

Self-Care Practice and Its Associated Factors Among Podoconiosis Patients in East Gojjam Zone, North West Ethiopia

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Introduction: Podoconiosis is endemic non-filarial elephantiasis of the lower legs swelling caused by barefoot exposure to red clay soil. The burden of disability occurs among the poorest populations. Self-care practice is the most cost-effective prevention strategy practiced at home to improve lymphedema, working functionality, and quality of life. Despite this, there is a scarce of knowledge about self-care practices and associated factors among podoconiosis patients in Ethiopia.

Objective: To determine self-care practice and its associated factors among podoconiosis patients in East Gojjam zone North West, Ethiopia.

Methods: Community-based cross-sectional study design was used among 633 podoconiosis patients. Computer-generated simple random sampling technique was used to recruit participants. All patients who started podoconiosis treatment were the source population. Data were entered using Epidata version 3.1 and exported to SPSS version 25 for cleaning and analysis. Variables with 95% CI corresponding AOR were used to identify statistically significant factors for self-care practice.

Results: In this study, the self-care practice of podoconiosis patient was 64%. Females [AOR: 0.38 (95% CI: 0.22, 0.65)], 55–65 years age [AOR: 0.41 (95% CI: 0.22, 0.74)], above 65 years age [AOR: 0.22 (95% CI: 0.11, 0.450)], 4–6 km distance from water source [AOR: 0.06 (95% CI: 0.03, 0.12)], above 6 km distance from water source [AOR: 0.03 (95% CI: 0.01, 0.09)], educational level [AOR: 0.05 (95% CI: 0.01, 0.40)], marital status [AOR: 5.40 (95% CI: 2.30, 12.90)], and distance from health institution [AOR: 0.35 (95% CI: 0.23, 0.54)] were statistically identified associated factors for self-care practice of podoconiosis patient.

Conclusion: In this study, the self-care practice of podoconiosis patients was not well practiced. Socio-demographic factors are identified as associated factors for self-care practice. Strengthening health education and behavioral changes are required to improve self-care practice.

Keywords: podoconiosis, self-care, practice, adults, Ethiopia

Introduction

Podoconiosis is endemic non-filarial elephantiasis of the lower legs swelling caused by barefoot exposure to red clay soil of volcanic origin in tropical highlands.^{1–5} The etiology of the disease is not fully understood, exposure to irritant soil that contains colloid-sized mineral particles are known to cause.^{2,6} Podoconiosis is a neglected tropical disease that resulted in the interaction between genetics and the environment over a long period.^{7,8} Lymphatic filariasis and podoconiosis are co-endemic in 20 countries and the burden of disability occurs among the poorest populations.^{7,9,10} Globally, podoconiosis cases are estimated at four million people, who live mainly in tropical Africa, Central and South America, Southeast Asia, and Northwest India.^{1,2,11,12} It is a public health problem in more than ten African countries, including Uganda, Tanzania, Kenya, Rwanda, Burundi, Sudan, Ethiopia, Cameroon, the Democratic Republic of Congo,

and Equatorial Guinea.^{1,13,14} The estimated total number of cases per country is highest in Ethiopia.¹⁵ Around 11 million Ethiopians (18% of the population) are at risk of exposure to irritant soil.¹³ The total number of podoconiosis cases is highest in Ethiopia, as an estimated 1.5 million people are affected with a national average prevalence of 4%,^{1,14–19} with geographical variations of 6.3% in Dano district,¹⁴ 3.3% in East and West Gojjam Zone,²⁰ 6.2% in Gamo Zone,¹⁷ and 4.3% in Waghemra Zone.²¹

The pathogenesis is not well known, soil mineral particles penetrate the skin, which is characterized by low hydration of the stratum corneum, and these particles are taken up by macrophages in the dermis, causing chronic inflammation process of lymphatic systems, this will lead to progressive lymphedema.^{1,6,7} Usually presents with “slipper-distribution” mossy lesions, bilateral and asymmetric lower limbs swelling below the knee, or rare groin involvement unlike the lymphatic form of elephantiasis.^{20,22} The primary lymphatic vessels become dilated and surrounded by lymphocytes as edema and disorganized collagen production occur. If fibrosis predominates, the lymphatic lumen narrows and is eventually destroyed; if edema predominates, lymphatic valvular dysfunction tends to occur.^{6,23,24} Episodes of acute-dermatolymphangioadenitis are among the most severe clinical consequences of lymphoedema characterized by malaise, fever, chills, diffuse inflammation, swelling of the limbs, lymphangitis, adenitis, and skin peeling.^{19,25} This is rarely a direct cause of mortality, greatly reducing productivity, leading to significant stigma from the community and health professionals (ie exclude from church, mosque, and school.), low quality of life, and marital discrimination problems.^{18,25–31} In developing countries, like Ethiopia, poor access to health care, possible lack of diagnosis, limited availability of medications, and adherence problems threaten efforts to treat podoconiosis.³² Across Ethiopia, the knowledge, attitude, and practice level for podoconiosis causes, prevention measures, and treatment misconceptions need attention.^{15,16,33,34}

The most effective strategy to prevent the disability of podoconiosis patients were early diagnosis and prompt treatment.³⁰ Self-care practice for podoconiosis patients includes shoe wear, washing feet with soap, using emollient, elevation, exercise, use of bandages, and lymphatic drainage.^{3,7,15,19,25,30,35} This helps to improve lymphedema, reduction in the frequency and duration of acute attacks, improve working functionality, and fewer interdigital and entry lesions.^{3,36–38} Interventions were implemented in this study setting to prevent, treat, and rehabilitate podoconiosis patients by International Orthodox Christian Charities (IOCC), an international non-governmental organization, and the Gojjam Lymphoedema Best Practice Trial (GoLBET).^{18,25,34,39} According to a randomized controlled trial conducted in Aneded district in northern Ethiopia, above 85% of intervention participants were washing their feet and lower legs with soap, applying ointment, used bandages, elevated, and exercised during the study period.²⁵ Evidence reported in the Waghemra zone, Ethiopia revealed that 83.7% of respondents wore shoes at the time of the interview, 53.94% of them wore the non-protective shoe, and 57.8% had foot washing habits.²¹ Only 28% of podoconiosis cases reported to wore shoes for the first time when they were older than 26 years and a majority 86.7% of the participants shoes wore at the time of the interview.¹⁴ Similarly, two-thirds of patients reported washing their feet at least once per day, only 58% of them reported feet washing with soap, and 96% of them had worn shoes at least once in their life.¹³ From the total of 5 practice questions, almost one-sixth (58.1%) of them scored below 3 shoe-wearing practices in Aneded district, Ethiopia.¹⁵ Previous evidence reported as sex, scarcity of water, poor self-care adherence, lack of knowledge on podoconiosis causes, problems of early health-seeking behavior, miss behaviors, and environmental and health system-related factors were possible factors for self-care practice among podoconiosis patients.^{15,18,20,25,40}

In Ethiopia, podoconiosis prevention and treatment program is not proactive (managed by non-governmental organizations), this may hinder the current status of cases and implementation of prevention measures to overcome the problem. The previous studies were done on the prevalence and risk factors of podoconiosis. Only a handful of studies have been published on factors associated with self-care practice among podoconiosis patients in Ethiopia, and in the highly endemic East Gojjam Zone, knowledge of self-care practice and associated factors is scarce. This study helps clinicians and health professionals to improve the quality of life and enhance treatment outcomes, provoking policy-makers and governmental and non-governmental organizations working in this area to develop guidelines and policies to robust the implementation of home-based self-care practice and other management strategies. Therefore, this study aims to determine the self-care practice and its associated factor among podoconiosis cases in the East Gojjam Zone, North West Ethiopia.

Materials and Methods

Study Design and Eligibility Criteria

A community-based cross-sectional study was conducted in East Gojjam Zone from January 1 to April 30, 2021. According to Central Statistical Agency of Ethiopia (CSA) 2021, the total population estimated 2,681,950 with 1,346,339 being women and 1,335,641 being men. The zone covers an area of 14,004.47 square kilometers divided by 23 Woredas. All adult (≥ 18 years) patients who have lived in East Gojjam Zone and who started podoconiosis treatment service are considered as source population. Podoconiosis patients who are registered in each health facility and started treatment in the selected districts were included in this study and patients with current illnesses resulting in difficulty in communication and age less than 18 years were excluded.

Sample Size Determination and Sampling Procedure

The sample size was calculated by Epi Info version 7 Software using single population proportion formula with no previous evidence existing considering a maximum of 50% proportion, 95% Confidence Interval (CI), 5% level of precision, 10% non-response rate, and 1.5 design effect yielding the total sample size 633. A multistage sampling technique was employed in this study. Woredas were selected by considering high-load podoconiosis patients. All lists of treatment-started podoconiosis cases registered in each health facility in the selected Woredas were received and study participants/cases were proportionally allocated by size to each Woreda. Finally, a computer-generated simple random sampling technique was used to select actual study participants. The list of podoconiosis patients in the health facilities contains important information (ie name, age, sex, and specific address of Kebele and got) for easy access to the selected participants in the community (Figure 1).

Operational Definition

Self-care practicing: Patients on treatment and practicing at least above the mean levels of seven self-care practices questions (shoe wear, washing feet with soap, using emollient, elevation, exercise, use of bandage, and lymphatic drainage) are considered to be practicing good self-care, while those practicing below the mean are considered to be practicing poor self-care. If it is good self-care practices coded as “1” and poor self-care practices coded as “0”.⁴¹

Variables

Dependent Variable

- Self-care practice (Good or Poor).

Independent Variables

- Socio-demographic and economic characteristics, behavioral, and clinical factors.

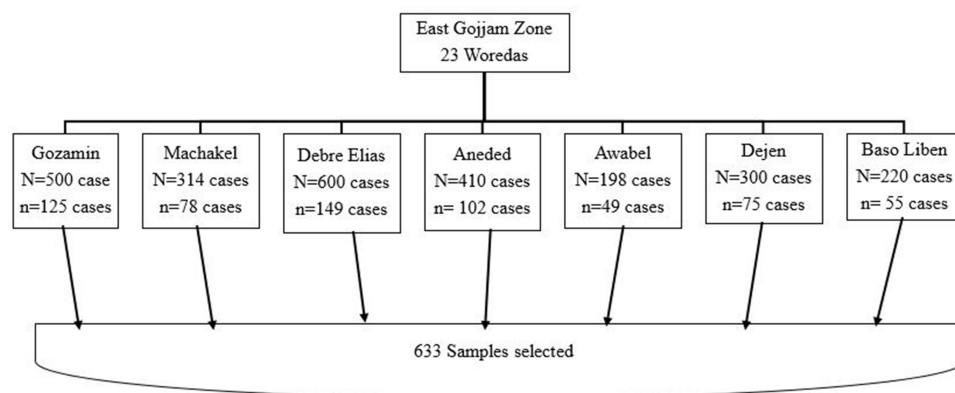


Figure 1 Schematic presentation of sampling procedure among podoconiosis cases of self-care practice and associated factors in East Gojjam Zone, 2021.

Data Collection Tools, Procedures, and Quality Control

An adapted structured questionnaire was used in this study by reviewing different literature. The questionnaire was developed in English, translated to the local language Amharic then back-translated to English to keep the consistency. The questionnaire includes socio-demographic characteristics, clinical, behavioral, and self-care practice variables. The interview administered technique was used to fill the questionnaire. Three trained degree health professional data collectors and one master's degree health professional supervisor participated. To maintain data quality, one day of training was given to data collectors and supervisors and pre-tested on the 5% of the sample size outside the actual study setting in the Zone. Close supervision was maintained during the entire data collection period. All filled questionnaires were checked for completeness, clarity, and consistency before data entry.

Data Processing and Analysis

Collected data were coded and entered using EpiData version 3.1 software and exported to SPSS version 25 software for data cleaning and analysis. Both bi-variable and multivariable logistic regression analysis models were fitted. Variables with p -values <0.25 in the bi-variable analysis were selected for multivariable analysis. Model fitness was checked using the Hosmer–Lemeshow test. Descriptive statistics were presented using mean, standard deviation, frequency tables, and figures. Finally, a Confidence Interval (CI) of 95% with an Adjusted Odds Ratio (AOR) was used to identify statistically significant factors for self-care practice.

Results

Socio-Demographic and Economic Characteristics

The study includes 633 podoconiosis patients who have started treatment, with a response rate of 100%. Two hundred ninety-four (46.4%) of the participants were males, 199 (31.4%) were between the ages of 56–65 years, and the mean age of the participants was 57.6 years. In this study, the majority (80%) were married and 535 (84.5%) could not read and write (Table 1).

Behavioral and Clinical Factors of Podoconiosis Patients

In this study, 446 (70.5%) patients felt recovered, and 151 (23.9%) of the participants felt that practicing self-care did not have effect on their treatment outcome. Almost one-six podoconiosis patients were positive about modern medications to prevent/treat podoconiosis cases and 385 (60.8%) of patients believed that walking barefoot transmitted the podoconiosis disease (Table 2).

Self-Care Practice of Podoconiosis Patient

The overall self-care practice of podoconiosis patients in this study was 405 (64%) with 95% CI: 62.0, 68.0. Among study participants, only 448 (70.8%) and 69 (10.9%) of them usually wore shoes and washed their feet with soap, respectively, as self-care practice of podoconiosis treatment measures to reduce further disability and complications of the affected limb/leg (Table 3).

Associated Factors of Self-Care Practice Among Podoconiosis Patients

In multivariable logistic regression analysis; variables sex, age, distance from the water source, educational level, marital status, and distance from health institution were selected as statistically significant factors for self-care practice among podoconiosis patients.

Female podoconiosis patients were 62% less likely to self-care practice compared to the male [AOR: 0.38 (95% CI: 0.22, 0.65)]. Patients whose ages between 55 and 65 years were 59% less likely to self-care practice compared to ages between 35 and 45 years [AOR: 0.41 (95% CI: 0.22, 0.74)], and ages above 65 years were 78% less likely to self-care practice compared to the counterparts of ages between 35 and 45 years [AOR: 0.22 (0.11, 0.45)].

Podoconiosis patients who were 4–6 km distance from water source were 94% less likely to self-care practice compared to those less than 4 km distances from water source [AOR: 0.06 (95%: 0.03, 0.12)], and above 6 km distances

Table 1 Socio-Demographic and Economic Characteristics of Podoconiosis Patients in East Gojjam Zone, Northwest Ethiopia, 2021

Variables	Response	Frequency (N)	Percentage (%)
Sex	Male	294	46.4
	Female	339	53.6
Age in years	35–45	139	22.0
	45–55	119	18.8
	55–65	199	31.4
	>65	176	27.8
Educational level	Cannot read and write	535	84.5
	Read and write	84	13.8
	Primary (grade 1–8) and above	14	2.2
Marital status	Married	505	80
	Single	41	6.5
	Divorced	66	10.4
	Widowed	21	3.0
Family size	≤4	459	72.5
	≥5	174	27.5
Distance from health institution	≤5 km	295	47
	>5 km	338	53
Distance from the water source	<4 km	511	80.7
	4–6 km	72	11.4
	>6 km	50	7.9
Monthly income	<500 Birr	160	25.3
	500–1000 Birr	288	45.5
	1001–1500 Birr	161	25.4
	>1500 Birr	24	3.8

from water source were 97% less likely to self-care practice compared to less than 4 km distances from the water source [AOR: 0.03 (95% CI: 0.01, 0.09)].

Moreover, patients' educational levels of reading and writing were 95% less likely to self-care practice compared to the comparator group primary (grade 1–8) and above education level [AOR: 0.05 (95% CI: 0.01, 0.4)].

Similarly, podoconiosis patients with widowed marital status were 5.40 times more likely to self-care practice compared to counterparts married [AOR: 5.40 (95% CI: 2.3, 12.9)].

Finally, study participants who were residing above 5 km distance from a health institution were 65% less likely to self-care practice compared to study participants residing 5 km and above distances from health institutions [AOR: 0.35 (95% CI: 0.23, 0.54)] (Table 4).

Table 2 Behavioral and Clinical Factors of Podoconiosis Patients in East Gojjam Zone, North West Ethiopia, 2021

Variables	Category	Frequency (n)	Percent (%)
Feelings of prevention/treatment mechanisms	Modern medication	381	60.2
	Holy water	107	16.9
	Traditional healers	113	17.9
	Others	32	5.1
Believes in podoconiosis mode of transmission	Heredity	60	9.5
	Mich	176	27.8
	Barefoot	385	60.8
	Contact with podoconiosis patient	12	1.9
The feeling of self-care outcome	Recovered	446	70.5
	Worsened	36	5.7
	Not changed	151	23.9
Have you any aggravating disease conditions	Yes	41	6.5
	No	592	93.5
Drink alcohol	Yes	609	96.2
	No	24	3.8

Discussion

This study was intended to address the self-care practice and associated factors among podoconiosis patients. The etiology is unknown, exposure to irritant soil which contains colloid-sized mineral particles of common clay elements has a significant role to cause the podoconiosis disease.^{2,6} Management of self-care practice was done at home-based care, which is convenient, cheap, and no need for technical procedures. This improves lymphedema status, reduction in the frequency and duration of acute attacks, increases working functionality, and fewer interdigital and entry lesions.^{36–38} In this study, the overall self-care practice among podoconiosis patients was 64% (95% CI: 62.0, 68.0). This finding was higher than the reported 45.4% in Gamo zone in Southern Ethiopia.⁴¹ This could be due to differences in sample size and previous exposure status of self-care practice. In this study, IOCC and GoLBeT intervention programs were implemented to help with the prevention and treatment of cases, which may improve self-care practices. Among podoconiosis cases, only 3.8% never wore shoes, 77.3% does not practice leg elevation, 69% did not do exercise, 79.3% did not use bandages in the affected limb, and 78.2% never practiced lymphatic drainage as self-care measures to prevent further disability and complications. This is similar to 4%¹³ and 15%²⁰ of not ever worn shoes in western Ethiopia. Most of these managements were practiced at home-based and suitable for use.³⁰ Overall self-care management was found needs to intention to be practiced to prevent disfigurement of feet and incidence of acute-dermatolymphangioadenitis resulting to improve social stigma, productivity, and quality of life of the patients.

The sex of the study participants was a statistically significant factor for self-care practice: Female podoconiosis patients were 62% less likely to self-care practice compared to the males. The majority of podoconiosis patients have reduced productivity due to loss of working days, are socially isolated, and are stigmatized by the communities as well as by health care professionals.^{12,16,21,30} This is due to gender inequalities of the inferiority beliefs and attitudes of females. However, women podoconiosis cases were stigmatized, not allowed to participate in social activities as a result of fear of

Table 3 Self-Care Practice Among Podoconiosis Patients in East Gojjam Zone, North West Ethiopia, 2021

Variables	Response	Frequency (N)	Percent (%)
Shoes wearing	Usually	448	70.8
	Sometimes	161	25.4
	Never	24	3.8
Wash (cleanse) feet with soap	Usually	69	10.9
	Sometimes	564	89.1
Using emollient	Sometimes	633	100
Elevation of legs	Usually	13	2.1
	Sometimes	131	20.7
	Never	489	77.3
Exercise	Usually	41	6.5
	Sometimes	155	24.5
	Never	437	69
Using bandage	Usually	5	0.8
	Sometimes	126	19.9
	Never	502	79.3
Lymphatic drainage	Usually	17	2.7
	Sometimes	121	19.1
	Never	495	78.2

discrimination, hopelessness in the restoring after treatment, wrong beliefs resulting from the punishment of wrong behaviors, limited time to care for themselves, and stayed overloaded (wife, mothers, and employee) at home to care of their families.⁴² All these conditions are the cause for them resilient to the care of her aesthetic values, this might be because females are less likely to self-care practices.

The age of the study participants was identified associated factor for self-care practice: Patients aged 55–65 years were 59% times less likely to self-care practice compared to those ages between 35–45 years, and those ages above 65 years were 78% less likely to self-care practice compared to the counterparts of age between 35 and 45 years. Desire to maintain attractiveness by others esteemed at adult ages. When the age goes elder, the intention to care for him/herself were lessened as a result of physiological, physical, and mental weakness which lower motivation and commitment, changing behavior, comorbid illness, and difficulties paying active role/decreasing functionality to care for themselves towards maintaining self-care.^{43,44}

Likewise, distance from the water source is a statistically associated factor: Podoconiosis patients who lived 4–6 km distances from the water source were 94% less likely to self-care practice compared to those who lived less than 4 km distances from the water source, and those who lived more than 6 km distance from water source were 97% less likely to self-care practice compared to who lived less than 4 km distance from the water source. Poor adherence to daily washing treatment regimens of podoconiosis patients increased the rate of complications.^{18,45} During the dry season (October to March) rivers and streams are a stable source of water this dries up and people are forced to travel long distances to water sources. At this time most of the patients ignored washing due to preserving water used for a drink.¹⁸ According to World

Table 4 Multivariable Analysis of Self-Care Practice and Associated Factors Among Podoconiosis Patients in East Gojjam Zone, North West, Ethiopia, 2021

Variable	Categories	Self-Care Practice		COR with 95% CI	AOR with 95% CI	P-value
		Good	Poor			
Sex	Male	197	97	1	1	
	Female	208	131	0.78(0.56, 1.10)	0.38(0.22, 0.65)	0.001*
Age in years	35–45	96	43	1	1	
	45–55	79	40	0.89(0.52, 1.49)	0.65(0.33, 1.30)	0.22
	55–65	128	71	0.81(0.51, 1.28)	0.41(0.22, 0.74)	0.03
	>65	102	74	0.62(0.38, 0.99)	0.22(0.11, 0.45)	0.001*
Distance from the water source	<4 km	387	124	1	1	
	4–6 km	13	59	0.07(0.04, 0.13)	0.06(0.03, 0.12)	0.001*
	>6 km	5	45	0.04(0.01, 0.09)	0.03(0.01, 0.09)	0.001*
Educational level	Cannot read and write	343	192	0.14(0.02, 1.06)	0.13(0.02, 1.00)	0.053
	Read and write	49	35	0.11(0.01, 0.90)	0.05(0.01, 0.40)	0.004
	Primary (grade 1–8) and above	13	1	1	1	
Marital status	Married	333	172	1	1	
	Single	20	21	0.52(0.27, 0.99)	0.51(0.24, 1.11)	0.09
	Divorced	41	25	0.89(0.52, 1.52)	0.83(0.43, 1.60)	0.57
	Widowed	14	7	1.31(0.72, 2.38)	5.40(2.30, 12.90)	0.001*
Distance from health institution	≤5 km	231	64	1	1	
	>5 km	174	164	0.29(0.21, 0.42)	0.35(0.23, 0.54)	0.001*

Note: *significant level <0.001.

Health Organization defines access to drinking water is the availability of at least 20 liters of water per person per day within a round trip walking distance of 30 minutes or equal to 1 km distance from the user's dwelling.^{13,46,47} In addition to this, around 8 liters of water is recommended per day to soak, wash and rinse feet; which means an alternative to this amount of water must be required, or that better and more stable water sources are necessary for podoconiosis patients.¹⁸ Therefore, traveling a distance of more than 1km to a water source is considered not deemed to access an adequate amount of water.

Similarly, the educational level of podoconiosis patients was a statistically significant factor: The education level of those who can read and write was 95% less likely to self-care practice compared to the comparator group primary (grade 1–8) and above education level. Patients with a high level of educated were well aware and confident in the prevention measures, available treatment options, and mode of transmission. They also have good knowledge to maintain personal and environmental hygiene, protect her/himself from risky conditions, good adherence to counseling, and treatments, and easy to change behaviors to improve from podoconiosis-related complications.⁴⁸

In addition, the marital status of patients was a statistically associated factor for self-care practice: Podoconiosis patients with widowed marital status were more than fivefold more likely to self-care practice compared to married patients. This might be fear of complications from previous partner experience death related to podoconiosis, an

improvement from social exclusions, needs to get a new partner/engagement, increasing functionality to cope with financial scarcity, the right to decide only by him/herself lonely and having more time (relatively less burden on daily house chores, raising children, and providing care) to self-care practice.^{42,49}

Finally, distance from health institutions is statistically significant: Study participants who were residing above 5 km distances from health institutions were 65% less likely to self-care practice compared to participants residing within 5 km and less distance from health institutions. This might be an individual who is far from a health facility may lead to a decrease in health-seeking behavior due to lack of health educational access, challenge traveling long distances to reach the health facility, and lack of public transport cost. This all resulted, in they do not have access to the information about different preventive strategies of self-care practice, and being unable to early detect, and diagnose podoconiosis cases.

Strength of the Study

This study was conducted in community-based settings, included high caseload Woredas in the Zone to ensure representativeness, and primary data sources were used. Unlike previous evidence, the current study enrolled a relatively large number of participants and also took into account their socio-demographic, clinical, and behavioral factors. This could be used as baseline data for the prevention and control of this neglected disease at the national level.

Limitation of the Study

There are no sufficient published studies, and the findings were not well discussed in the related literature. Moreover, since the data collection method was interview administered self-report rather than direct observation of the patient's self-care practice this may result in social desirability and recall bias. All lists of cases were received from health facilities and started treatment, by using the lists selected cases were traced to the community. Due to this reason, patients who were not registered and had not started treatment in the health facilities were not included in the study, this may under or overestimate the outcome.

Conclusions

In this study, the self-care practice of podoconiosis patients was not well practiced. Variables of sex, age, distance from the water source, education level, marital status, and distance from health institutions were identified as associated factors for self-care practice. All the responsible bodies give emphasis to these prevention measures to reduce further disabilities and complications of this neglected tropical disease by considering identified risk individuals. Developing robust intervention strategies, policies, and treatment guidelines through proper case management integrations with other health programs is essential including strengthening health education and behavioral change required to improve self-care practice at individual and community levels.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethical Statement and Consent to Participate

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional research committee and the guidelines of the Declaration of Helsinki. Written informed consent was obtained from each study participant before starting the interview. This study was approved by the Debre Markos University, College of Health Science ethical review committee (HSC/R/C/Ser/Co/324/11/13). The information given was maintained strictly confidential and used for this study purpose only.

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Disclosure

The authors have declared that they have no competing interests in this work.

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