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Traditional medical uses of different varieties of *Citrus species* consumed by the Agatu/Idoma tribe of Ayele in Nasarawa local government Area of Nasarawa State, Nigeria

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Abstract

Citrus is the second most popular and common fruit after mango that is widely consumed by the Agatu tribe of Ayele in Nasarawa Local Government Area of Nasarawa State, Nigeria since the ancient time. The objective of the research was to document different varieties of citrus in Ayele and their traditional medical uses. Well-known and respected individuals in the field of traditional medicine practices in Ayele community were interviewed orally on varieties of citrus and their uses and specimens were gathered for confirmations. Results of the findings showed that different varieties of sweet, bitter and sour citrus were used to manage various ailments such as cancer, inflammation, high blood pressure, diabetes, skin diseases, blurred vision, cuts, and loss of appetite, obesity, indigestion and flatulence. The varieties of citrus used and their folklore uses were properly identified and documented by their Scientific, English, Agatu/Idoma and Hausa names.

Keywords: Ayele, citrus, variety, food, ethno-medicine

Introduction

Citrus was first known to China as documented in their old literature of 314 BC^[1, 2]. In 1987, *citrus* was the highest orchard plants globally^[3] and in 2010, the yearly harvest was about one hundred and twenty three million tons^[4, 5]. In 2012, the world cultivation of sweet oranges increased to 70%^[6] and in 2017, more than seventy three million tons of oranges were planted globally and Brazil was known to cultivate about 24% of the global total amount seconded by China and then India.^[7] The different species of oranges documented in the literature include *C. limon* (lemon), *C. medica* (citron), *C. aurantium* (sour orange), *C. paradisi* (grape fruit), *C. reticulata* (mandarin, tangerine), *C. clementina* (clementine) and *C. sinensis* (sweet orange) and are broadly classified into sweet sour and bitter oranges^[8]. They are eaten throughout the world as it provides good quantity of ascorbic acid to the body as antioxidants and boosters^[8]. Traditionally, citrus have been used to manage constipation, cramps, colic pains, diarrhea, bronchitis, tuberculosis, cough, cold, obesity, menstrual disorder, angina, hypertension, anxiety, and depression and stress^[9]. Different chemical constituents have been associated with the fruits, peels, leaves, juice and roots such as flavonoids, steroids, hydroxyamides, alkanes, fatty acids, coumarins, peptides, carbohydrates, carbamates, alkylamines, carotenoids, volatile compounds and nutritional elements like potassium, magnesium, calcium and sodium were identified^[10]. Orange is one of the most useful edible trees in Nigeria consumed at home as food and in the industries for production. In the industry, citrus is rated highest above other fruits used as raw materials in juice industry with more than 70% of total consumption of fruits in Nigeria^[11].

Materials and Methods**Study Design**

Illustrative prevalence study was carried out in Ayele in Nasarawa Local Government Area of Nasarawa State, Nigeria to determine the different varieties of *Citrus species* used as traditional medicine by the community.

Study Area

Ayele village, founded by the Agatu in 1830, is a village under Loko District Council of Nasarawa Local Government Area in Nasarawa State. Ayele is located in a riverine area on the edge of the Benue River.

The main ethnic group and the inhabitants of Ayele village are the Agatus. As an agrarian community, farming, fishing, hunting and commerce are the preoccupation of the people with 99.99% of the population as Christians and only about 0.01% pagans and muslins. It has an area of 176, 012 km² and a population of about 10, 611 with more of the older people (50- 90 years) than the youth (20- 49 years). Ayele has only one Primary Health Care as Healthcare Delivery System with few and primitive facilities making over 95% of the entire population to depend on Traditional Medicine. Most of the youths in Ayele have left for cities in search of education and white collar jobs allowing the huge-wealth of the knowledge in traditional medicine with the uneducated and old folks who are mainly farmers, business men, hunters, fishermen and herbalists and who may soon be gathered up to their ancestors.

Study Population

The sourced data includes patients on traditional medicine, farmers, hunters, fishermen and herbalists or any one identified and received by the community to have knowledge on traditional medicine for not less than ten years. The research area included people from the age of ≥ 40 years which have reside in the village for \geq ten years.

Sample Size

The formula, $N = X^2 Y (1-Y)/F^2$ was used in the calculation of sample size.

Where

N = Approximate sample size

X = Standard value correlating to the preference measure of certainty

F = Error of clarity

Y= Individuals acquiring healthcare from traditional medicine (95%).

Note: Putting on the non-respondent rate (5%) to the final sample size became 290 but 300 was adopted as the sample size for the research.

Oral Interview

The method used by [12] was acquired for the research work. Data on different varieties of oranges from Ayele were collected by oral interview of folks with treasures of grip on traditional medicine using designed question polls. Older folks, Traditional medical practitioners, herb-doctors and individuals with sufficient knowledge on the tradition and prescriptions; well-known and respected by the locality were interviewed. Plant samples were collected in company of the Traditional medical practitioners and digital photographs of the plant samples were taken. For the periods of the quiz, common plant names, beneficial medicinal parts, mode of preparation and application, dosage and length of treatment were documented. The research took one year to be completed (January 2021 to January 2022).

Plant Collection and Identification

Different varieties of orange leaves, flowers and fruits were gathered from Ayele in Nasarawa Local Government Area of Nasarawa State, Nigeria between 2nd January, 2021 and 17th January, 2021. The plants were identified in the field using pharmacognostic descriptive tools and conditions in the 'Flora of West Tropical Africa' [13] and the 'Woody plants of Ghana' [14]. This was then authenticated at the Department of Horticulture and Landscape technology, Federal College of Forestry, Jos, Nigeria and allocated Voucher Numbers by Mr. Joseph Jeffrey Azila and the specimens were deposited in the herbarium of the same institution.

Table 1: Identification of the Varieties of Citrus species

S. No	Botanical Name	Authority	Family	English Name	Hausa Name	Idoma name	Type
1	<i>Citrus bergamia</i>	Risso et Poiteau	Rutaceae	Bergamot orange	Lemu mai daci	Alemu Onugba	BITTER
2	<i>Citrus reticulata</i>	Blanco	Rutaceae	Mandarin Orange	Lemu Mandarin	Alemu Mandalin	SWEET
3	<i>Citrus sinensis</i>	L.	Rutaceae	Sweet/Common/Juice Orange	Lemu mai zaki	Alemu Olamu	SWEET
4	<i>Citrus meyeri Citrus limon</i>	Burm.F.	Rutaceae	Lemon	Lemu mai tsami	Alemu Opompo	SOUR
5	<i>Citrus aurantiifolia</i>	L.	Rutaceae	Lime-Orange	Lemu mai tsami	Alemu Ogbibli	SOUR
6	<i>Citrus sinensis</i>	L.	Rutaceae	Navel Orange	Lemu mai cibiya	Alemu Agriki	BITTER
7	<i>Citrus macracantha</i>	Hassk	Rutaceae	Heirloom navel/Washington Orange	Lemu mai cibiya kara	Alemu Agriki kara	BITTER
8	<i>Citrus aurantium</i>	L.	Rutaceae	Seville Soar Orange	Lemu mai tsami	Alemu Ogbibli	SOUR
9	<i>Citrus sinensis</i>	L. (Osbeck)	Rutaceae	Red/Blood Orange	Lemu mai ji'ni	Alemu goyi	SWEET
10	<i>Citrus paradisi</i>	Macfad.	Rutaceae	Pink-grape Orange	Garehul	Yero Lemu	SWEET
11	<i>Citrus medica</i>	L.	Rutaceae	Citron	Lemu Citron	Alemu Citron	SOUR
12	<i>Citrus sinensis</i>	L.	Rutaceae	Acid-less Orange	Lemu mara acid	Alemu yeye	SWEET
13	<i>Citrus nobilis</i>	King	Rutaceae	King-Mandarin	Sarkin-Mandarin	Oche-Mandalin	SWEET
14	<i>Citrus paradisi</i>	Macf.	Rutaceae	Florida-grape Orange	Garehul Florida	Alemu Flolida	SWEET
15	<i>Citrus sinensis</i>	L.	Rutaceae	Cara-Cara	Lemu mai Jan cibi	Alemu Kala-kala	BITTER
16	<i>Citrus grandis/maxima</i>	L. (Osbe).	Rutaceae	Pomelo/Pummelo	Lemun tsami	Alemu Ogbibli	SOUR
17	<i>Citrus reticulata</i>	Blanco	Rutaceae	Murcott Mandarin	Lemu mai ruwa	Alemu olonye	SWEET
18	<i>Citrus reticulata</i>	Blanco	Rutaceae	Golden-nugget Mandarin	Mandarin mai zinariya	Mandalin ga jifa	SWEET
19	<i>Citrus reticulata</i>	Blanco	Rutaceae	Clementine Orange	Klemeti	Klementin	SWEET
20	<i>Poncirus trifoliata</i>	L. Raf	Rutaceae	Trifoliate orange	Lemu mai daci	Alemu Ogbibli	BITTER
21	<i>Citrus sinensis</i>	L.	Rutaceae	Pineapple Orange	Lemu mai Abarba	Alemu ko g'ede k'ebon	SWEET
22	<i>Citrus unshiu</i>	Yu-tanaka	Rutaceae	Satsuma/Unshu mikan/Cold hardy mandarin	Sa suma	Sa suma	SWEET
23	<i>Citrus bergamia</i>	Risso	Rutaceae	Bergamot orange	Lemu mai daci	Alemu ohiono	BITTER

Table 2: Ethno-medical uses of the different varieties of *Citrus species*

S. No	Type	Uses
1	Sweet	Management of cancer, inflammation, high blood pressure, diabetes, skin diseases, blurred sight, loss of appetite, obesity, indigestion & flatulence
2	Bitter	Control of high blood pressure, diabetes, wounds, indigestion & skin diseases
3	Sour	Control of high blood pressure, diabetes, wounds, skin diseases & flatulence

Discussion

Citrus are very good source of ascorbic acid, antioxidant, folate, dietary fibers and bioactive constituents like carotenoids, hesperetin, naringenin and flavonoids that prevent cancer and other degenerative diseases [8]. Citrus also contain compounds that have antiinflammatory properties that inhibit the regulatory enzymes such as protein kinase c, phosphodiesterase, phospholipase and cyclooxygenase which control the formation of biological mediators responsible for the activation of endothelial and specialized cells responsible for inflammation [8]. Sweet, sour and bitter oranges do not contain sodium but are good source of fibre and potassium (14%) [8]. Low sodium, fibre and potassium keep the heart healthy by reducing the risk of increased blood pressure and heart diseases from developing and from being fatal [8]. Fibres upgrade the level of some biochemical factors such as protein and albumin in the blood and decreases cholesterol, triglyceride, high density lipoprotein and low density lipoprotein in the blood because of its capacity to lower or inactivate multienzyme-complex of fatty acid synthesis HMG-CoA reductase [15] and this slows down diabetes development and progression. Ascorbic acid level of citrus also adds to collagen production that supports the skin, promotes wound healing and improves skin strength [8]. Furthermore, citrus contains excellent quantity of vitamin A and α - and β - carotenes, β - cryptoxanthin, zeaxanthin and lutein [8]. Vitamin A keeps mucus membranes and skin healthy and is useful for vision. It is a good source of B-complex vitamins such as thiamin, pyridoxine and folates for external skin replenishments [16]. The alkaline property of oranges stimulates digestive juices to relieve constipation [8, 16] but note that patients with gastro-esophageal reflux diseases may experience increase symptoms such as heartburn and regurgitation due to high acid content [8, 16]. Finally, oranges contain low calories with no saturated fats or cholesterol, but are rich in dietary fibre and pectin which is effective in patients with obesity [8, 16]. Pectin as a bulk laxative protects the mucus membrane from exposure to toxic substances [8, 16] and reduces cholesterol level in the blood by decreasing its reabsorption in the colon and by binding to bile acids. The alkaloid, synephrine in the peel of oranges also reduces the production of cholesterol in the liver. The antioxidant elements combat oxidative stress that oxidizes the low density lipoprotein in the blood [8, 16] and therefore, reduces cholesterol level in the blood.

Conclusion

Twenty three (23) different varieties of *Citrus species* in Ayele, Nasarawa Local Government Area of Nasarawa State, Nigeria were identified with their English, Hausa and Idoma/Agatu names as these languages among others are commonly used as means of communication by the locality. Their traditional medical uses were also documented and this could explain why oranges are consumed in high amount in this part of the globe.

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