184 ul	-	4 ul	12 ul	-
Activity	182 ul	-	4 ul	12 ul	2 ul
Inhibition	181 ul	1 ul	4 ul	12 ul	2 ul
Normal	181 ul	DH_2O	4 ul	12 ul	2 ul

In table 2 below, the survey showed a total of 156 respondent there are more female respondents) most of the respondents fall within the age range of 21 - 40. Participants' ages 21 – 40 had more knowledge on plants with anti-hypecholesterolemic activities.

Fifty eight percent of respondent claim their source of knowledge from parents or ancestor while 26% from training. Only 6% claimed to get their knowledge through divination, and 10% claimed ancestral and training.

➢ *Diversity of Medicinal Plants Used*

Fifty therapeutic plants belonging to thirty three (33) families were encountered in the survey. Table 1.3 included the plant components utilized, family, scientific names, common names, and habits. Herbs made up 50% of the plant flora, with trees coming in second at 34% and shrubs third at 16%. The most commonly utilized plant portion was the leaves (54%) which were followed by the fruits (22%) stem bark 3%, seeds 7%, entire plant 6%, bulb and roots 2% each, and stem bark . about 27% of the plants were found around the house, 25% were bought at the market, and 12% are not easily accessible.

➢ *Plants Identified to Reduce Blood Cholesterol*

From the 50 plants gathered from the survey six most recommended plants: Phyllanthus amarus, Phyllanthus muellerianus, Chenopodium ambrosoide, Sida acuta, and Triumfetta cordifolia were selected and screened for β-Hydroxy-β-methylglutaryl-CoA (HMG–CoA) assay as shown in table 4 below.

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III. RESULTS

Table 2. Socio – Demographic Indices of Respondents

	SPECIFICATION	FREQUENCY	PERCENTAGE
GENDER	Male	73	46.8
	Female	83	53.2
	Total	156	100.0
AGE (YEARS)	<20	10	6.4
	21 – 40	68	43.6
	41- 60	54	34.6
	>60	24	15.4
	Total	156	100.0
EDUCATION LEVEL	Primary	18	11.5
	Secondary	43	27.6
	Tech.//teachers college	11	7.1
	Diploma	26	16.7
	Vocational training	16	10.3
	NCE	1	.6
	First degree	7	4.5
	Higher Degree	4	2.6
	No Formal Education	30	19.2
	Total	156	100.0
OCCUPATION	Farming	47	30.1
	Herbseller	34	21.8
	Government official	19	12.2
	Private Sector Employee	33	21.2
	Traditional healer	6	3.8
	Artisan	3	1.9
	Others	14	9.0
	Total	156	100.0
RELIGION	Christianity	64	41.0
	Islam	80	51.3
	Others	12	7.7
	Total	156	100.0

Table 3: Anti-Hypecholesterolemic Plants Encountered in Ado Ado-odo Ota Area of Ogun State

S/N	SCIENTIFIC NAME	FAMILY	PLANT PART(S) USED	HABIT	FRQ
1	*Abelmoschus esculentus* (L) Moench	Malvaceae	Fruit	Herb	1
2	*Allium sativum* L.	Liliaceae	Bulb	Herb	5
3	*Aloe vera* (L.)	Liliaceae	Leaf	Herb	2

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4	*Anthoclesita djalolensis* A. Chev.	Longaniaceae	Bark	Tree	2
5	*Capsicum annuum*	Solannaceae	Fruit	Shrub	3
6	*Carica papaya* L.	Caricaceae	Leaf	Herb	1
7	*Cassia obtusifolia*	Caesalpiniaceae	Leaf	Herb	1
8	*Chenopodium ambrosoide*	Euphorbiaceae,	Whole leaf	Herb	7
9	*Chromolaena odorata* (L.)	Compositae	Leaf	Herb	1
10	Citrullus colocynthis, L.	Cucurbitaceae	Whole plant	Herb	4
11	*Citrus paradisi* Macfad.	Rutaceae	Fruit	Tree	1
12	*Citrus lemon* L.	Rutaceae	Fruits	Tree	1
13	*Citrus aurantium* L.	Rutaceae	Fruits	Tree	1
15	*Cocos nucifera* L	Palmae	Fruit	Tree	1
16	*Cola nitida*	sterculiaceae	Leaf	Tree	1
17	*Corchorus olitorius* L.	Tiliaceae	Seed	Herb	1
18	*Cucumeropsis manni*	Cucurbitaceae	Leaf/ Fruit	Herb	1
19	*Curcuma longa* L	Zingiberaceae	Root	Herb	7
20	*Cymbopogon citrates*	Poaceae	Leaf	Herb	3
21	*Dialium guineens*	Fabaceae	Leaf	Herb	2
22	*Ficus exasperata* (Vahl)	Moraceae	Leaf/Seed/Bark	Tree	1
23	*Garcinia kola* Heckel	Guttiferae	Seed	Tree	1
24	*Gossypium sp*	Malvaceae	Leaf	Shrub	1
25	*Ipomea batatas*	Convolvulaceae	Leaf	Herb	1
26	*Jatropha gossypifolia*	Euphobiaceae	Leaf	Shrub	2
27	*Justicia secunda* Vahl	Acanthaceae	leaf	Herb	9
28	*Kigelia africana* Benth	Bignoniaceae	Leaf	Herb	3
29	*Lawsonia inermis* L.	Lythraceae	Leaf	Shrub	1
30	*Lycopersiacum esculentus*	Solannaceae	Leaf/Fruit	Herb	1
31	*Magnifera indica*	Anacardiaceae	Leaf	Tree	1
32	*Moringa oleifera* Lam.	Moringaceae	Leaf	Tree	2
33	*Musa acuminata* L.	Musaceae	Leaf	Herb	2
34	*Nicotina tabacum*	Solanaceae	Leaf	Shrub	1
35	*Persea americana*	Lauraceae	Fruit	Tree	1
36	*Phyllanthus amarus* Schumach. & Thonn	Phyllanthaceae,	whole	Herb	5
37	*Phyllanthus muellerianus* (Kuntze) Exell	Phyllanthaceae	Leaf	Herb	12
38	*Piper guianense* Schum & Thonn	Piperaceae	Fruit	Shrub	1
39	*Psidium guajava* L.	Myrtaceae	Leaf	Herb	3
40	*Rauvolvia vomitoria* Afzel	Apocynaceae	Leaf/ Root	Tree	1
41	*Senna alata* (L.) Roxb	Caesalpinaceae	Leaf	Tree	2
42	*Sida acuta* Burm.	Malvaceae,	Leaf	Herb	7
43	*Solanum melongena*	Solanaceae	Fruit	Herb	1
44	*Theobroma cacao* L.	Malvaceae	Leaf	Tree	1
45	*Trema orientalis* (L) Blume	Cannabaceae	Leaf	Tree	4
46	*Triumfetta cordifolia* A. Rich	Tiliacea	leaf	Herb	11
47	*Vernonia amygdalina* Delile	Asteraceae	Leaf	Herb	7
48	*Xylopia aethiopica*	Annonaceae	Seed	Tree	2

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49	*Zea mays*	Poaceae	Fruit	Shrub	2
50	*Zingiber officinale* Roscoe	Zingiberaceae	Rhizome	Shrub	11

Table 4: Percentage Inhibition of Each Plant Aqueous Extract Against HMG CoA reductase

	10 µg/ml (% Inhibition)	30µg/ml (%inhibition)
Phyllanthus amarus	45	-89
Phyllanthus muellerians	27	17
Chenopodium ambrosoide	27	17
Triumfetta cordifolia	20	99
Sida acuta	7	84
Justica secunda	-7	31

- *Inhibitory Effect of the Six Plants Extracts Against HMG CoA Reductase at Different Concentrations*

The result of the inhibitory activity of the selected six plants against HMG CoA revealed that *Triumfetta cordifolia* had the highest inhibition (99%) followed by *Sida acuta* (84%), *Justica secunda* (31%), *Phyllanthus muellerianus* (17%), *Chenopodium ambrosoide* (17%) and *Phyllanthus amarus* had the least inhibitory effect (-89%) (Table 1.4)

IV. DISCUSSION

Most traditional medicine is derived from plants, and it is believed that 80% of humans and 90% of cattle rely on it [12]. According to the current study, female had more knowledge of medicinal plant and most fall within the age range of 21 -40. Their major occupation is farming. just about 19% had no formal education and 27% had the first school leaving certificate. The majority of respondents (57%) primarily learned the source of their knowledge verbally from their ancestors. This discovery was made in conjunction with a previous report by Rizwan, *et al*. (2024) [13] that said that the customary means of transfering information on the applications of medicinal plant which its owners may preserve zealously at times —is verbal transmission. Such indigenous behaviors are either lost or rejected, and the reason for this seems to be the changes that modern life has forced upon social structures and attitudes.

Local names for plants used in recipes to control hypercholesterolemia were provided by interviewees. Using standard texts, the indicated local names were confirmed to correspond with their corresponding botanical names Forms that are most frequently used are herbs, which are followed by trees and shrubs. Herbs may be readily obtained and gathered from backyards or farms. Malvaceae and Solanaceae were the most preferred families used. High pharmacological characteristics have been identified for these families. Fewer species were observed in the other 33 families encounterd. Based on useage, plant parts most commonly utilised were leaves (51%), then fruits (23%), seeds (8%), and stem bark, bulb, rhizome, roots (14%) whole plants (2%) and flower (2%), The most often utilised plant components are leaves, and tthis agreed with the research done in 2019 by Malik *et al*.[14], here leaves are the highest ranked among the harvested plant parts.

HMG CoA is a major enzyme in the mevalonate pathway, which synthesis cholesterol. Studies have indicated that HMG CoA inhibition has a crucial role in blocking the formation of cholesterol.[15]. In this experiment, the six selected plants subjected to in vitro HMG CoA reductase assay showed that *T. cordifolia* had the highest inhibitory activity of 99% against HMG CoA. This simply implies that the plant is very active and can prevent the production of cholesterol that had been implicated as an onset of various forms of cardiovascular diseases.

V. CONCLUSION

Due to the adoption of new work and leisure norms by the majority of people in poor and average income nations, like Nigeria, as well as the notable shifts in the type, quantity, and quality of food consumed—particularly with the rise of fast food restaurants and the associated risks they pose to a healthy diet—there have been substantial changes in food consumption patterns. As a result of this unhealthy feeding habit there had been an increase in consumption of food with high dietary cholesterol. which could result into cardiovascular related diseases.

From the report of this research, the two plants which where found to have the highest level of inhibition against

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HMG CoA. can be further researched upon. The active compounds of the plants can be determined and isolated. Patent drugs could be produced from such. Through TVET participation, systematic analytical and standardization procedures can be developed for products of phytomedicine research to fit into business models for pharmaceuticals and form the bedrock for sustainable engagement of pharmaceutical industries in the health care of economically poor African populations.

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REFERENCES

[1]. Lawal, I.O., *et al*., *Ethnobotanical survey of local flora used for medicinal purposes among indigenous people in five areas in Lagos State, Nigeria*. Plants, 2022. **11**(5): p. 633.

[2]. Bhusnure, O.G., *et al*., *Phytopharmaceuticals: An emerging platform for innovation and development of new drugs from botanicals.* Journal of Drug delivery and therapeutics, 2019. **9**(3-s): p. 1046-1057.

[3]. Nwaka, S., *Landscape for Research and Innovation in Africa*, in *Social and Technological Innovation in Africa: Sustaining a Post COVID-19 Research for Development*. 2021, Springer Singapore: Singapore. p. 11-24.

[4]. Adedeji, A.A., I.E. Talabi, and F. Oladoja, *Alternative Medicine in Health Care: Is the Time not Now to Standardize African Phytomedicine to Indigenize Health Care and Create Entrepreneurial Opportunities?*, in *Medical Entrepreneurship: Trends and Prospects in the Digital Age*. 2023, Springer. p. 259-273.

[5]. Srivastava, A., *et al*., *New Look to Phytomedicine*. 2019, Academic press.

[6]. Cha, D. and Y. Park, *Association between dietary cholesterol and their food sources and risk for hypercholesterolemia: the 2012–2016 Korea national health and nutrition examination survey.* Nutrients, 2019. **11**(4): p. 846.

[7]. Zampelas, A. and E. Magriplis, *New insights into cholesterol functions: a friend or an enemy?* 2019, MDPI. p. 1645.

[8]. Vandoni, M., et al., *Combatting sedentary behaviors by delivering remote physical exercise in children and adolescents with obesity in the COVID-19 era: a narrative review.* Nutrients, 2021. **13**(12): p. 4459.

[9]. Upadhyay, R.K., *High Cholesterol Disorders, Myocardial Infarction and Its Therapeutics.* World Journal of Cardiovascular Diseases, 2023. **13**(8): p. 433-469.

[10]. Ajao, A.A.-n., Y.O. Mukaila, and S. Sabiu, *Wandering through southwestern Nigeria: An inventory of Yoruba useful angiosperm plants.* Heliyon, 2022. **8**(1).

[11]. Ayanda, O.I., O.A. Bello, and O.I. Nwabuisi, *Trace metal toxicity in some food items in three major markets in Ado-Odo/Ota LGA, Ogun State, Nigeria and associated health implications.* African Health Sciences, 2020. **20**(4): p. 2050-61.

[12]. Aragaw, T.J., D.T. Afework, and K.A. Getahun, *Assessment of knowledge, attitude, and utilization of traditional*