Bio-Science Research Bulletin
http://www.bpasjournals.com

Original Research Article

Print version ISSN 0970 0889
Online version ISSN 2320 3161
DOI: 10.5958/2320-3161.2020.00009.7
Vol. 36 No. 2, July-December 2020: P.64-69

Healing From Households: Urban Trees in the Management of Diarrhea and Dysentery in Ijesa Region, Nigeria

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Received on 18.04.2020
Accepted on 08.09.2020

ABSTRACT

The perceptions of Ijesa people on *Musa parasidiaca, Musa sapentum, Polyalthia longifolia* and *Psidium guajava* identified for the management of diarrhea and dysentery were examined. Four respondents, that had maintained continuous domicile for minimum of 10years in Ijesa region, were purposively selected from each of 25 randomly selected communities and interviewed with the aid of semi-structured questionnaire matrix. The medicinal formula on these species, dosage utilization and perceived efficacies were determined. Respondents cut across varying socio-economic classes and were knowledgeable on the identified species. The use of the trees for medicine was perceived as free, readily available and extremely easy to prepare. The trees were cultivated primarily for purposes other than medicine. *P. guajava* and *P. longifolia* were valued for diarrhea while *M. paradisiaca, M. sapientum* and *P. longifolia* were valued for dysentery. Harvesting and use of stems in *M. paradisiaca* and stem barks in *P. longifolia* were annihilative and predatory while harvesting of leaves in *P. guajava,* flowers in *P. longifolia* and fruits in *M. sapientum* were not. The tree-derived medicine were described as very effective because they contained diverse phytochemicals however, pregnant women were disallowed from the use of extracts of *P. longifolia* as they are capable of inducing abortion. Secondary information revealed that diarrhea and dysentery have similar causal organisms, especially *Shigella.* Phytochemicals present in the identified tree species are capable of managing these causal organisms. Strategies that could further enhance medicinal values from urban forestry were prescribed.

KEYWORDS: Households, urban trees, Diarrhea dysentery, Nigeria

INTRODUCTION

Diarrhea and dysentery are common illnesses in developing countries (Uddin, *et.al*. 2015). WHO (2015) revealed that diarrhea causes 4% of all deaths, 5% of health loss to disability and kills around 2.2 million people globally each year. The disease is characterized by loose, watery stools or a frequent bowel movement. Diarrhea may be acute, persistent or chronic. It is acute when it lasts less than 2 weeks, persistent when it lasts between 2 and 4 weeks, and chronic when it lasts longer than 4 weeks (Ochoa and Surawicz, 2002). The disease may be a result of a viral or bacterial infection or food poisoning (Huguera, 2019).

Dysentery is an intestinal infection capable of spreading from an infected person to an uninfected person. According to WHO (2015), dysentery causes about 15% of all deaths yearly. The

disease is of two types, amoebic and bacillary dysentery. Amoebic dysentery is caused by a parasite called *Entamoeba histolytica* and it is common in tropical location that has poor sanitation while bacillary dysentery is caused by bacteria called *Shigella* (also called shigellosis) and it is the most common type of dysentery (Felman, 2017).

Recent initiatives now recognized the dependence on the use of plant-derived medicine in developing countries such as Nigeria. Some of the medicinal plants are becoming scarce as a result of the unprecedented destruction of the environment through various anthropogenic factors. Domestication of plants with medicinal values is now being advocated (Kayode, 2006). The urban forestry is now recognized as a viable domestication method of conserving medicinal plants.

Urban forest plays an important role in ecology and economy of human habitats. They beautify the urban environment, impact climate and the economy while providing shelter to wildlife and recreational area for city dwellers (Jiri, 2017). The urban trees are excellent filters for urban pollutants and fine particulates (Anon. 2020a). Trees provide food, such as fruits, nuts and leaves (FAO 2020). Spending time near trees improves physical and mental health by increasing energy level and speed of recovery, decrease blood pressure and stress (Arborcarbon, 2016). They also serve as source of medicine (Adamant, 2018).

Recently Cole and Kayode (2020) enumerated the urban trees in Ijesa region of Osun State, Nigeria and discovered that four of the trees sampled were valued for curing diarrhea and dysentery. Thus, the study being reported here examined the perceptions of Ijesa people on the household-located trees identified for the management of diarrhea and dysentery in the region.

MATERIALS AND METHODS

The details geographic and agronomic features of Ijesa region of Osun State, Nigera were provided in Cole and Kayode (2020), who had earlier identified the urban trees in the region. The region was delineated into six Local Government Areas (LGAs). 25 communities, spread across the region (Table 1) were randomly selected. Four adults, who had maintained continuous domicile for minimum of 10years, in each of the selected community, were purposively selected and interviewed with the aid of a semi-structured questionnaire matrix.

The interviews were focused, conversational and were centered on the four identified tree species used in the management of diarrhea and dysentery in Ijesa region of Nigeria by Cole and Kayode (2020). The ethnomedicinal formula on these species, dosage utilization and perceived efficacies were determined.

Respondents' consensus on this formula was determined through the conductions of group interviews in each community. Two group interviews, each made up of at least three respondents, were conducted in each community. Key informants made up of health and forest officials in each LGA were indentified and interviewed. Secondary information on the identified species was obtained from journals and websites.

Table 1: Communities where participants were selected in Ijesa region, Nigeria

S.No.	LGA	Community
1	Atakunmosa East	Igangan, Ikoromoja, Iperindo, Iwikun
2	Atakunmosa West	Aaye, Abebeyun, Igila, Itagunmodi, Lefaaji, Olorombo
3	Ilesa East	Olomilagbala, Osun Ankara
4	Ilesa West	Ajimoko, Arimoro. Ilo Ayegunle
5	Obokun	Esa Odo, Esa Oke, Ibokun, Ilahun, Ilase
6	Oriade	Ere Ijesa, Erinmo, Ijeda, Iloko, Iwaraja

Source: Field survey: June 2020

RESULTS AND DISCUSSION

Respondents that cut across varying socio-economic classes were sampled in this study (Table 2). They were mostly males (75%), adults (92%), married (92%), literates (58%) and adherents of the major religion sects in the country. Field observation revealed that their socio-economic classifications did not deprive them of the indigenous knowledge on the four identified trees used in the management of diarrhea and dysentery in the region. The respondents perceived the use of these medicinal trees as free, effective, readily available and the medicine derived from them as extremely easy to prepare.

Table 2: Socio-economic Classification of Respondents in Ijesa region, Nigeria

Feature	Classification	Proportion (%) of Respondents
Gender	Male	75
	Female	25
Age (Years)	<20	8
	21-60	42
	>60	50
Marital Status	Married	92
	Single	8
Religion	Christianity	50
	Islam	33
	Others	17
Educational Status	Literate	58
	Illiterate	42

Source: Field survey: June 2020

Table 3: Identified urban trees used in the management of dysentery and diarrhea in Ijesa region, Nigeria

S. No.	Name of tree species			Family
	Botanical	Common	Vernacular	
1	*Musa parasidiaca*	Plantain	Ogede Agbagba	Musaceae
2	*Musa sapentum*	Banana	Ogede wewe	Musaceae
3	*Polyalthia longifolia*	False ashoka	Igi Igunu	Annonaceae
4	*Psidium guajava*	Guava	Gurova	Myrtaceae

Source: Cole and Kayode 2020

Musa parasidiaca, Musa sapentum, Polyalthia longifolia and *Psidium guajava* were identified by Cole and Kayode (2020) as being valued for the management of dysentery and diarrhea in Ijesa region, Nigeria (Table 3). Although *M. parasidiaca* and *M. sapientum* lacked woody stems and may not be classified scientifically as trees (McLaughlin, 2018; Anon. 2020b) but Cole and Kayode (2020) asserted that respondents in the study area regarded them as trees. Indeed, these two species were classified as non-wood forest products. All the four species were cultivated primarily for purposes other than medicine. *M. parasidiaca, M. sapientum* and *P. guajava* were cultivated primarily for their fruits while *P. longifolia* was cultivated for ornamental purpose.

Table 4: Parts used and classification of the harvesting methods in the identified urban trees used in the management of dysentery and diarrhea in Ijesa region, Nigeria

Disease	Tree species used	Part(s) used	Harvesting Method
Diarrhea	*P. guajava* *P. longifolia*	Leaves Stem barks, Leaves and Flowers	Non annihilative Annihilative
Dysentery	*M. paradisiaca* *M. sapientum* *P. longifolia*	Stem Fruits Flowers	Annihilative Non annihilative Non annihilative

Source: Field survey: June 2020

Table 4 revealed that two and three of the identified species were valued for the management of diarrhea and dysentery respectively. *P. guajava* and *P. longifolia* were valued for diarrhea while *M. paradisiacal, M. sapientum* and *P. longifolia* were valued for the management of dysentery. The use of stem in *M. paradisiaca* and stem barks in *P. longifolia* was annihilative and predatory as the harvesting of the parts used are capable of destroying the mother plants. Cutting eliminates the mother plants while debarking, according to Kayode and Ogunleye (2008), often results in the mortality of the mother plant. Harvesting of leaves in *P. guajava,* flowers in *P. longifolia* and fruits in *M. sapientum* were non-annihilative.

The recipes of the tree-derived medicine are shown in Table 5. Information from the respondents as well as the field observations revealed that the medicines were extremely easy and safe to prepare and the preparations enjoyed the economy of time and materials. They were described as very effective. However, pregnant women were disallowed to use extracts of *P. longifolia,* being capable of inducing abortion.

Table 5: Recipes of the tree-derived medicine from identified urban trees used in the management of dysentery and diarrhea in Ijesa region, Nigeria

Disease	Recipe(s)*
Dysentery	a. Squeeze the flowers of *P. longifolia*, extract the juice and drink few drops of the juice.
	b. Cut the stem of *M. paradisiaca* into pieces, and pound, extract the juice and mix one bottle of the juice with half bottle of honey, drink few drops of the mixture
	c. Mash the fruits of *M. sapientum* with little salt and consume
Diarrhea	a. Boil stem barks or leaves or flowers or mixture of these parts of *P. longifolia* in water, allow to cool and filter. Drink a cup of the filtrate.
	b. Collect tender leaves of *P. guajava* and chew and the infusion is taken

* Extracts of *P. longifolia* should not be used by pregnant women
Source: Field survey: June 2020

Diarrhea and dysentery and are like 'Siamese twins'. They are diseases with similar causal organisms. Diarrhea is caused by *Shigella* (also known as shigellosis). Shigellosis is the most common type of dysentery while Buff (2018) opined that dysentery is caused by infection with bacteria from *Shigella*, Campylobacter, Salmonella, or enterohemorrhagic *E. coli.* Table 6 revealed that the identified urban trees are rich in phytochemicals that are capable of managing these causal organisms. Recent study by Yakubu *et al.* (2015) substantiated the folkloric claim of *M. paradisiaca* sap in the management of diarrhea. They opined that the *antidiarrhoeal* activity of *M. paradisiaca* sap were attributed to the presence of alkaloids, phenolics, flavonoids, and/or saponins which may involve, among others, enhancing fluid and electrolyte absorption through de novo synthesis of the sodium potassium ATPase and/or reduced nitric oxide levels.

Table 6: Phytochemical components of the identified urban tree species used in the management of dysentery and diarrhea in Ijesa region, Nigeria

S. No.	Tree species	Active ingredients
1	*M. paradisiaca*	Flavonoids, phenolics, saponins, alkaloids, tannins, and steroids (Yakubu *et. al.* 2015)
2	*M. sapientum*	Cellulose, hemicelluloses, arginine, aspartic acid, glutamic acid, leucine, valine, phenylalanine and threonine (Imam and Akter 2011)
3	*P. guajava*	Flavonoids, guayavolic acid, guavanoic acid, guajadial, guajaverin (Sanda *et. al.* 2011)
4	*P. longifolia*	Steroids, alkaloids, terpenoids, phenolics and flavonoids (Lavanya *et. al.* 2018)

Source: Secondary information June 2020

Similarly, *M. sapientum* is widely used in Bangladeshi folk medicine for the treatment of diarrhea. Hossain *et. al.* (2011) asserted that the extract of this tree displayed strong anti-bacterial effect against *Escherichia coli, Shigella dysenteriae*, and *Pseudomonas aeruginosa*. Studies by Chah *et al*., (2006), Nair and Chanda (2007) revealed that the extracts of *P. guajava* leaves were effective against *Staphylococcus aureus, Streptococcus mutatis, Pseudomonas aeruginosa, Salmonella enteritidis, Bacillus cereus, Proteus* spp., *Shigella* spp. and *Escherichia coli*. Studies on *P. longifolia* by Lavanya *et. al.* (2018) also established the antibacterial activities of this plant.

In conclusion, the existence of these trees within the household environment provides a ready relieve from the attacks from these diseases. More tree species with medicinal values should be identified and incorporated in urban forestry. Seedlings of such species should be mass produced and made available to the populace for planting in urban environment. Previous suggestion by Cole and Kayode (2020) requesting for enactment of legislation making tree planting compulsory in household areas is still relevant and should be implemented.

REFERENCES

1. Arborcarbon (2016). Benefits of urban trees-Infographic. http: / / arborcarbon.com.au / benefits-of-urban-trees-infographic /
2. Adamant, A. (2018). 16 Medicinal Trees for Your Herbal Medicine Chest. https: / / practicalselfreliance.com / medicinal-trees /
3. Anon. (2020a). The best trees to reduce air pollution. Future Planet. https: / / www.bbc.com / future / article / 20200504-which-trees-reduce-air-pollution-best
4. Annon. (2020b).Is Banana a fruit or herb https: / / www.lexico.com / explore / is-a-banana-a-fruit-or-a-herb
5. Buff, S. (2018). What is dysentery and how is it treated? https: / / www.healthline.com / health / digestive-health / dysentery
6. Chah, K.F., C.A. Eze, C.E. Emuelosi and Esimone, C.O. (2006). Antibacterial and wound healing properties of methanolic extracts of some Nigerian medicinal plants. *J. Ethnopharmacol.,* 104: 164-167.
7. Cole, A. T. and Kayode, J. (2020). Species Diversity in Urban Areas of Ijesa Region of Osun State, Nigeria. *Bulletin of Pure and Applied Sciences,* 38B (1):5-18
8. FAO (2020). Food from the forest. http: / / www.fao.org / 3 / u5620e / U5620E03.htm
9. Felman, A.(2017) Everything You should know about dysentery. Medical News Today. https: / / www.medicalnewstoday.com / articles / 171193
10. Hossain, M. S., Alam, S.B., Asadujjaman, M., Zahan, R., Islam, M. M., Ehsanul, M., Mazumder, H. and Haque, M. E. (2011). Antidiarrheal, Antioxidant and Antimicrobial Activities of the *Musa sapientum* Seed. *Avicenna J Med Biotechnol*.,3(2): 95–105.
11. Huguera, V. (2019). Chronic Diarrhea. https: / / www.healthline.com / health / diarrhea / chronic-diarrhea

12. Imam, M. Z. and Akter, S. (2011). *Musa paradisiaca* L. and *Musa sapientum* L.: A Phytochemical and Pharmacological Review. *Journal of Applied Pharmaceutical Science,* 01 (05), 14-20.
13. Jiri, L. (2017). "The power of streetscape and how to protect it". Newcastle Herald. Newcastle NSW Australia.
14. Kayode, J. (2006). *Conservation in Nigeria Perspective.* Akolawole Press, Ado-Ekiti, 66pp.
15. Kayode, J. and Ogunleye, T. (2008). Checklist and Status of Plant Species Used as Spices in Kaduna State of Nigeria. *Research Journal of Botany* 3 (1): 35-40.
16. Lavanya, C., Rao, B. G. and Ramadevi, D. (2018). Phytochemical and pharmacological studies on *Polyalthia longifolia. International Journal of Pharmaceutical Science and Research,* 3 (4), 1-7.
17. McLaughlin, R. (2018). Plantain Tree. https://dengarden.com/gardening/Plantain-Tree
18. Nair, R. and Chanda, S. (2007). *In vitro* antimicrobial activity of *Psidium guajava* L. leaf extracts against clinically important pathogenic microbial strains. *Braz. J. Microbiol.*, 38, 452-458.
19. Ochoa, B. and Surawicz, M. (2002). Diarrhea: Acute or Chronic. American College of Gastroenterology. https://gi.org/topics/diarrhea-acute-and-chronic/
20. Uddin M.S., Chowdhury V., Uddin S.B., Howlader, M.S. (2015). Ethnomedicinal plants used for the treatment of diarrhea and dysentery by the Lushai community in Bandarban district, *Bangladesh. Journal of Advancement in Medical and Life Sciences,* 2(4), 1-8.
21. WHO (2015) Water related diseases. World Health Organization, Geneva. Switzerland. https://www.who.int/water_sanitation_health/diseases-risks/diseases/diarrhoea/en/
22. Yakubu,M. T., Nurudeen, Q. O., Salimon, S. S., Yakubu, O. M., Jimoh, R. O., Nafiu, M. O. Akanji, M. A., Oladiji, A. T. and Williams, F. E. (2015). Antidiarrhoeal Activity of *Musa paradisiaca* Sap in Wistar Rats. Evidence-Based Complementary and Alternative Medicine Vol. 2015, Article ID 683726, 9 pp. | https://doi.org/10.1155/2015/683726