

A Preliminary Report on Herbal Medicine Use Among Patients Hospitalized at Two-Large COVID-19 Treatment Centers in Uganda

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Introduction: Herbal medication use among patients with COVID-19 imposes a significant risk of drug-herbal interactions and adverse events. This study aimed to assess the prevalence and factors associated with herbal medicine use among patients hospitalized with COVID-19 attending two large COVID-19 Treatment Units (CTU) in Uganda.

Methods: A hospital-based descriptive cross-sectional study was conducted recruiting patients with COVID-19 hospitalized at the Mulago National Referral Hospital and Namboole Stadium CTUs. Chi-square or Fishers' exact test for categorical and Mann-Whitney *U*-test for numerical were used to determine the association between dependent and independent variables.

Results: The study was terminated early because of significant reduction in the number of patients hospitalized with COVID-19 and the closure of Namboole CTU. Of the anticipated 422 participants, we recruited 108 (25.6%). Of this, 58 (53.7%) were female, with a median age of 38 (range: 20–75) years. Forty-nine (45.4%) had received at least one dose of the COVID-19 vaccine. Fifty-eight (57.3%) of the participants had ever used herbal medicine and the majority had used them in the past 12 months (71.9%, *n* = 41) either before the diagnosis of COVID-19 (85.4%, *n* = 35) or after (36.6%, *n* = 15). Being vaccinated for COVID-19 (adjusted odds ratio (aOR): 3.1, 95% confidence interval (CI): 1.4–6.8, *p* = 0.005) and having attained tertiary level of education (aOR: 6.2, 95% CI: 1.7–23.1, *p* = 0.006), as well as the accessibility to herbalists (aOR: 31.2, 95% CI: 3.7–263.2, *p* = 0.002) were significantly associated with herbal medication use. The majority of participants reported some improvement after using herbal medicine (80.7%, *n* = 46) and their doctors or nurses asked almost half of the participants about herbal medicine use (49.5%, *n* = 53).

Conclusion: The use of herbal medicines to treat or prevent COVID-19 among hospitalized patients is a widespread practice in Uganda amidst unpublished evidence of their safety and efficacy.

Keywords: COVID-19, prevalence, herbal medicine use, Uganda

Introduction

Globally, herbal medicines use has been reported as a common practice both in the prevention and treatment of diseases.^{1–3} This is especially common with diseases with high mortality, morbidity or those without conventional therapy that cure the disease. Previous studies in Uganda report that more than 60% of the population depended on traditional medicine before the coronavirus disease (COVID-19) pandemic.⁴ Due to the high mortality associated with the second wave of COVID-19, this practice is likely to have increased.

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Many factors have been identified as drivers of herbal medicine use. In many parts of the world, users have reported that herbal remedies are safe, effective, and are cheap.^{1,5} In Uganda, easy access, and cultural familiarity as well as the higher number of traditional health practitioners compared to health-care professionals are some of the common factors influencing this practice.^{4,6} A recent study in Uganda reported that media has increased the use of herbal medicines in the treatment and prevention of COVID-19.⁷ However, there is limited information concerning the level of herbal medicine use among hospitalized COVID-19 patients and the reasons why they resort to this practice even with the existence of conventional supportive treatment and vaccines.

Although some studies have reported the role of combining herbal remedies with westernized medicine in the treatment of COVID-19,⁸ the side effects of these remedies are not well studied. This is in addition to the wide variation in the types of herbal medicines on the market which may wrongly influence their use. Various studies have documented harmful consequences of herbal remedies including hepatotoxicity and allergies, which may be worsened by confounders such as self-medication.^{1,9} The continued use of herbal medicines without question may lead to long-term health consequences for both the individual and the government.

The Uganda National Drug Policy and Authority Statute (1993) gives the National Drug Authority (NDA) a mandate to regulate herbal medicine use including approving of all manufacturers. During the pandemic, several manufacturers have hit the market with herbal medicine products, but only a few of these are approved by the NDA and little has been done to regulate their practice.¹⁰ This study, therefore, aimed to determine the prevalence of and factors associated with herbal medicine use among hospitalized patients at the two large COVID-19 treatment units in Uganda.

Methods

Study Design and Setting

An observational, cross-sectional study was conducted between July and August 2021 in two large CTUs in Kampala, Uganda, namely, Mulago National Referral Hospital CTU and Namboole Stadium CTU. These are the main referral CTUs in the country with bed capacities of over 30,000 beds catering for a diverse range of patients from all over the country. The CTUs run daily, seeing both

patients referred from other health facilities across the country as well as patients who are being followed up routinely.

Study Population

We approached all patients hospitalized with COVID-19 in the two-largest CTUs in the country. Eligible participants

Table 1 Socio-Demographic Characteristics of Participants

| Variable | Frequency | Percentage |
|---|-----------|------------|
| Median age (interquartile range) | | |
| <39 years | 38 | 20–75 |
| ≥ 39 years | 58 | 53.7 |
| | 50 | 46.3 |
| Sex | | |
| Female | 62 | 57.4 |
| Male | 46 | 42.6 |
| Region of residence | | |
| Central | 76 | 70.4 |
| East | 11 | 10.2 |
| North | 3 | 2.8 |
| West | 18 | 16.7 |
| Level of education (n=106) | | |
| Primary | 19 | 17.8 |
| Secondary | 31 | 29.3 |
| Tertiary | 40 | 37.7 |
| None | 16 | 15.1 |
| Formal employment status | | |
| Employed | 61 | 56.5 |
| Not employed | 47 | 43.5 |
| Religion | | |
| Christianity | 72 | 66.7 |
| Islam | 17 | 15.7 |
| Others | 19 | 17.6 |
| Marital status | | |
| Married | 57 | 52.8 |
| Divorced | 10 | 9.3 |
| Single | 32 | 29.6 |
| Window/widower | 9 | 8.3 |
| Treatment site | | |
| Mulago | 45 | 41.7 |
| Namboole | 63 | 58.3 |
| Vaccination status | | |
| Vaccinated | 49 | 45.4 |
| Not vaccinated | 59 | 54.6 |
| On treatment for COVID-19 | | |
| No | 14 | 13.1 |
| Yes | 93 | 86.9 |

Abbreviation: n, number of participants.

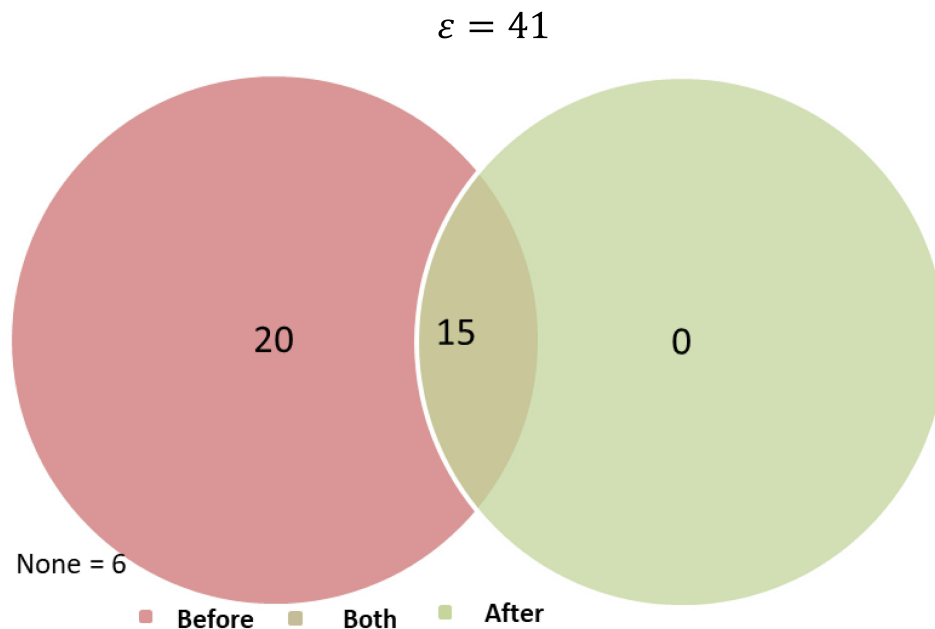


Figure 1 Herbal medical use before and after diagnosis of COVID-19 in the last 12 months. ε represents the total number of patients who had used herbal medicines in the last 12 months before this survey.

were those confirmed to have COVID-19 and aged 18 years and above. Respondents with a known history of impaired mental capacity to provide coherent and reliable information, critically ill in the absence of a reliable caretaker were excluded.

Sample Size Calculation

The sample size was calculated using the Kish Leslie formula for cross-sectional studies where the estimated sample size at 95% confidence interval was 384 participants. To cater for non-response associated with critically ill, unable to provide information or absence of caretakers, 10% of the estimated sample size was added leading to a final sample size of 422 participants.

Questionnaire Development

The questionnaire was divided into three major sections: socio-demographic characteristics (age, gender, tribe, religion, education level, employment status, occupation, residence), herbal medicine use assessment (prevalence, and reasons for herbal medicine use), and factors associated with herbal medicine use with both open and closed-ended questions.

Measurements

The questions asked were modified from the International Questionnaire to Measure Use of Complementary and

Alternative Medicine (I-CAM-Q); which aims to comparably assess the use of CAM internationally.¹¹

Data Analysis and Management

Fully completed questionnaires were extracted from KoBo Toolbox[®] and exported to a Microsoft Excel 2016 for cleaning and coding. The cleaned data was exported to STATA 16 (StataCorp LLC, College Station, Texas, USA) for analysis. Numerical data were then summarized as means and standard deviations or median and range as appropriate. Categorical variables were summarized as frequencies and relative percentages. To assess the association between independent variables with herbal medicine use, chi-square test or Fishers' exact test (for categorical variables) and Mann-Whitney *U*-test (for continuous variables) were used at bivariate analysis. All independent variables with $p < 0.2$ at bivariate analysis were included in the multivariable logistic regression models to adjust for confounders. A $p < 0.05$ was considered statistically significant.

Ethics

The study was performed according to the Declaration of Helsinki, after obtaining approval from Mulago Hospital Research and Ethics Committee (Approval number MHREC 2097). Consent forms were given to respondents before the initiation of the study.

Table 2 Herbal Medicine Use Among the Participants

| Variable | Frequency | Percentage |
|---|-----------|------------|
| Have you ever used herbal medicine | | |
| Yes | 58 | 53.7 |
| No | 50 | 46.3 |
| Ever used herbal medicine in the last 12 months (n=57) | | |
| No | 16 | 28.1 |
| Yes | 41 | 71.9 |
| Current use of herbal medicine (n=57) | | |
| No | 30 | 52.6 |
| Yes | 27 | 47.4 |
| Using COVIDEX to treat current symptoms | | |
| No | 79 | 73.8 |
| Yes | 28 | 26.2 |
| Accessibility of herbal medicine as compared to conventional | | |
| Health care provider more accessible | 42 | 39 |
| Herbalists are more accessible | 15 | 13.9 |
| They are equality accessible | 51 | 47.2 |
| Any improvement after using herbal medicine (n=57) | | |
| No | 11 | 19.3 |
| Yes | 46 | 80.7 |
| Doctor/nurse asked about herbal medical use (n=107) | | |
| No | 54 | 50.5 |
| Yes | 53 | 49.5 |

Abbreviation: n, number of participants.

COVID 19 Precautions

The study was conducted following the Ministry of Health and the National COVID-19 task force guidelines of Uganda.

Results

Characteristics of the Participants

The study was terminated early because of a significant reduction in the number of patients hospitalized with COVID-19 and the closure of one of the CTUs. Of the anticipated 422 participants, we recruited 108 (25.6%). Of the 108 participants, 58 (53.7%) were female, with a median age of 38 (range: 20–75) years. Majority of the participants were from central Uganda (70.4%, n = 76) and were Christians (66.7%, n = 72), more than one-third

attained tertiary level of education (37.7%, n = 40). More than half were employed (56.5%, n = 61) and were married (52.8%, n = 57). Forty-nine (45.4%) participants had received at least one dose of the COVID-19 vaccine. Majority were on COVID-19 treatment (86.9%) and more than half were getting their treatment from Namboole CTU (58.3%, n = 53). [Table 1](#) summarizes the socio-demographic characteristics of participants.

Herbal Medical Use

Of the 108 participants, 58 (57.3%) ever used herbal medicine and the majority had used herbal medicine in the past 12 months (71.9%, n = 41). Of those that had used herbal medicines in the past 12 months, 35 (85.4%) had used before a diagnosis of COVID-19, and 15 (36.6%) continued to use even while on treatment for COVID-19 ([Figure 1](#)). Their doctors or nurses asked almost half of the participants about herbal medicine (49.5%, n = 53), and the majority reported some improvement after using herbal medicine (80.7%, n = 46). [Table 2](#) summarizes the use of herbal medicine by the participants. Of those that were using herbal medicines, efficacy, accessibility, and affordability were the frequently reported as the reasons for their use (n = 35, 60.3%), (n = 14, 24.1%) and (n = 14, 24.1%), respectively ([Figure 2A](#)). Gastrointestinal disturbances such as diarrhea, constipation, abdominal pain, and vomiting were the most commonly reported side effects associated with the use of herbal medicines ([Figure 2B](#)).

[Table 3](#) summarizes factors associated with herbal medicine use among the participants at bivariate analysis. Vaccination status (p = 0.004), level of education (p = 0.002), and accessibility of the herbalists vs conventional treatment (p < 0.001). [Table 4](#) summarizes factors associated with herbal medicine use among the participants at multi-variable logistic regression: being vaccinated (adjusted odds ratio (aOR): 3.1, 95% CI: 1.4–6.8, p = 0.005) and having attained a tertiary level of education (aOR: 6.2, 95% CI: 1.7–23.1, p = 0.006), as well as the accessibility of the herbalists (aOR: 31.2, 95% CI: 3.7–263.2, p = 0.002).

Discussion

In the current study, the prevalence of herbal medicine use was found to be 57.3%. All participants who reported to have used herbal medicines started to use before hospital-based treatment a third of whom continued to use even after initiation of COVID-19 treatment. This finding was consistent with the results of a cross-sectional online survey among Vietnamese adults that found nearly half of the respondents

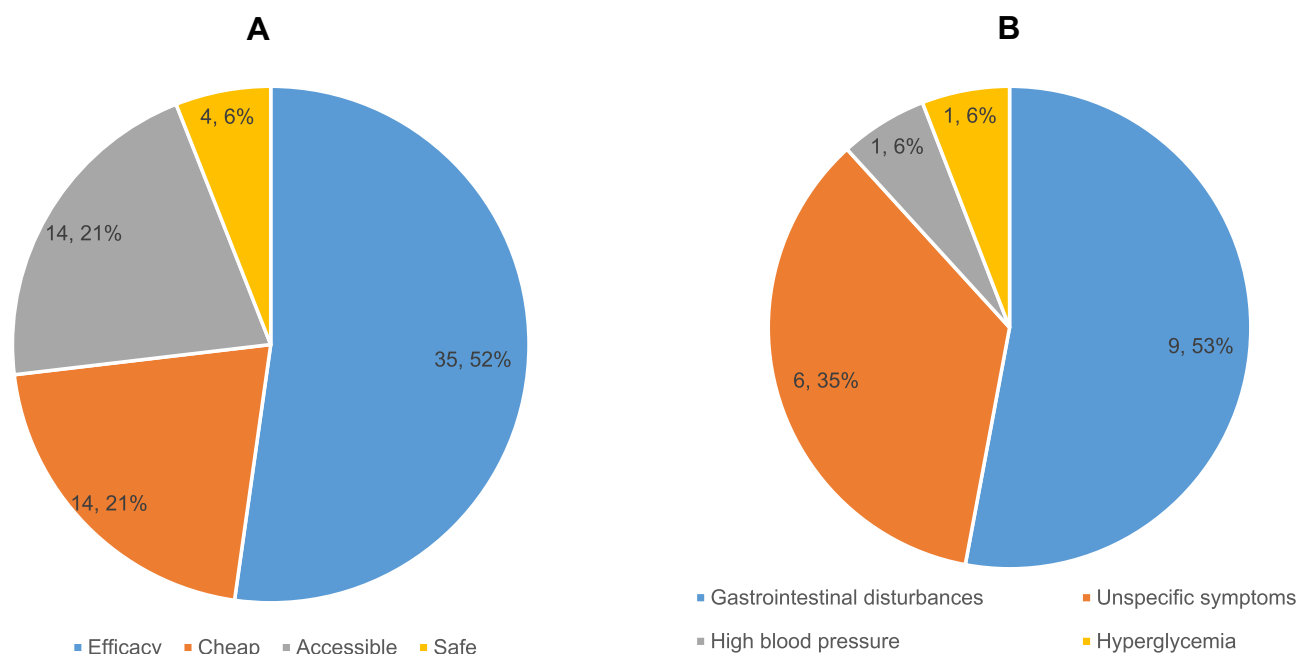


Figure 2 (A) Reasons for use of herbal medicines among COVID-19 patients. **(B)** Common side effects of herbal medicines reported.

to use herbal medicine for common illnesses during the COVID-19 pandemic.¹² However, studies from Saudi Arabia report rather a higher prevalence (>90%) of herbal medicines use in the management of COVID-19 and other conditions.^{1,5,13} This big difference in the prevalence could be explained by the fact that our study assessed herbal medicine use among virologically confirmed patients, unlike the Saudi Arabian study whose participants reported to have used herbs for boosting their immunity and to improve general health and not to cure infection.¹³ However, a finding of herbal medicine use of more than half in our study is concerning given limited evidence supporting efficacy and safety of herbal medicines. In fact, previous studies in Uganda assessing herbal medicine use have reported a comparatively high prevalence.^{6,14,15} Easy access, affordability, cultural familiarity, and the unfavorable doctor-patient ratio in Uganda are the major factors leading to increased herbal medicine use.⁴

Being vaccinated, having attained a tertiary level of education, as well as the accessibility of the herbalists were found to be significantly associated with herbal medicines in this study. This finding corroborates with the results of a study conducted in Vietnam which reported higher levels of income, urban dwellers, and higher levels of education to be more likely to use herbal medicines in the management of COVID-19.¹² Although studies from other countries have reported a predilection of females

towards herbal medicine use,^{12,16} this was not the case in our study. Our study revealed that participants who were vaccinated against COVID-19 continued to use herbal medicine for prevention and treatment. Notably, still, our participants believed that herbal medicines were safe and effective corroborating findings reported by Nguyen et al, in which nearly 70% of participants considered herbal medicines safe and effective.¹² With limited research evidencing the efficacy, mode of action, and toxicity profiles of the common herbal medicines on market, the population is at great risk of drug-herbal medicine interactions, drug resistance, and unexplained adverse reactions. Efforts should be directed towards further studies to understand the role of herbal remedies in patient management and public awareness to guide their utilization.

To the best of our knowledge, this is the first study in sub-Saharan Africa to assess the use of herbal medicine among COVID 19 patients hospitalized in treatment centers. Previous studies on herbal medicine use in Uganda and other sub-Saharan countries have focused on populations with HIV, hepatitis, and hypertension and there is a paucity of literature on the prevalence and rationale of herbal medicine use among patients with COVID-19 in sub-Saharan Africa.^{17,18} Findings from this study provide documented evidence on herbal medicine use among the population of COVID-19 patients, which will be used to promote public awareness, and knowledge of proper use of herbal therapies and contribute to the National

Table 3 Bivariate Analysis for Socio-Demographic Factors Associated with Herbal Medical Use

| Variable | ALL (n=108) Freq (%) | Herbal Medical Use | | P value |
|---|----------------------|---------------------|--------------------|----------------|
| | | Yes (n=58) Freq (%) | No (n=50) Freq (%) | |
| Median age (interquartile range) | 38 (20–75) | | | 0.152 |
| Age range | | | | 0.250 |
| <39 years | 58 (53.7) | 28 (48.3) | 30 (60) | |
| ≥39 years | 50 (46.3) | 30 (51.7) | 20 (40) | |
| Sex | | | | 0.468 |
| Female | 62 (57.4) | 34 (58.6) | 28 (56) | |
| Male | 46 (42.6) | 24 (41.4) | 22 (44) | |
| Region of residence | | | | 0.875 |
| Central | 76 (70.4) | 39 (67.2) | 37 (74) | |
| East | 11 (10.2) | 6 (10.3) | 5 (10) | |
| North | 3 (2.8) | 2 (3.5) | 1 (2) | |
| West | 18 (16.7) | 11 (19) | 7 (14) | |
| Level of education (n=106) | | | | 0.002 |
| Primary | 19 (17.8) | 15 (26.8) | 4 (8) | |
| Secondary | 31 (29.3) | 16 (28.6) | 15 (30) | |
| Tertiary | 40 (37.7) | 13 (23.2) | 27 (54) | |
| None | 16 (15.1) | 12 (21.4) | 4 (8) | |
| Formal employment status | | | | 0.102 |
| Employed | 61 (56.5) | 29 (50) | 32 (64) | |
| Not employed | 47 (43.5) | 29 (50) | 18 (36) | |
| Religion | | | | 0.777 |
| Christianity | 72 (66.7) | 37 (63.8) | 35 (70) | |
| Islam | 17 (15.7) | 10 (17.2) | 7 (14) | |
| Others | 19 (17.6) | 11 (19) | 8 (16) | |
| Marital status | | | | 0.148 |
| Married | 57 (52.8) | 25 (43.1) | 32 (64) | |
| Divorced | 10 (9.3) | 6 (10.3) | 4 (8) | |
| Single | 32 (29.6) | 20 (34.5) | 12 (24) | |
| Window/widower | 9 (8.3) | 7 (12.1) | 2 (4) | |
| Treatment site | | | | 0.301 |
| Mulago | 45 (41.7) | 26 (44.8) | 19 (38) | |
| Namboole | 63 (58.3) | 32 (55.2) | 31 (62) | |
| Vaccination status | | | | 0.004 |
| Vaccinated | 49 (45.4) | 39 (67.2) | 20 (40) | |
| Not vaccinated | 59 (54.6) | 19 (32.8) | 30 (60) | |
| On treatment for COVID-19 | | | | 0.291 |
| No | 14 (13.1) | 6 (10.5) | 8 (16) | |
| Yes | 93 (86.9) | 51 (89.5) | 42 (84) | |
| Ever used herbal medicine in the last 12 months (n=57) | | | | |
| No | 16 (28.1) | 16 (28.1) | 0 (0) | Not applicable |
| Yes | 41 (71.9) | 41 (71.9) | 0 (0) | |

(Continued)

Table 3 (Continued).

| Variable | ALL (n=108) Freq (%) | Herbal Medical Use | | P value |
|---|----------------------|---------------------|--------------------|---------|
| | | Yes (n=58) Freq (%) | No (n=50) Freq (%) | |
| Using COVIDEX to treat current symptoms | | | | <0.001 |
| No | 79 (73.8) | 33 (56.9) | 46 (93.9) | |
| Yes | 28 (26.2) | 25 (43.1) | 3 (6.1) | |
| Accessibility of herbal medicine as compared to conventional | | | | <0.001 |
| Health care provider more accessible | 42 (39) | 13 (22.4) | 29 (58) | |
| Herbalists are more accessible | 15 (13.9) | 14 (24.1) | 1 (2) | |
| They are equality accessible | 51 (47.2) | 31 (53.5) | 20 (40) | |
| Doctor/nurse asked about herbal medical use (n=107) | | | | 0.459 |
| No | 54 (50.5) | 28 (49.1) | 26 (52) | |
| Yes | 53 (49.5) | 29 (50.9) | 24 (48) | |

Abbreviations: n, number of participants; %, proportion of participants.

Drug Authority's objective to regulate the use of herbal medicine in Uganda. This information can also be used to promote activities to bring about improved communication between patients and health workers about herbal medicine use.

Limitations

Several limitations were taken into consideration as we interpreted these results. First, the study employed a non-random sample. Participation in the study was voluntary and no information was available about the characteristics of those who did not participate. Secondly, the cross-sectional design of our study does

not allow for a causal interpretation of the results. Thirdly, the CTUs employed were geographically situated in town and this could have limited access to populations in rural areas who could have reflected different study findings. However, despite these limitations, this is the first study in Uganda assessing the prevalence of herbal medicine use and its associated factors among hospitalized COVID-19 patients.

Conclusion

The use of herbal medicine during the COVID-19 pandemic is a widespread practice among the general population in

Table 4 A Multivariable Logistic Regression Showing Predictors of Use of Herbal Medical Use

| Variable | Adjusted Odds Ratio | 95% CI | P-value |
|--|---------------------|-----------|---------|
| Vaccination status | | | |
| Vaccinated | 3.1 | 1.4–6.8 | 0.005 |
| Not vaccinated | Reference | – | |
| Level of education | | | |
| Primary | 0.8 | 0.2–3.9 | 0.782 |
| Secondary | 2.8 | 0.7–10.7 | 0.128 |
| Tertiary | 6.2 | 1.7–23.1 | 0.006 |
| None | Reference | – | |
| Accessibility of herbal medicine as compared to conventional | | | |
| Health care provider more accessible | 9.0 | 1.1–74.1 | 0.04 |
| Herbalists are more accessible | 31.2 | 3.7–263.2 | 0.002 |
| They are equality accessible | Reference | | |

Abbreviation: CI, confidence interval.

Uganda amidst unpublished evidence of their safety and efficacy. Continuous public health awareness is suggested on the different natural remedies and further studies on the role of herbal medicine in patient management are recommended.

Data Sharing Statement

The data used to support the results of the research are available from the corresponding author upon request.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data, took part in drafting the article or revising it critically for important intellectual content, agreed to submit to the current journal, gave final approval to the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no potential conflicts of interest for this work.

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