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Differences in Symptom Severity and Quality of Life among Patients with Cancer Using Conventional Therapies with/without Herbal Medicines in Uganda: A Cross-Sectional Study

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Abstract

Objective: Patients with cancer experience numerous symptoms related to cancer and treatment side effects that reduce their quality of life (QOL). Although herbal medicine (HM) is used to manage such symptoms by patients in sub-Saharan Africa, data on patients' perceived clinical outcomes are limited. We compared differences in QOL and symptom severity between patients with cancer using HM plus conventional therapies (i.e., chemotherapy, hormonal therapy, radiotherapy, surgery) and those using conventional therapies alone. **Methods:** This cross-sectional study included patients with cancer aged >18 years who were consecutively sampled and completed a researcher-administered questionnaire between December 2022 and January 2023. Specifically, data was collected using The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) and the MD Anderson Symptom Inventory for Traditional Chinese Medicine (MDASI-TCM). Data were analyzed using descriptive statistics and chi-square and logistic regression analyses. **Results:** Of 400 participants (67.5% female), 49% (n=195) used HM plus conventional therapies and 51% (n=205) used conventional therapies alone. Most participants were aged >38 years (73.3%; median age 47 years). A univariate analysis showed the HM plus conventional therapies group had better mean scores for most QOL and symptom severity measures than the conventional therapies alone group. However, only role functioning significantly differed (p=0.046) in the bivariate analysis. There were no statistically significant differences between the two groups after confounder adjustment for all others measures of symptom severity and QOL. **Conclusion:** HM plus conventional therapies may offer minimal benefits or differences for clinical outcomes among patients with cancer. However, our findings have clinical, research, and public health implications for Uganda and other sub-Saharan African settings.

Keywords: Quality of life- symptom severity- oncology- herbal medicine- patients

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Introduction

Patients with cancer experience numerous symptoms related to cancer and treatment side effects that reduce their quality of life (QOL). Many patients use herbal medicine (HM) concomitantly with conventional therapies to manage these symptoms, especially in sub-Saharan Africa (Asiimwe et al., 2021). For example, 22%–45% of patients with cancer in Uganda used HM while undergoing chemotherapy (Kiwanuka, 2018; Mwaka et al., 2019). Chinese herbal medicine (CHM) was found to alleviate cancer symptoms and improve QOL, including physical functioning, emotional functioning, and global health status (Han et al., 2016; Lee et al., 2021). Some CHM may potentiate the effects of chemotherapeutic agents, thereby improving patients' QOL or reducing side effects without affecting treatment efficacy (Abascal and Yarnell, 2003; Choi et al., 2016; Mete et al., 2016; Febriansah and Komalasari, 2019; Mvondo et al., 2021; Putri et al., 2021). Therefore, measuring symptom severity and QOL among patients with cancer is paramount for both traditional medicine and modern oncological approaches (Han et al., 2016). However, most available studies evaluated CHM use in cancer in Asian countries, and little is known about patients' perceived clinical outcomes following HM use during cancer treatment in sub-Saharan Africa. Above all, due to the variations in species of the same family and geographical locations, medicinal part

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used, season or time, the phytochemicals constituents of medicinal plants used in sub-Saharan Africa may differ from those used in CHM, which may lead to differences in clinical outcomes (Kadu et al., 2012; Raskar et al., 2022). As subjective oncology outcomes are increasingly used to measure treatment efficacy, we compared QOL and symptom severity between patients with cancer that used HM plus conventional therapies and those that used conventional therapies alone. Our findings will contribute to addressing gaps in the literature.

Materials and Methods

Design and setting

This cross-sectional study was conducted at the Uganda Cancer Institute (UCI; www.uci.or.ug), which is located in Kampala city and affiliated with Mulago National Referral Hospital and Makerere University School of Medicine. UCI provides palliative and rehabilitative services to inpatients (minimum capacity of 80 beds) and serves around 200 outpatients per day.

Participants, sample size, and sampling

We consecutively sampled male and female adult (>18 years) patients with a medical diagnosis of cancer (clinical and histopathological laboratory findings). We included patients with any type of cancer who were treated by oncologists using conventional therapies (chemotherapy, radiotherapy, hormonal therapy, surgery) and had been diagnosed with cancer within the past 12 months. We included patients with comorbid chronic diseases (e.g., hypertension, diabetes) that were receiving corresponding treatments. We excluded patients that were unable to communicate in/understand the Luganda or English languages, involved in any clinical trial in the last 30 days, or considered too unwell to complete an interview.

A required sample size of 314 patients with cancer was obtained using the Cochrane formula (Israel, 1992). The sample size calculation assumed that 28.6% of patients with cancer used HM (p=0.286; (Yarney et al., 2013). The z-score corresponding to a 95% confidence level was set at 1.96, with 5% precision (e=0.05). Based on a 30% non-response rate, we adjusted the sample size to about 394 (~400) participants. The sample was stratified into two groups for comparison purposes: conventional therapies alone and HM plus conventional therapies.

Data collection

This study was conducted over 7 weeks in December 2022 and January 2023. After obtaining ethical approval and clearance to conduct this study, research assistants were recruited and trained in the consent process and administration of study tools. Staff clinicians and nurses were briefed about the study and asked to identify potential participants based on their medical records. The research team then briefed and screened these patients against the inclusion criteria, and invited eligible patients to participate in this study. Participants that provided consent were interviewed, and their clinical data were confirmed and extracted from their medical records. The face-to-face interviews were conducted in Luganda and English and lasted 15–30 minutes. After their interview, participants medical records were returned to the staff nurse for archiving.

Main outcome measures

Quality of life (QOL)

The primary outcome was differences in QOL between the HM plus conventional therapies and conventional therapies alone groups. QOL was assessed using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30), which measures physical, psychological, emotional, and social well-being (Oliver and Greenberg, 2009). This tool was previously validated and had the required reliability and sensitivity to measure QOL (Fayers et al., 1995). For each item, participants rate their subjective experience for 1 week before the interview on a scale from 1 ("not at all") to 4 ("very much"). Low scores indicate good QOL. To evaluate global health status (two items), participants rated their health and QOL on a 7-point scale (1= "very poor," 7="excellent"), with low scores indicating worse QOL. Based on mean scores, EORTC QLQ-C30 total and subscale/item scores were categorized as "good" or "poor."

Symptom severity

The second primary outcome was differences in clinical symptoms experienced between the two groups. Symptom severity was evaluated with the MD Anderson Symptom Inventory for Traditional Chinese Medicine (MDASI-TCM), which measures the severity of common cancer-related symptoms experienced by patients who may opt for traditional medicines and the impact of symptoms on daily functioning (Li et al., 2017). This tool covers cancer-related symptoms (13 items), traditional Chinese medicine (TCM)-related symptoms (seven items), and symptom interference in physical (three items) and mental/social (three items) functioning (Li et al., 2017). Responses are on a scale from 0 ("not present/did not interfere") to 10 ("as bad as you can imagine/interfered completely") reflecting the severity of symptoms/symptom interference within the past 24 hours. Higher scores indicate greater symptom severity/interference. We grouped symptom severity and symptom interference by total scores as mild (0–4) and moderate/severe (≥5).

Main exposures/independent variable

The use of conventional therapies with/without HM was the main exposure in this study. We defined use of conventional therapies as patients that received one or more of the listed treatment options (chemotherapy, radiotherapy, hormonal therapy, surgery). HM use was considered as the use of plants/plant products to manage cancer for at least one month and categorized as "Yes" (HM plus conventional therapies) or "No" (conventional therapies alone).

Potential confounders

We collected sociodemographic information (gender, age, level of income, education level, residence, religion,

region, occupation, and marital status) and patients' clinical characteristics. Clinical data extracted from patient files included: cancer disease characteristics (cancer type and stage, metastasis), treatment modality characteristics (e.g., length of treatment, number of cycles), comorbidities (e.g., HIV, hypertension, diabetes, kidney disease) and treatments, and immediate past laboratory findings, including immunological parameters (white blood cell count; WBC) and liver (alanine S transferase; AST) and kidney function tests.

Study rigor

The questionnaire was translated into Luganda and back-translated into English, then pretested with 10 patients from the Cancer Institute-Mulago. Reliability analyses showed all EORTC QLQ-C30 and MDASI-TCM scales/subscales had acceptable internal consistency (Cronbach's $\alpha \geq 0.7$) (Table 1). The overall Cronbach's α for the EORTC QLQ-C30 was 0.88, and that for the MDASI-TCM was 0.89.

Data analyses

Data were entered and cleaned in REDCAP at the UCI and exported to SPSS (version 20) for analysis. We performed preliminary analyses (reliability and normality) for the scales/subscales before categorization. Data were described at a univariate level using tables and descriptive statistics. Chi-square tests of independence were used to explore differences in outcomes between study groups. Logistic regression was used to control for confounders. The level of significance ($p<0.05$) was reported with 95% confidence intervals (CI).

Ethical considerations

The Faculty of Medicine Research Ethics Committee (FREC# 22/01-2021), Mbarara University of Science and Technology Research Ethics Committee (MUREC/7#05/02-21), and Uganda National Council of Science and Technology (Ref: HS1602ES) approved this study. UCI gave clearance to conduct this study (SR-25/22). All participants provided informed consent and were compensated for their time (equivalent to USD 3) upon completing their interview. Before the study started, a UCI counselor was notified about potential referrals should participants experience distress during their interview.

Results

Participants' demographic and clinical characteristics

Table 2 summarizes participants' (N=400) demographic and clinical characteristics. The majority of participants were female (67.5%), aged >38 years (73.3%; median age 47 years), employed (60%), married (62.2%), from Uganda's central region (52.3%), and lived in rural settings (58.8%). Most participants were Christian (89.8%), had completed primary and secondary education (80%), and had an average daily income of USD ≤6 (78.3%). Gender ($p=0.004$) and region ($p=0.036$) were the only demographic variables that significantly differed between the two groups.

The most common cancer type was breast cancer (35.3%) followed by cervical cancer (13.5%), prostate cancer (5.5%), and Kaposi sarcoma (5.3%). The majority of participants had stage III or IV cancer (59.05%). Among those whose cancer was staged, 44% had cancer metastasis to other organs and 48.2% to lymph nodes. Comorbidities were reported by 25.3% of participants (HIV: 62.4%; hypertension: 24.8%; diabetes mellitus: 5.5%). The majority of participants (71.1%) had received treatment for <6 months (chemotherapy, 70.7%; radiotherapy, 21.3%) and had three or more chemotherapy

Table 1. Internal Consistency and Item Measurement Properties

Subscales	Items	MIIC	Cronbach's α	NCITC >0.3
EORTC QLQ-C30	30	0.208	0.88	27
Global health	2	0.592	0.74	2
Cognitive	2	0.311	0.47	2
Physical	5	0.45	0.81	5
Emotional	4	0.649	0.88	4
Role	2	0.739	0.85	2
Social	2	0.592	0.74	2
Fatigue	3	0.555	0.79	3
Nausea	2	0.754	0.86	2
Pain	2	0.532	0.69	2
MDASI-TCM	26	0.251	0.89	25
Cancer symptoms	13	0.315	0.86	12
TCM symptoms	7	0.27	0.72	7
Interference	6	0.579	0.89	6
Physical functioning	3	0.668	0.86	3
Mental/emotional functioning	3	0.567	0.8	3

Note. EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; MDASI-TCM, MD Anderson Symptom Inventory for Traditional Chinese Medicine; MIIC, mean inter-item correlation; NCITC, number of items with corrected item-total correlations

Table 2. Participants' demographic and Clinical Characteristics

	Overall n (%)	HM + conv. therapies (n=195) n (%)	Conv. therapies alone (n=205) n (%)	p-value
Gender				
Male	130 (32.5)	50 (12.5)	80 (20)	0.004
Female	270 (67.5)	145 (36.3)	125 (31.3)	
Age (years), median (range)	47 (18–88)			0.101
18–27	28 (7.1)	9 (2.3)	19 (4.8)	
28–37	78 (19.6)	38 (9.6)	40 (10.1)	
38–47	106 (26.7)	59 (14.9)	4 (11.8)	
48–58	92 (23.2)	44 (11.1)	48 (12.1)	
≥59	93 (23.4)	42 (10.6)	51 (12.9)	
Region				0.036
North	48 (12.1)	22 (5.6)	26 (6.6)	
East	77 (19.3)	32 (8.1)	45 (11.4)	
Central	207 (52.3)	116 (29.3)	91 (23.0)	
West	64 (16.2)	25 (6.3)	39 (9.8)	
Residence				0.258
Rural	235 (58.8)	109 (27.3)	126 (31.5)	
Urban	165 (41.3)	86 (21.5)	79 (19.8)	
Education				0.062
None	21 (5.3)	11 (2.8)	10 (2.5)	
Primary	215 (53.9)	95 (23.8)	120 (30.1)	
Secondary	104 (26.1)	62 (15.5)	42 (10.5)	
Tertiary	59 (14.8)	26 (6.5)	33 (8.3)	
Employment status				0.414
Employed	240 (60)	121 (30.3)	119 (29.8%)	
Unemployed	160 (40)	74 (18.5)	86 (21.5)	
Average daily income				0.794
≤20,000 Ugx	148 (78.3)	76 (40.2)	72 (38.1)	
>20,000 Ug.x	41 (21.7)	22 (11.6)	19 (10.1)	
Religion				0.997
Christian	359 (89.8)	175 (43.8)	184 (46.0)	
Muslim	41 (10.3)	20 (5)	21 (5.3)	
Marital status				0.955
Single	34 (8.5)	16 (4.0)	18 (4.5)	
Married	248 (62.2)	122 (30.6)	126 (31.6)	
Divorced/separated/widowed	117 (29.3)	56 (14.0)	61 (15.3)	
Cancer type				0.515
Breast	141 (35.3)	76 (19.0)	65 (16.3)	
Cervical	54 (13.5)	31 (7.8)	23 (5.8)	
Prostate	21 (5.3)	7 (1.8)	14 (3.5)	
Kaposi sarcoma	21 (5.3)	9 (2.3)	12 (3)	
Ovary	15 (3.8)	6 (1.5)	9 (2.3)	
Esophagus	17 (4.3)	8 (2)	9 (2.3)	
NHL	11 (2.8)	5 (1.3)	6 (1.5)	
Leukemia	11 (2.8)	5 (1.3)	6 (1.5)	
Rectum	10 (2.5)	4 (1)	6 (1.5)	
Uterus	9 (2.3)	5 (1.3)	4 (1)	
Stomach	8 (2.0)	4 (1)	4 (1)	

Table 2. Continued

	Overall n (%)	HM + conv. therapies (n=195) n (%)	Conv. therapies alone (n=205) n (%)	p-value
Cancer stage				0.677
I	24 (6)	9 (2.8)	15 (4.7)	
II	58 (14.5)	28 (8.8)	30 (9.4)	
III	109 (27.25)	56 (17.6)	53 (16.7)	
IV	127 (31.8)	62 (19.5)	65 (20.4)	
Unstaged	82 (20.5)	39 (9.8)	41 (10.3)	
Lymph nodes				0.116
Yes	146 (48.2)	64 (21.1)	82 (27.1)	
No	157 (51.8)	83 (27.4)	74 (24.4)	
Metastasis				0.905
Yes	135 (44)	65 (21.2)	70 (22.8)	
No	172 (56)	84 (27.4)	88 (28.7)	
Comorbidity				0.386
Yes	101 (25.3)	53 (13.3)	48 (12.0)	
No	299 (74.8)	142 (35.5)	157 (39.3)	
Type of comorbidity**				
HIV	68 (62.4)	34 (31.2)	34 (31.2)	
Hypertension	27 (24.8)	14 (12.8)	13 (11.9)	
Diabetes	6 (5.5)	4 (4)	2 (2)	
Liver	2 (1.8)	2 (2)	0 (0)	
Others	6 (5.5)	3 (2.8)	3 (2.8)	
Cancer treatment period				0.238
<6 months	261 (71.1)	131 (35.7)	130 (35.4)	
≥6 months	106 (28.9)	46 (12.5)	60 (16.3)	
Cancer treatment**				
Chemotherapy	379 (70.7)	184 (46.0)	195 (48.8)	
Radiotherapy	114 (21.3)	54 (13.5)	60 (15.0)	
Surgery	40 (7.5)	23 (5.8)	17 (4.3)	
Others	3 (0.6)	2 (0.5)	1 (0.3)	
Number of treatment modalities				0.679
1	272 (68.5)	131 (33.0)	141 (35.5)	
≥2	125 (31.5)	63 (15.9)	62 (15.6)	
Chemotherapy cycles				0.512
≤3	201 (60.5)	101 (30.4)	100 (30.1)	
>3	131 (39.5)	61 (18.4)	70 (21.1)	
Radiotherapy cycles				0.25
≤6	56 (78.9)	28 (39.4)	28 (39.4)	
>6	15 (21.1)	5 (7.0)	10 (14.1)	
Lab investigations				
WBC				0.381
Low	107 (27.3)	56 (14.3)	51 (13.0)	
Normal-high	285 (72.7)	135 (34.4)	150 (38.3)	
Creatinine				0.679
Normal-low (<73)	207 (55.9)	101 (27.3)	106 (28.6)	
High (≥73)	163 (44.1)	76 (20.5)	87 (23.5)	
AST				0.94
Normal-low (<48 U/L)	330 (91.2)	157 (43.4)	173 (47.8)	
High (≥48 U/L)	32 (8.8)	15 (4.1)	17 (4.7)	

Note. WBC, white blood count; AST, alanine S transferase. (20,000 Ugandan shillings /= is ≈ 6 US Dollars). NHI, Non-Hodgkin's lymphoma

(60.5%) and six or more radiotherapy cycles (78.9%). Only 31.5% of participants received more than two treatment modalities. Participants' most recent laboratory investigations indicated normal WBC (72.7%), creatinine (55.9%), and liver function (AST: 91.2%). There were no significant differences in clinical characteristics between the two groups.

Study outcomes

Quality of life (QOL)

The univariate analysis showed the mean global health status score was below average (3.4; range, 1–7), with a higher mean score in the conventional therapies alone group than the HM plus conventional therapies group (3.45 vs. 3.38) (Table 3). Overall, we observed high mean scores (lower functioning) for social, role, physical, emotional, and cognitive functioning respectively. The HM plus conventional therapies group had lower mean scores (higher functioning) for role, physical, and cognitive functioning than the conventional therapies alone group.

Pain, fatigue, insomnia, nausea, and dyspnea had high mean scores. The HM plus conventional therapies group had lower mean scores (lower severity of symptoms) for pain, dyspnea, and insomnia than the conventional therapies alone group. However, fatigue, appetite loss, diarrhea, and constipation were less frequently experienced or reported in the conventional therapies alone group than the HM plus conventional therapies group. The mean score for financial difficulties was higher in the conventional therapies alone group than the HM plus conventional therapies group (3.62 vs. 3.61).

Symptom severity

Pain was the most severe cancer-related symptom followed by fatigue, nausea, distress, disturbed sleep, numbness, feeling sad, lack of appetite, and dry mouth (Table 4). The HM plus conventional therapies group had lower mean scores (less severity) for all symptoms, except feeling drowsy, than the conventional therapies alone group. Feeling cold and sweating were the most severe TCM-specific symptoms, followed by palpitations, constipation, and coughing. Except for heat in the palms or soles, coughing, and sweating, all other TCM-related symptoms were more commonly reported in the HM plus conventional therapies group than the conventional therapies alone group.

Overall, symptoms interfered more with physical functioning than mental/social functioning. General activity and work were most severely affected physical functioning domains. Relationships with others and enjoyment of life were the most affected mental/social functioning domains. The HM plus conventional therapies group reported less symptom interference in physical functioning (general activity and walking) than the conventional therapies alone group. Conversely, the latter group reported less symptom interference in mental/social functioning (relationships with others and mood) than the HM plus conventional therapies group.

Differences in QOL and symptom severity

The bivariate analysis showed no significant difference in global health status between the HM plus conventional therapies and conventional therapies alone groups (p=0.553) (Table 5). There was a significant difference in role functioning (p=0.046) between the two groups, but no significant differences in physical, cognitive, emotional, or social functioning. There were no significant differences in symptoms experienced between the two groups. In addition, there were no significant differences in cancer-related symptoms, TCM-specific symptoms, and physical and mental/social symptom interference between

Table 3. Univariate Comparison of Mean Quality of Life Scores between the Two Groups

Quality of life measures	Overall (mean±SD)	HM + conv. therapies (mean±SD)	Conv. therapies alone (mean±SD)
Global health	3.42±1.09	3.38±1.12	3.45±1.059
Functioning			
Cognitive	1.78±0.77	1.73±0.736	1.8293±0.79
Physical	2.15±0.729	2.13±0.74	2.16±0.72
Emotional	2.08±0.87	2.09±0.89	2.06±0.85
Role	2.82±1.01	2.74±1.07	2.89±0.95
Social	2.89±0.96	2.89±0.99	2.89±0.93
Symptoms			
Fatigue	2.36±0.80	2.37±0.82	2.34±0.79
Nausea	1.69±0.89	1.69±0.93	1.69±0.85
Pain	2.57±0.93	2.53±0.97	2.61±0.88
Dyspnea	1.67±0.88	1.62±0.86	1.71±0.91
Insomnia	1.95±1.02	1.91±1.03	1.98±1.01
Appetite	1.97±1.03	2.02±1.08	1.92±0.982
Diarrhea	1.36±0.72	1.37±0.72	1.35±0.72
Constipation	1.64±0.940	1.72±0.99	1.56±0.885
Financial difficulties	3.61±0.81	3.61±0.78	3.62±0.83

Note. SD, standard deviation; HM, herbal medicine.

Table 4. Univariate Comparison of MDASI Scores between the Two Groups

MDASI measures	Overall (mean±SD)	HM + conv. therapies (mean±SD)	Conv. therapies alone (mean±SD)
Cancer-related symptoms			
Pain	5.18±3.32	4.99±3.38	5.37±3.26
Fatigue	3.97±3.08	3.96±3.09	3.98±3.09
Nausea	2.01±2.77	1.97±2.89	2.03±2.65
Disturbed sleep	2.91±3.29	2.75±3.30	3.06±3.29
Feeling distressed	2.97±3.04	2.81±2.98	3.12±3.089
Dyspnea	1.43±2.31	1.39±2.27	1.47±2.34
Problems remembering	1.54±2.40	1.48±2.41	1.59±2.39
Lack of appetite	2.55±3.11	2.80±3.29	2.31±2.92
Feeling drowsy	1.99±2.47	2.10±2.61	1.87±2.32
Dry mouth	2.23±2.81	2.36±2.93	2.10±2.69
Feeling sad	2.77±2.92	2.77±2.89	2.78±2.96
Vomiting	1.29±2.52	1.19±2.46	1.38±2.58
Numbness or tingling sensations	2.80±3.08	2.78±2.98	2.82±3.19
TCM symptoms			
Sweating	2.31±2.89	2.17±2.91	2.43±2.89
Feeling cold	2.66±3.04	2.81±3.05	2.52±3.03
Constipation	1.74±2.83	1.82±2.91	1.65±2.76
Bitter taste	1.63±2.47	1.67±2.49	1.59±2.46
Coughing	1.70±2.63	1.536±2.52	1.86±2.73
Palpitations	1.84±2.46	1.969±2.62	1.72±2.29
Heat in palms or soles	1.53±2.68	1.35±2.61	1.71±2.74
Symptom interference			
Physical interference			
General activity	5.57±2.90	5.45±2.96	5.69±2.85
Work	5.40±3.38	5.41±3.32	5.39±3.43
Walking	4.41±3.23	4.29±3.16	4.52±3.305
Mental/social interference			
Relationships with others	3.89±3.4	3.94±3.50	3.86±3.35
Mood	3.69±3.02	3.78±3.07	3.60±2.98
Enjoyment of life	5.92±3.22	5.89±3.21	5.98±3.24

Note. SD, standard deviation; MDASI, MD Anderson Symptom Inventory; TCM, traditional Chinese medicine.

the two groups.

Controlling for confounders

Binary logistic regression was used to establish if various confounders affected differences in QOL and symptom severity between the two groups. Independent variables that were statistically significantly associated ($p<0.05$) with MDASI-TCM and QOL scores/subscales were added in Model 2 (Supplementary Tables 1 and 2.)

For QOL measures in Model 1, a significant difference was only found for role functioning. Those using HM plus conventional therapies were 0.66 times less likely to perform their role functions than those who used conventional therapies alone. However, when controlled for employment status, education level, and type of cancer (breast vs. others) in Model 2, differences in role functioning between the two groups became non-significant (odds ratio [OR]=0.715 95%CI: 0.471–1.087). Employment status became statistically significant, with employed participants being 0.372 times less likely to perform their role functions than those who were unemployed (OR=0.372, 95%CI: 0.239–0.578). After controlling for sociodemographic and clinical characteristics (Model 2), differences between the two groups remained non-significant for global health status, cognitive functioning, emotional functioning, physical functioning, social functioning, and symptoms experienced. However, in model 2, some participants' demographic and clinical characteristics became statistically significantly associated with those QOL measures. Details of observed associations are presented in the supplementary Table 1.

Additionally, model 1 showed there were no statistically significant differences between the two groups in symptom severity, TCM symptoms, and physical and mental/social symptom interference (supplementary Table 2). Model 2 showed these outcomes remained non-significant when controlled for sociodemographic

Table 5. Differences in Quality of Life and Symptom Severity between the Two Groups

	HM + conv. therapies n (%)	Conv. therapies alone n (%)	Chi-square (df)	p-value
Global health			0.353 (1)	0.553
Poor	86 (21.7)	84 (21.2)		
Good	108 (27.2)	119 (30.0)		
Functioning				
Cognitive			2.786 (1)	0.095
Poor	78 (19.5)	99 (24.8)		
Good	117 (29.3)	106 (26.5)		
Physical			0.142 (1)	0.706
Poor	56 (14.1)	56 (14.1)		
Good	137 (34.4)	149 (37.4)		
Emotional			0.383 (1)	0.536
Poor	81 (20.3)	91 (22.8)		
Good	114 (28.6)	113 (28.3)		
Role			3.985 (1)	0.046**
Poor	102 (25.7)	128 (32.2)		
Good	91 (22.9)	76 (19.1)		
Social			0.048 (1)	0.826
Poor	121 (30.5)	127 (32.0)		
Good	71 (17.9)	78 (19.6)		
Symptoms				
Fatigue			0.986 (1)	0.321
Mild	118 (29.5)	114 (28.5)		
Worse/severe	77 (19.3)	91 (22.8)		
Nausea			1.397 (1)	0.237
Mild	125 (31.3)	119 (29.8)		
Worse/severe	70 (17.5)	85 (21.3)		
Pain			0.157 (1)	0.692
Mild	109 (27.3)	110 (27.6)		
Worse/severe	86 (21.6)	94 (23.6)		
Dyspnea			0.766 (1)	0.382
Mild	114 (29.1)	110 (28.1)		
Worse/severe	90 (23.0)	78 (19.9)		
Insomnia			1.326 (1)	0.25
Mild	92 (23.2)	86 (21.7)		
Worse/severe	100 (25.3)	118 (29.8)		
Appetite			0.005 (1)	0.941
Mild	85 (21.4)	90 (22.7)		
Worse/severe	107 (27.0)	115 (29.0)		
Diarrhea				
Mild	145 (36.3)	157 (39.3)	0.268 (1)	0.605
Worse/severe	50 (12.5)	48 (12.0)		
Constipation			1.650 (1)	0.199
Mild	114 (28.7)	132 (33.2)		
Worse/severe	80 (20.2)	71 (17.9)		
Financial difficulties			0.003 (1)	0.957
Mild	18 (4.6)	19 (4.8)		
Worse/severe	172 (43.7)	185 (47.0)		

Table 5. Continued

	HM + conv. therapies n (%)	Conv. therapies alone n (%)	Chi-square (df)	p-value
MDASI				
Overall			0.665 (1)	0.415
Mild	171 (42.8)	185 (46.3)		
Moderate to severe	24 (6)	20 (5)		
Cancer symptoms			0.426 (1)	0.514
Mild	171 (42.8)	184 (46.0)		
Moderate to severe	24 (6)	21 (5.3)		
TCM symptoms			0.101 (1)	0.75
Mild	185 (46.3)	193 (48.3)		
Moderate to severe	10 (2.5)	12 (3)		
Symptom interference			0.255 (1)	0.613
Mild	94 (23.5)	104 (26.0)		
Moderate to severe	101 (25.3)	101 (25.3)		
Physical interference			0.018 (1)	0.894
Mild	85 (21.3)	88 (22.0)		
Moderate to severe	110 (27.5)	117 (29.3)		
Mental/social interference			0.004 (1)	0.952
Mild	105 (26.3)	111 (27.8)		
Moderate to severe	90 (22.5)	94 (23.5)		

Note. MDASI, MD Anderson Symptom Inventory; TCM, traditional Chinese medicine. ** $p<0.05$

and clinical characteristics. However, in model 2, some participants' demographic and clinical characteristics became statistically significantly associated with those symptom severity/interference measures. Details of observed associations are presented in the supplementary Table 2.

Discussion

Many studies reported associations between QOL and complementary/alternative medicine in cancer. However, few studies from sub-Saharan Africa evaluated QOL, symptom severity, and the use of HM among patients with cancer. We compared differences in QOL and symptom severity between patients with cancer in Uganda using HM plus conventional therapies with those using conventional therapies alone. Our findings presented a mixed picture when compared with existing literature.

Our univariate analysis indicated patients using HM plus conventional therapies had higher role, physical, and cognitive functioning than those using conventional therapies alone. Similarly, a clinical trial among patients with breast cancer reported most aspects of QOL, especially physical functioning, improved following 1-week consumption of cinnamon and honey (Aghamohammadi et al., 2017). However, only role functioning showed a significant difference between our two study groups. A clinical trial involving patients with advanced non-small cell lung cancer found significant differences in emotional and physical functioning but not social functioning among patients using CHM (Han et al., 2016). Another study reported global health status improved following use of Sipjeondaebo-Tang HM to manage cancer-related fatigue (Lee et al., 2021). We found that although those using HM plus conventional therapies were 0.66 times less likely to perform their role functions than those who used conventional therapies alone, this association became non-significant when controlled for confounders. Differences in global health status and cognitive, emotional, and social functioning between the two groups remained non-significant when adjusted for confounders. A previous meta-analysis also reported TCM had an unclear beneficial effect on QOL among patients with lung cancer (Stewart, 2017). In addition, when controlled for confounders, global health status did not significantly differ between patients receiving TCM plus chemotherapy and those receiving chemotherapy alone (Chan et al., 2011). These findings suggested HM may have minimal effects on QOL among patients with cancer. However, HM may affect other parameters that we did not evaluate, such as blood indices (red blood cell count, WBC components), immunity, and liver/kidney damage (Molassiotis et al., 2009; Chan et al., 2011; Lee et al., 2020). Further longitudinal studies focused on HM in cancer in sub-Saharan Africa may need to consider such factors and clarify how they mediate the effects of HM on QOL.

Research suggests HM may offer some relief from symptoms caused by the release of inflammatory mediators and side effects of conventional therapies that affect QOL among patients with cancer (Lee et al., 2020). Our univariate analysis showed lower severity of pain, dyspnea, and insomnia among patients using HM plus conventional therapies compared with

conventional therapies alone. Patients taking HM plus conventional therapies reported lower severity for all MDASI-TCM symptoms (except feeling drowsy) than those using conventional therapies alone. Other studies also found HM, especially TCM, reduced cancer- and chemotherapy-related symptoms among patients with breast and lung cancers (Molassiotis et al., 2009; Deshmukh et al., 2014; Aghamohammadi et al., 2017; Stewart, 2017). We found that those using HM plus conventional therapies were less likely to experience or report financial difficulties than those using conventional therapies alone. This suggested patients who used HM could afford to pay or the availability of HM made its use affordable. However, our bivariate and multivariate analyses showed none of the investigated cancer-related symptoms significantly differed between the two study groups. Another study found no significant differences in the severity of chemotherapy side effects (e.g., nausea, vomiting) between patients with ovarian cancer using TCM compared with those using chemotherapy alone (Chan et al., 2011).

In our study, TCM-related symptoms of feeling cold, constipation, palpitations, and bitter taste were more commonly reported by patients using HM plus conventional therapies than those using conventional therapies alone. This suggested the HM patients used included CHM (e.g., turmeric) or that HM has similar symptoms to CHM, which may be related to phytochemicals (e.g., alkaloids) common among medicinal plants used for cancer worldwide (Wink, 2015; Velu et al., 2018). The HM plus conventional therapies group reported less symptom interference in physical functioning (general activity and walking) than the conventional therapies alone group. Similarly, a study among patients with head and neck cancer found work and walking (physical functioning) ability improved following CHM use (Huang et al., 2013). Physical functioning may influence hormonal levels (e.g., sex hormones and insulin), which increase wellness and QOL (Aghamohammadi et al., 2017). However, our bivariate and multivariate analyses found no significant differences in symptom interference and TCM-related symptoms between the two groups.

The discrepancies in findings related to symptoms experienced/interference between our study and previous studies may be because previous studies evaluated the use of specific HM (i.e., formulas) for specific cancers using general/specific QOL tools and observational cohort or clinical trial study designs. In contrast, our study considered nonspecific HM use for various cancers, and herbal-to-herbal interactions may have made HM less effective. Therefore, further research on HM in sub-Saharan Africa could consider these parameters. In addition, this study had limitations that may influence our conclusions. We recruited patients newly-diagnosed with cancer and our findings may not represent patients receiving lifelong cancer treatment. Our cross-sectional design suggested associations rather than allowing conclusions regarding causality.

In conclusion, we compared differences in QOL and symptom severity among patients with cancer using HM plus conventional therapies with those using conventional therapies alone. We found no statistically significant differences in symptom severity and QOL between the two groups. However, this study has clinical, research, and public health implications for Uganda and other sub-Saharan African settings. Efforts by clinicians to discourage patients with cancer from using HM in Uganda have not been successful. Therefore, healthcare providers may need to create an environment that allows patients to openly discuss HM use and record medicinal plants used and related outcomes (e.g., QOL) to facilitate further research on HM interactions, efficacy, and safety. This will also enable product development and support behavioral change among the general public. Recording plants used may aid in conducting retrospective studies that evaluate long-term outcomes (e.g., survival and QOL over time), which are currently not possible because such data are missing. Further qualitative studies exploring patients' perceptions of HM use during cancer treatment and longitudinal observational studies concentrating on specific cancers are also recommended.

Author Contribution Statement

AJB: idea conception, methodology, data collection, analysis, and manuscript writing. PPN, ECA, and MMK, AJ: supervision, idea conception, methodology, and manuscript revisions.

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Ethical considerations

The Faculty of Medicine Research Ethics Committee (FREC# 22/01-2021), Mbarara University of Science and Technology Research Ethics Committee (MUREC/7#05/02-21), and Uganda National Council of Science and Technology (Ref: HS1602ES) approved this study. Uganda Cancer institute gave clearance to conduct this study (SR-25/22).

Availability of data

All supplementary data or files are published with this article.

Conflict of interest statement

The Author(s) declare (s) that there is no conflict of

interest'.

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