Utilization of medicinal plants used in the management of HIV/AIDS opportunistic infections in Njeru sub-county, Buikwe district, Uganda

Abstract

HIV/AIDS pandemic is currently the largest socio-economic challenge that faces Eastern Africa including Uganda as it affects mostly the young and the most economically productive population. The majority of the people living with HIV/AIDS are susceptible to bacterial and fungal opportunistic infections that result from immune suppression. However, the increasing acceptance of medicinal plants as an additional and alternative therapeutic strategy to fight against HIV/AIDS opportunistic infections is not adequately documented. The study aimed at assessing the utilization of selected plants used in the management of HIV/AIDS opportunistic infections. Data was collected by ethno-botanical survey. Fifty two (52) medicinal plant species belonging to forty nine (49) genera and thirty one (31) families were identified. Most of these plants were found to belong to families: Lamiaceae, Moraceae, Leguminosae and Verbenaceae. Leaves were the plant part that was predominantly used while drinking of the decoction was the predominant mode of application. Many infections such as skin infections, chronic cough, stomach infection, tuberculosis, diarrhoea, warts, herpes zoster and others were claimed to be treated using medicinal plants.

Keywords: HIV/AIDS, herbs, traditional medicine, complementary medicine, environmental, conservation

Abbreviations: TMPs, traditional medicinal practitioners; HIV, human immunodeficiency virus; AIDS, acquired immune deficiency syndrome; SPSS, statistical package for social sciences

Introduction

Human Immunodeficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS) is a major cause of premature death and imposes a large disease burden around the world (David 2006, 4-5). It reduces progressively the effectiveness of the immune system and leaves the patient susceptible to opportunistic infections. The number of people living with HIV/AIDS are steadily increasing. Many of these cases are in the developing countries. HIV/AIDS pandemic is currently the largest socio-economic challenge that faces Eastern Africa including Uganda as it affects mostly the young and most economically productive population.

The majority of the people living with HIV/AIDS are susceptible to bacterial and fungal opportunistic infections that result from immune suppression. In Sub-Saharan Africa, traditional healers treat and manage a large number of people with HIV/AIDS. Health facilities are overburdened by the increasing demand for care of HIV/AIDS patients, and medicinal plants play a crucial role of providing remedy and also help care by taking care of people living with HIV/AIDS. In Uganda, people use plants as medicines and nutritional supplements in the management of various infections associated with HIV/AIDS which are not documented.

The Global Fund Guidelines (2005) for HIV/AIDS indicate that 135,000 people get infected with the virus every year and most of them are found in Sub-Saharan Africa including Uganda. HIV/AIDS and other opportunistic infections exert the greatest limitations for health care in the world by causing serious debility, morbidity and mortality in the affected population. It is also regarded as the major factor behind population decrease in the last 10 years in the overall life expectancy in Sub-Saharan Africa. This implies that the majority of the people suffering from HIV/AIDS cannot afford modern health care because of the high cost associated with HIV/AIDS drugs. However, the use of medicinal plant species in Uganda especially in Njeru sub-county persist, and is likely to increase substantially because of the increase in human population, ever increasing cases infections with HIV and other diseases. The high demand for medicinal plants fuels the non-sustainable harvesting of medicinal plant species.

This will consequently lead to loss and depletion of wild-harvested medicinal plant species, which in turn will threaten the health care not only in Njeru- Uganda but also worldwide. This is due to lack of a proper strategy of conservation and organizing the commercial trade of the plants and integrating the development from production to consumption. This results to every stakeholder in the medicinal plant sector to have their own interests and thus causing them to ignore the overall development of the sector. Due to degradation of natural vegetation for economic development, genetic erosion and extinction of medicinal plant used in management of HIV opportunistic diseases is rife in Buikwe District (Assistant Environmental officer, personal comm.).
This is going on at the time when new infections and dependency on herbs is on the rise. The information on plants used in the management of HIV/AIDS opportunistic infections in Uganda is to some extent still scattered and under the custodianship of few individuals who have the knowledge on medicinal plants and are of advanced aged. Further still the effectiveness of these plants in the management of the opportunistic diseases has not been tested. Thus the study focused on documentation of the plants used in the management of HIV/AIDS opportunistic infections before they are lost through degradation of their habitat and death of the elderly people who have the knowledge about them. Also their effectiveness in the management of the opportunistic diseases was assessed.

Materials and methods

Study area

Njeru sub-county is located within Buikwe District and it covers an area of 144 sq. km. It is 45 miles East of Kampala, the capital city of Uganda (Figure 1). It also lies North of the equator at latitude 00 28’N and longitude 32 12’E and altitude of 3845 ft (1172 m) above sea level.

Figure 1 Map showing the location of the study area in Buikwe District.

Research design

The study was conducted in Njeru sub-county, Buikwe District. The study focused on the utilization of medicinal plants used in the management of HIV/AIDS opportunistic infections. Ethno-botanical survey was used to identify and document the various plant species used in the management of HIV/AIDS opportunistic infections and in experimental research design was used to identify secondary metabolites and test the bacterial activity of selected medicinal plant extracts used in the management of HIV/AIDS opportunistic infections.

Determination of sample size

A sample size of 35 traditional medicinal practitioners (TMPs) were purposively selected from the three (3) parishes of Njeru Sub-county after were identified by the local council assistant and only 30 TMPs were duly consulted during the data collection because they are not around.

Data collection method

Preliminary survey: Field work for the study was conducted to obtain various medicinal plants. Prior to any contact with the local community, the study were introduced to the sub county officer (LC 1) and Village leader through an introductory letter from Islamic University in Uganda. Two research assistants were helped during the course of the study survey. A pilot study lasted for three days at the beginning of the research. In the pilot study, traditional medicinal practitioners (TMPs) were identified with the help of the local assistant as an interpreter.

Plant species identification: Traditional medicinal practitioners (TMPs) were duly consulted. Medicinal plants used for the management of HIV/AIDS opportunistic infections were collected from their habitat with the help of practitioners. On conversations, data on the local names of plants, plant parts used, infection treated, modes of applications were recorded.

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Method of data analysis

The data collected were analyzed using both Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 20. Frequency and percentage tables were generated to summarize results for discussion. Pie and bar charts were also used to present results.

Results and discussion

Demographic information of the respondents

The majority of the respondents were above 45 years (Table 1). The study was therefore dominated by respondents in the age group
that had been found to hold a lot of knowledge on medicinal plants in various local communities. Uniyal et al.\textsuperscript{24} reported that elderly people know more about plant use than young worldwide. Few traditional medicinal practitioners were in the age group of the youth. Information from the table implies that 7 majorities of those who participated in the study were old women, female herbalists were more involved in conservation by cultivating the medicinal plant species for easy access and they spent most of their time around homesteads. The TMPs in Njeru were females and less educated.

Table 1 Demographic characteristic of the respondents (n=30)

| Parameters         | Frequency | Percentage |
|--------------------|-----------|------------|
| Age                |           |            |
| 15-25 years        | 1         | 3.3        |
| 26-35              | 2         | 6.7        |
| 36-45              | 11        | 36.7       |
| 45 and above       | 16        | 53.3       |
| Gender             |           |            |
| Male               | 13        | 43.3       |
| Female             | 17        | 56.7       |
| Level of education |           |            |
| Primary            | 23        | 76.7       |
| Secondary          | 6         | 20         |
| No formal education| 1         | 3.3        |

Source: Field survey (2015)

Table 2 Medicinal plants used for the management of HIV/AIDS opportunistic infections identified and recorded in Njeru

| Family            | Specie                                | Infection treated                                      | Part used         | Mode of application                  | Growth form | Freq. |
|-------------------|---------------------------------------|--------------------------------------------------------|-------------------|--------------------------------------|-------------|-------|
| Acanthaceae       | Justicia betonica L.                  | Skin infections                                        | Leaves            | Decoction drunk                      | Herb        | 1     |
|                   | Justicia flava (Forssk.) Vahl.        | Tuberculosis; Chronic cough                             | Leaves            | Decoction drunk                      | Herb        | 1     |
| Amananthaceae     | Chenopodium opulifolium Schrad. ex. WDJ Koch & Ziz. | Cryptosporidias meningitis; Tonsillitis | Leaves            | Infusion bath; decoction drunk       | Herb        | 5     |
| Amaryllidaceae    | Allium sativum L.                     | Skin infections; Wound                                 | Whole part        | Crushed with jelly smeared on skin   | Herb        | 2     |
| Anacardiaceae     | Pseudospondias microcarpa (A.Rich) Engl. | Stomach infections                                   | Leaves            | Decoction drunk                      | Tree        | 8     |
|                   | Mangifera indica L.                   | Tuberculosis; Chronic cough                             | Leaves; Stem bark | Decoction drunk                      | Tree        | 6     |
| Apiaceae          | Stegonotaei aoraliacea Hochst          | Stomach pain; Tuberculosis                              | Roots; Stem bark  | Decoction drunk                      | Tree        | 1     |
| Apocynaceae       | Plumeria rubra L.                     | Herpes zoster; Skin infection                          | Stem bark         | Sap mixed with jelly and smeared on skin | Tree        | 4     |
| Asparagaceae      | Sansevieria hyacinoides (L.) Druce.    | Stomach infections; Skin infection                      | Whole part        | Decoction drunk                      | Herb        | 1     |
| Bignoniaceae      | Spathodea campanulata P. Beauv.       | Skin infection                                         | Leaves            | Extract with jelly smeared on skin   | Tree        | 7     |
| Caricaceae        | Carica papaya L.                      | Chronic cough                                          | Leaves            | Decoction drunk                      | Tree        | 4     |
| Cleomaceae        | Gloene gynandra L.                    | Skin infection                                         | Flower            | Extract applied on affected part     | Herb        | 2     |

Plant species used in the management of HIV/AIDS opportunistic infections

A total of 52 plants species used in the management of HIV/AIDS opportunistic infections belonging to 49 genera and 31 families were identified. The families Lamiaceae and Leguminosae had the highest number of species recorded each having 6 and 5 plant species respectively, followed by Moraceae and Verbenaceae in that order (Figure 2) (Table 2). Lamiaceae was used by traditional healers to manage HIV/AIDS infections; including urinary tract, wounds, kidney infection and stomach ache, members of this family contain terpenoids. Terpenoids are biological compounds that can enhance and maintain the body immunity.\textsuperscript{5}
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| Family          | Specie                                      | Infection treated                   | Part used       | Mode of application         | Growth form | Freq. |
|-----------------|---------------------------------------------|-------------------------------------|-----------------|-----------------------------|-------------|-------|
| Compositae      | Tagetes minuta L.                           | Diarrhea; Dysentry                  | Leaves          | Decoction drunk             | Herb        | 3     |
|                 | Vernonia cinerea (L). Less.                 | Diarrhea; Chronic cough             | Leaves          | Decoction drunk             | Shrub       | 2     |
| Cressalaceae    | Kalonchae densiflora Rolfe.                 | Respiratory infection               | Leaves; Stem    | Concoction drunk            | Shrub       | 4     |
| Cucurbitaceae   | Momordica foetida Schumach.                 | Chronic cough                       | Leaves          | Infusion drunk              | Herb        | 2     |
|                 | Luffa cylindrica (L.) M. Roem.              | Respiratory infection; Chest pain   | Stem bark;     | Decoction drunk             | Climber     | 3     |
| Cupressaceae    | Cupressus lusitanica Mill.                  | Tuberculosis; Asthma; Chronic cough | Stem bark;     | Concoction drunk            | Tree        | 3     |
| Euphorbiaceae   | Jatropha cirus Linn.                        | Chronic cough; Diarrhea             | Root; Leaves    | Decoction drunk             | Shrub       | 2     |
|                 | Euphorbia candelabrum Tremaux ex Kotschy.   | Warts; Tuberculosis                 | Whole part      | Decoction drunk             | Herb        | 4     |
| Hypericaceae    | Psorospermum febrifugue Spach              | Herpes zoster; Skin infection       | Leaves          | Extract with jelly smeared on skin | Tree        | 7     |
|                 | Solenostemon latifolius (Hochst. Ex. Benth) JK Morton | Candidiasis; Oral ulcer           | Leaves          | Concoction drunk             | Herb        | 5     |
| Lamiaceae       | Tetradenia riparia (Hochst)                 | Stomachache; Ulcer                  | Leaves          | Decoction drunk             | Herb        | 5     |
|                 | Hash landa opposita Vahl.                   | Candidiasis; Sore throats           | Leaves          | Infusion drunk              | Herb        | 1     |
|                 | Ocimum gratissimum L.                       | Stomach infections                  | Leaves          | Decoction drunk             | Herb        | 3     |
|                 | Plectranthus barbatus Andrews.              | Skin infections; herpes zoster      | Leaves          | Crushed and applied on affected part | Shrub       | 4     |
|                 | Leonotis nepetfolia (L.) R Br.              | Stomach infections                  | Leaves          | Chewed and decoction drunk  | Herb        | 2     |
| Lauraceae       | Persea americana Mill.                      | Chronic cough; Chicken pox; Stomach ulcer | Leaves; Stem bark | Decoction drunk             | Tree        | 3     |
|                 | Senna didymobotrya (Fresen.)                | Fungal infections                   | Leaves          | Concoction drunk             | Tree        | 2     |
| Leguminosae     | Erythrina abyssinica DC                     | Stomach infections                  | Leaves; Stem    | Concoction drunk             | Tree        | 5     |
|                 | Albizia coriaria Oliv.                      | Diarrhea; Chronic cough             | Stem bark       | Infusion drunk               | Tree        | 11    |
|                 | Entada abyssinica A Rich.                   | Chronic cough; Tuberculosis         | Stem bark       | Decoction drunk              | Tree        | 2     |
|                 | Tamarindus indica L.                        | Diarrhea                            | Leaves          | Infusion drunk               | Tree        | 1     |
| Lythraceae      | Punica granatum L.                          | Skin infection; wound; stomach ulcer | Seed; Roots     | Chewed and swallowed         | Shrub       | 2     |
| Malvaceae       | Sida cordifolia L.                          | Warts, swollen limbs                | Leaves          | Crushed and smeared on a swollen part | Herb        | 4     |
| Meliaceae       | Azadirachta Indica A Juss.                  | Stomach infection; oral candidiasis | Leaves; Stem    | Decoction drunk              | Tree        | 2     |
|                 | Ficus asperfolia Miq.                       | Fungal infection; throats ulcer      | Leaves          | Concoction drunk             | Shrub       | 1     |
|                 | Artocarpus heterophyllus Lam.               | Chronic cough; Chest pain           | Stem bark       | Concoction drunk             | Tree        | 3     |
|                 | Milicia excelsa (Welw.) CC Berg.             | Skin infections                     | Stem bark       | Decoction drunk              | Tree        | 3     |
|                 | Trecula africana Decne. ex. Trecul.         | Stomach infections                  | Roots; leaves   | Decoction drunk              | Tree        | 1     |

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Table Continued....

| Family       | Specie                           | Infection treated                  | Part used | Mode of application            | Growth form | Freq. |
|--------------|----------------------------------|------------------------------------|-----------|-------------------------------|-------------|-------|
| Myrtaceae    | Callistemon citrinus (Curtis)    | Chronic Cough                      | Leaves    | Decoction drunk               | Tree        | 9     |
|              | Skeels.                          |                                    |           |                               |             |       |
|              | Psidium guajava L.               | Tuberculosis; Diarrhea              | Leaves; Stem bark | Decoction drunk | Tree        | 2     |
| Phyllanthaceae| Flueggea virora (Roxb. ex Wild)  | Dysentery; skin infection          | Leaves; Roots | Decoction drunk | Shrub       | 3     |
|              | Royce.                           |                                    |           |                               |             |       |
| Phytolaccaceae| Phytolaccia decandra L.          | Skin infection; swollen limbs       | Leaves    | Crushed and smeared on affected part | Shrub       | 1     |
| Polygonaceae | Rumex usambarensis Damm.         | Skin infection; oral candidiasis    | Leaves    | Crushed and smeared on affected part | Herb        | 1     |
| Rutaceae     | Zanthoxylum chalybeum Engl.      | Chronic Cough; Tuberculosis         | Roots; Stem bark | Decoction drunk | Tree        | 2     |
|              |                                  |                                    |           |                               |             |       |
| solanaceae   | Solanum lycopersicum L.          | Skin infection                      | Whole part | Crushed and smeared on affected part | Herb        | 3     |
|              | Solanum nigrum L.               | Joint pain; chronic headache        | Leaves    | Decoction drunk               | Herb        | 2     |
|              | Lantana camara L.               | Chronic Cough                       | Leaves    | Decoction drunk               | Shrub       | 1     |
| Verbenaceae  | Clerodendrum myricoides (Hochst) | Stomach infections; Warts           | Stem bark; Roots | Concoction drunk | Shrub       | 1     |
|              | R Br. ex. Vatke.                |                                    |           |                               |             |       |
|              | Lantana trifolia L.             | Tuberculosis; skin infections       | Leaves    | Concoction drunk               | Herb        | 3     |
| Xanthorrhoeaceae| Aloe vera (L.) Burm f.          | Skin infections                     | Leaves    | Sap mixed with jelly smeared on skin | Herb        | 3     |

Most of the plants used were trees and herbs (Figure 3). The most frequently used plant was Albizia coriaria, Callistemon citrinus, Pseudospondias microcarpa, Spathodea campanulata, Psorospermum fruticulare, Solestenostemon latifolius, Tetradenia riparia and Erythrina abyssinica. Thirty four (34) plant species were used to manage more than one condition, with Cupressus lusitanica, Persea americana, and Punica granatum as the only species used to manage more than two HIV opportunistic infections. The most commonly used part of the medicinal plant was leaves, followed by bark and roots in that order (Figure 3). Leaves are commonly used because they have a higher content of bioactive compounds that treats the infection. The utilization of leaves in local medications inflicting less damaged to the medicinal plants and is advantageous as far as conservation is concerned.

The plant species identified in this study were used to manage twenty eight (28) HIV opportunistic infections. Most of the plant species identified were known to manage skin infections, chronic cough, tuberculosis, stomach infections, diarrhoea, herpes zoster and Warts (Figure 4). Others with low percentage of mention included dysentery, Cryptococcal meningitis, wound, respiratory infections, chest pain, candidiasis, stomach ulcer, fungal infections, swollen limbs, oral candidiasis, tonsillitis, stomach pain, asthma, oral ulcer, stomachache, ulcer, sore throats, chicken pox, throat ulcer, joint pain and chronic headache. Some of the mode of application included decoction drunk, infusion bath, crushed with jelly smeared on skin, extract applied on the affected part, infusion drunk, concoction drunk, chewed and swallowed, crushed and smeared on a swollen part. Drinking decoction was the commonest mode of application followed by drinking concoction, smearing jelly on skin and drinking of infusion in that order. Similarly this mode of application has been reported to be common in Western Uganda. Use of decoction may be due to the advantages associated with it. Decoction as boiling method is an effective method of preparing medicinal plant because it preserves the medicine longer when compared to cold water. According to Marshall NT, in traditional medicine, boiling is believed to be efficient in extracting active ingredient and for hygienic reasons. Similarly Asase et al. observed that the majority of the herbal preparations involved boiling the plant material and then drinking the extract.
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References

Conflict of interest

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The authors declare that they have no competing interest.

Conclusion

Njeru is endowed with a large number of plant species that can be used to manage HIV/AIDS opportunistic infections. A total number of (52) plants species were identified, but the number could even be higher. Plants from the family Lamiaceae, Moraceae, Leguminosae and Verbenaceae were the most frequently used plants. The most commonly used plant part was leaves for the management of HIV/AIDS opportunistic infections. The plants were used to manage several infections but the most commonly mentioned were skin infections, chronic cough, tuberculosis, stomach infections, diarrhea, warts and herpes zoster. The mode of application used by traditional medicinal practitioners (TMPs) was predominantly by decoction drunk.

Figure 4 Percentage of medicinal plant parts used.

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