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# Factors associated with herbal medicine use among patients with cancer attending a tertiary hospital in Southwestern Uganda: a cross-sectional study

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## Abstract

**Background** Herbal medicine use among patients with cancer is prevalent particularly in low- and middle-income countries. However, concerns about safety and potential interactions with chemotherapy emphasize the need to understand the prevalence and factors associated with herbal medicine use in this setting. Therefore, the aim of this study was to determine the prevalence and factors associated with herbal medicine use among patients with cancer at Mbarara Regional Referral Hospital (MRRH).

**Methods** We conducted a cross-sectional study between September 2023 and November 2023 at the oncology unit of MRRH. Data analysis was done using SPSS version 27. The demographic characteristics of the study participants were analyzed descriptively and presented as frequency and percentage. The prevalence of herbal medicine use was presented as a percentage. We employed both bivariate and multivariate logistic regression to determine the factors associated with herbal medicine use and statistical significance was considered at a  $p$ -value  $< 0.05$ .

**Results** A total of 358 patients were approached for the study and data from 303 participants was used for analysis. The overall prevalence of herbal medicine use among patients with cancer attending the MRRH was 56.8% (172/303). Of the 172 patients with cancer who use herbal medication, 46.4% (80/172) use herbal medication alongside conventional medication. Factors associated with herbal medicine use among the study participants include: stage III cancer (aOR = 2.7, 95% CI: 1.3–5.3;  $p$ -value = 0.005), Stage IV cancer (aOR = 3.1, 95% CI: 1.5–6.3;  $p$ -value = 0.003), having a comorbid condition (aOR = 1.8, 95% CI: 1.1–2.9;  $p$ -value = 0.026), and having received three or more cycles of chemotherapy (aOR = 2.5, 95% CI: 1.2–5.0;  $p$ -value = 0.014).

**Conclusion** The high prevalence of herbal medicine use among patients with cancer at MRRH indicates a strong reliance on complementary medicine, especially among those with advanced cancer and multiple comorbidities. Addressing this requires



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education on safe herbal medicine use and regular monitoring to ensure patient safety and improve treatment outcomes.

**Keywords** Herbal medicine, Cancer patients, Complementary medicines, Prevalence, Patient safety

## 1 Introduction

Cancer remains a significant global health challenge. In 2022 alone, an estimated 20 million new cases and 9.7 million deaths were due to cancer [1]. According to the Global Cancer Observatory, there were an estimated 35,968 new cancer cases and 24,629 cancer deaths in Uganda in the year 2020 [1]. A study in Mbarara district in southwestern Uganda registered 1,258 new cancer cases between 2013 and 2017 [2]. The high prevalence of cancer is associated with an increase in the cost of healthcare, psychological distress, and loss of productivity among the patients and their caregivers [3].

Modalities used in conventional cancer treatment include chemotherapy, radiotherapy, and surgical interventions [4]. These treatment options have helped reduce cancer-related mortalities and improved the quality of life of cancer patients [5, 6]. Despite the successes, these treatment interventions remain relatively expensive and inaccessible to most of the patients with cancer in Low- and Middle-Income Countries (LMICs) [7]. Additionally, chemotherapy is also associated with devastating side effects which may sometimes be intolerable to some patients [8]. This has pushed patients and their caregivers to seek alternative treatment options such as herbal medicine [9].

The World Health Organization (WHO) reports that up to 80% of Africans still rely on plant-derived medicines for their healthcare needs [10]. In relation to cancer treatment, it is reported that up to 50% of patients with cancer worldwide concurrently use herbal medicines alongside conventional treatments [11]. Studies conducted in Nigeria and Ghana indicate that a substantial number of cancer patients incorporate herbal treatments into their overall healthcare strategies [12, 13]. Another study in Kampala-Uganda showed that up to 70% of patients with cancer use herbal remedies as adjunct therapies [14]. Herbal medicine use greatly varies from region to region, particularly in low- and middle-income countries [15].

The reasons for herbal medicine use among patients with cancer are numerous. A study by Mwaka et al. shows that patients with cancer use herbal medication for symptom relief, minimizing the toxicity of conventional chemotherapy, and improving their overall quality of life [14]. Additionally, patients perceive herbal medicines as natural and holistic, with a lower risk of side effects compared to conventional treatments [16]. However, the use of herbal medicines among these patients has raised concerns regarding their safety profiles, potential interactions with conventional cancer therapies, and non-adherence to prescribed treatments due to patient preference for herbal medicines [17]. This can result in treatment interruptions and poor results with studies in Uganda showing that only 30–40% of patients with cancer adhere to their follow up visits [18, 19]. Therefore, it is important for healthcare workers to understand the drivers for increased herbal medicine use among patients with cancer.

At Mbarara Regional Referral Hospital, there is a high prevalence of adverse drug reactions among patients with cancer [20]. The adverse effects impact the adherence to chemotherapy and consequently, the patients may consider herbal use as a possible alternative. Anecdotal observations during clinical practice at the oncology unit of MRRH

show that patients rarely seek information regarding herbal medication use. The extent of herbal medicine use and its associated factors among patients with cancer in this setting remains unclear. Additionally, there is a risk of drug interactions between herbal medicine use alongside chemotherapy. This interaction may lead to adverse effects or lead to suboptimal effects of the chemotherapeutic agents and impact the treatment outcomes in patients with cancer [21]. Therefore, the aim of this study was to determine the prevalence and factors associated with herbal medicine use among patients with cancer at the MRRH Cancer Unit.

## 2 Methods

### 2.1 Study design and setting

This was a cross-sectional study to explore the prevalence and factors associated with herbal medicine use among patients with cancer at Mbarara Regional Referral Hospital (MRRH). The study was conducted from September 2023 to November 2023.

Mbarara Regional Referral Hospital is a tertiary hospital and the largest referral center in southwestern Uganda. It is 280 km from the capital Kampala and has a 600-bed capacity [22]. The hospital serves a population of over four million people in its catchment area comprising 13 districts of southwestern Uganda. The cancer unit of MRRH has a bed capacity of 38 beds which is 20 beds for adults and 18 beds for pediatric patients respectively with 2 specialist oncologists, 1 pharmacist, and 7 nurses. At the time of the study, the oncology unit had approximately 800 active patients attending the clinic with most of them as outpatients.

### 2.2 Study population, sample size, and sampling

The study population included adult patients with cancer of any type confirmed with biopsy. Participants were either currently receiving or had previously received conventional cancer treatments at the MRRH. Only patients able to provide informed consent were included in the study. Patients with a confirmed diagnosis of cognitive deficits, hearing or speaking impairments, or communication barriers that may hinder effective data collection were excluded from the study.

Cochran's formula [23] for cross-sectional studies was used to determine the sample size based on an estimated prevalence of 68.3% [19] and the assumptions of a 95% confidence interval, and a 5% margin of error. Thus, a minimum sample size of 333 was obtained. After adding 5% for the potential non-response rate, the total sample size was 350 patients with cancer.

We calculated a sampling interval from a total of active patients (800) at the oncology unit currently receiving chemotherapy and other treatments for their diagnoses. The sampling interval was  $(800/350)$  approximately 2. Every 2nd patient on the list of active clients who met the inclusion criteria was approached to participate in the study on their next clinic visit.

### 2.3 Data collection tools and procedure

We developed a structured questionnaire consisting of two sections based on a comprehensive review of the existing literature and research objectives. The first section focused on gathering the socio-demographic information and the medical history of the participants. The second part was designed to capture information regarding patients' clinical

data and herbal medicine use patterns. The questionnaire was translated from English into Runyankore by a professional translator who was fluent in both languages. The translated version was then reviewed by a bilingual (English and Runyankole) health-care worker at the oncology unit of MRRH to ensure that the questions were culturally appropriate and accurately conveyed the intended meaning.

Before the data collection, the questionnaire was reviewed by experts in quantitative research to ensure its correctness and validity. Participants were recruited sequentially after obtaining their informed consent. During the administration of the questionnaire, participants and their caregivers were informed about the purpose of the study and reassured that it would not affect their treatment plan in any way. The questionnaire was administered by trained research assistants in a private room at the oncology ward of MRRH. The questionnaire was administered in either the local language (Runyankore) or English based on the participants' preferences.

#### **2.4 Data management and analysis**

At the end of each day, the data collection tools were checked for completeness by the study team and any anomalies were addressed before data entry. The data was then entered into a password-protected Microsoft Excel version 19 accessed only by the research team. The entered data was cleaned in Excel and transferred to a statistical package for social sciences (SPSS) version 27 [24] for analysis. Descriptive statistics, such as frequencies, percentages, mean, and standard deviation, were used to summarize the socio-demographic characteristics of the participants. The prevalence of herbal medicine use was calculated by dividing the count of participants who reported herbal medicine use by the total number of participants in the study and presenting it as a percentage. The association of independent variables with herbal medicine use among patients with cancer was investigated using both bivariate and multivariate logistic regression. Differences between variables with a  $p$ -value  $< 0.25$  at bivariate analysis were adopted for multivariate analysis, where the differences with a  $p$ -value  $< 0.05$  were considered statistically significant and thus associated with herbal medicine use.

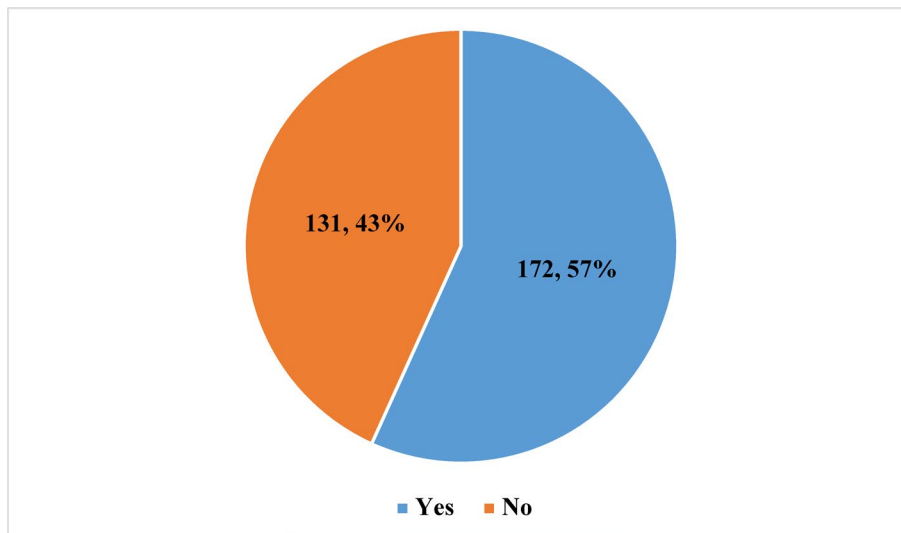
### **3 Results**

#### **3.1 Sociodemographic characteristics of patients with cancer at Mbarara regional referral hospital**

A total of 358 patients attending both the in-patient and out-patient services at the Cancer unit of MRRH were approached to be enrolled in this study and 55 either declined to participate or were unable to complete the entire questionnaire. Of the 303 participants, 186 (61.4%) were male and the mean age  $\pm$  SD was  $60.4 \pm 15.9$  years with the majority between 35 and 65 years 167 (55.1%). Most participants ( $n = 142$ , 46.9%) had completed primary education while the majority ( $n = 260$ , 86.4%) were not employed. Prostate cancer 72 (23.8%) was the most common cancer among the study participants and about 127 (41.9%) of the participants had a comorbid condition on top of their cancer diagnosis (Table 1).

**Table 1** Sociodemographic and clinical characteristics of the patients with cancer at Mbarara regional referral hospital, Sept-Nov 2023 (N = 303)

Characteristic	Categories	Frequency (%)
Age (Years)	Young adults (18–34)	18 (5.9)
	Middle aged (35–65)	167 (55.1)
	Older adults (> 65 years)	118 (38.9)
Gender	Male	186 (61.4)
	Female	117 (38.6)
Education	Non formal education	79 (26.1)
	Primary	142 (46.9)
	Secondary	52 (17.2)
	Tertiary	30 (9.9)
Marital status	Married	226 (74.6)
	Divorced	7 (2.3)
	Widowed	46 (15.2)
	Single	24 (7.9)
Employment n = 301	Employed	41 (13.6)
	Non-employed	260 (86.4)
Residence	Urban	52 (17.2)
	Rural	251 (82.8)
Stage of cancer	Stage 0	57 (18.8)
	Stage I	25 (8.3)
	Stage II	44 (14.5)
	Stage III	98 (32.3)
	Stage IV	79 (26.1)
Cancer duration	< 1 year	154 (51.0)
	≥ 1 year	148 (49.0)
Comorbid conditions	No	176 (58.1)
	Yes	127 (41.9)



**Fig. 1** Prevalence of herbal medicine use among patients attending the oncology unit at Mbarara Regional Referral Hospital

**3.2 The prevalence of herbal medicine use among patients with cancer at MRRH cancer unit**

Overall, 172/303 patients (56.8%) with cancer attending the MRRH Cancer unit reported herbal medicine use (Fig. 1). Of the 172 patients with cancer who use herbal medication,

46.4% (80/172) reported using herbal medicine alongside conventional medication.

The highest percentage of herbal medicine use was reported in the advanced stages of cancer (68.4% in stage IV and 65.3% in stage III) (Fig. 2).

### 3.3 Factors associated with herbal medicine use among patients with cancer

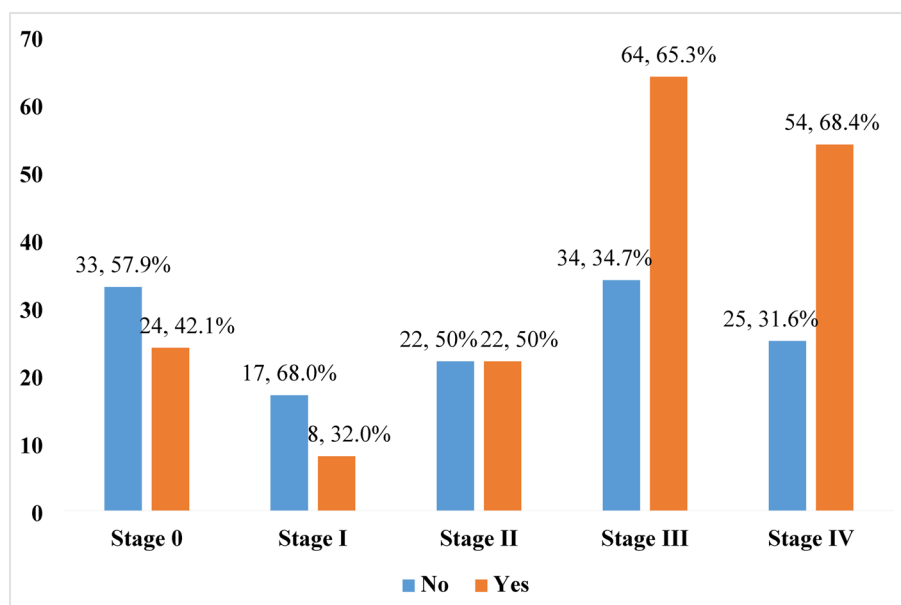
The association of independent variables with herbal medicine use among patients with cancer was investigated using both bivariate and multivariate logistic regression.

At bivariate level, age older than 60 years (cOR = 1.7, 95% CI: 1.1–2.6; *p*-value = 0.029), stage III cancer (cOR = 2.6, 95% CI: 1.3–5.1; *p*-value = 0.005), Stage IV cancer (cOR = 3.0, 95% CI: 1.5–6.0; *p*-value = 0.003), having comorbid conditions (cOR = 1.7, 95% CI: 1.1–2.8; *p*-value = 0.020), having received three or more cycles of chemotherapy (cOR = 3.1, 95% CI: 1.6–6.0; *p*-value = 0.001), being able to afford the cost of chemotherapy (cOR = 0.7, 95% CI: 0.4–1.2; *p*-value = 0.176), developing adverse events related to chemotherapy (cOR = 2.0, 95% CI: 1.1–3.8; *p*-value = 0.023), or being on chemotherapy for more than six months (cOR = 1.8, 95% CI: 1.01–3.2; *p*-value = 0.046) all had a *p*-value < 0.25 and were introduced into the multiple logistic regression.

At multivariate analysis, having stage III cancer (aOR = 2.7, 95% CI: 1.3–5.3; *p*-value = 0.005) and Stage IV cancer (aOR = 3.1, 95% CI: 1.5–6.3; *p*-value = 0.003) compared to stage 0, having a comorbid condition (aOR = 1.8, 95% CI: 1.1–2.9; *p*-value = 0.026), and having received three or more cycles of chemotherapy (aOR = 2.5, 95% CI: 1.2–5.0; *p*-value = 0.014) retained statistical significance and therefore were associated with herbal medicine use among patients with cancer at MRRH (Table 2).

## 4 Discussion

Our study identified a high prevalence (56.8%) of herbal medicine use among patients with cancer at Mbarara Regional Referral Hospital. This is comparable to studies conducted in similar settings; 58.2% in Ghana [12], 65% in Nigeria [13], 40% (pooled prevalence) in Africa [15], and 49.3% pooled prevalence in Asia [25]. The high use of herbal



**Fig. 2** Proportions of herbal medicine used at different stages of cancer at the oncology unit of MRRH

**Table 2** Bivariate logistic regression analysis of the association of independent factors with herbal drug use among patients with cancer at MRRH

Variable	Category	Herbal medicine use		cOR (95% CI)	p-value	aOR (95% CI)	p-value
		No	Yes				
Age (Years)	≤ 60	73 (49.7)	74 (50.3)	1			
	>60	58 (37.2)	98 (62.8)	1.7(1.1–2.6)	0.029*	1.3 (0.8–2.2)	0.239
Gender	Male	80 (43.0)	106 (57.0)	1.02 (0.6–1.6)	0.921		
	Female	51 (43.6)	66 (56.4)	1			
Marital status	Married	99 (43.8)	127 (56.2)	0.9 (0.5–1.5)	0.731		
	Unmarried	32 (41.6)	45 (58.4)	1			
Education	Tertiary	10 (33.3)	20 (66.7)	1.8 (0.7–4.2)	0.206		
	Secondary	25 (48.1)	27 (51.9)	0.9 (0.5–1.9)	0.889		
	Primary	59 (41.5)	83 (58.5)	1.2 (0.7–2.2)	0.448		
	Non-formal	37 (46.8)	42 (53.2)	1			
Cancer stage	Stage 0	33 (57.9)	24 (42.1)	1			
	Stage I	17 (68.0)	8 (32.0)	0.6 (0.2–1.7)	0.389	0.7 (0.2–2.1)	0.528
	Stage II	22 (50.0)	22 (50.0)	1.4 (0.6–3.0)	0.430	1.4 (0.6–3.2)	0.370
	Stage III	34 (34.7)	64 (65.3)	2.6 (1.3–5.1)	0.005*	2.7 (1.3–5.3)	<b>0.005</b>
	Stage IV	25 (31.6)	54 (68.4)	3.0 (1.5–6.0)	0.003*	3.1 (1.5–6.3)	<b>0.003</b>
Comorbidity	No	86 (48.9)	90 (51.1)	1			
	Yes	45 (35.4)	82(64.6)	1.7 (1.1–2.8)	0.020*	1.8 (1.1–2.9)	<b>0.026</b>
Cost of Chemotherapy	Affordable	52 (48.6)	55 (51.4)	0.7 (0.4–1.2)	0.176*	0.8 (0.4–1.3)	0.277
	Not affordable	79 (40.5)	116 (59.5)	1			
Chemotherapy Adverse events	No	29 (58.0)	21(42.0)	1			
	Yes	102 (40.3)	151 (59.7)	2.0 (1.1–3.8)	0.023*	1.5 (0.8–3.2)	0.236
Cancer duration	< 1 year	73 (47.4)	81 (52.6)	1			
	≥ 1 year	58 (39.2)	90 (60.8)	1.4 (0.9–2.2)	0.150*	0.9 (0.5–1.5)	0.582
Cycles of Chemotherapy received	One	29 (64.4)	16 (35.6)	1			
	Two	31 (46.3)	36 (53.7)	2.1 (1.0–4.6)	0.060	1.7 (0.7–3.8)	0.215
	Three/ More	71 (37.2)	120 (62.8)	3.1 (1.6–6.0)	0.001	2.5 (1.2–5.0)	<b>0.014</b>
Duration on Chemotherapy	< 3 months	35 (53.8)	30 (46.2)	1			
	3–6 months	32 (42.7)	43 (57.3)	1.6 (0.8–3.1)	0.188*	1.0 (0.4–2.2)	0.990
	> 6 months	64 (39.3)	99 (60.7)	1.8 (1.01–3.2)	0.046*	1.1 (0.4–3.0)	0.921

medicines in these low- and middle-income countries can be attributed to the high cost of conventional treatment options and cultural acceptance to the use of herbal medicine [14, 15].

This prevalence is lower than a study conducted in China which identified a prevalence of 75.1% herbal medicine use among patients with cancer [26]. The difference may be explained by the cultural and health system differences between Uganda and China. In China, traditional Chinese medicine is embedded within the healthcare system and is frequently integrated with conventional cancer treatments [27]. This integration likely contributes to the high use of herbal medicine in Chinese cancer care settings.

On the other hand, the prevalence in this study is considerably higher than that reported among patients with cancer in the west midlands (19.7%) [28]. This can be explained by the greater access to comprehensive cancer care services in the west midlands like advanced therapies and supportive care that are often covered by health insurance or national health systems. This accessibility may reduce the perceived need or appeal for herbal medicine use.

In this study, patients with advanced stages of cancer (stage III and Stage IV cancer) were more likely to use herbal medicines compared to those in the initial stages. This is

consistent with findings from a previous study conducted in Tanzania [29]. This, which could be because of the distressing pain and suffering those patients in the late stage go through that may force them to seek alternative remedies in order to reduce their symptoms [30].

Study participants who had a chronic comorbid condition on top of their cancer diagnosis were more likely to use herbal medicine compared to those with just a cancer diagnosis. This has previously been identified by a study in Ethiopia [31]. Patients with comorbidities are likely to seek herbal medicine to manage their comorbid conditions [14]. The herbal use in these patients can be attributed to a focus on the management of cancer and little attention paid to the comorbid conditions leading to patients seeking herbal medicine to manage the comorbidities [32].

Patients who had received three or more cycles of chemotherapy had higher odds of using herbal medicine compared to those with one cycle. Chemotherapy is associated with adverse effects that may affect the quality of life of patients [8]. In turn, as the patient receives more cycles of chemotherapy, they may shy away from the chemotherapy because of the associated adverse effects and consider using herbal medicine instead.

This study had some limitations. The study was conducted at a single site and therefore this may limit the generalizability of our findings. However, the study site is a tertiary hospital in southwestern Uganda and the only one with a specialized oncology unit in the south and the west of the country. As such it receives a large pool of patients seeking care for cancer diagnosis.

## 5 Conclusion

The high prevalence of herbal medicine use among patients with cancer at MRRH shows a strong reliance on complementary medicine in this setting. This is particularly common in patients with advanced cancer, comorbid conditions, and those who have had multiple cycles of chemotherapy. The high use reflects potential gaps in the accessibility of conventional cancer treatment and management of symptoms in patients with cancer. Integration of education programs on the safe use of herbal medicine into cancer care and training of healthcare providers on complementary medicine are essential to ensure the safety of patients. Regular monitoring of herbal medicine use among cancer patients is recommended to assess impacts on treatment outcomes and guide policy development for comprehensive cancer care.

### Abbreviations

aOR	adjusted Odds Ratio
cOR	Crude Odds Ratio
GLOBOCAN	Global Cancer Observatory Network
LMICs	Low-and Middle-Income Countries
MRRH	Mbarara Regional Referral Hospital
WHO	World Health Organization

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### Author contributions

All the authors named in this manuscript have contributed greatly to this work and meet the criteria for authorship. S.M.N, CUT and T.M.Y participated in research conceptualization, data collection, data interpretation, and manuscript revision. J.K, A.D, and A.O contributed towards data analysis and data interpretation and manuscript writing/revision. All authors read and approved the final manuscript.

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**Data availability**

The data set and data collection tools used in this study are available upon reasonable request from the corresponding author.

**Declarations****Ethics approval and consent to participate**

This study was conducted in accordance with the declaration of Helsinki. The study was approved by the research and ethics committee of Mbarara University of Science and Technology with approval number (MUST-2023-957). The director of Mbarara Regional Referral Hospital provided administrative clearance to conduct the study.

**Informed consent**

Written informed consent was sought from eligible participants before obtaining data from them.

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare no competing interests.

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