Knowledge of Diabetes and its Herbal Treatment among Patients with Diabetes and Herbalists Living in Baringo County-Kenya

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Received February 14, 2025, accepted April 12, 2025, Published July 1, 2025.

ABSTRACT

Context: The use of herbal medication in Baringo County-Kenya in managing ailments, especially chronic ones, is very common. Such chronic ailments include cancer, hypertension, and diabetes mellitus. This use is even though there is little information on whether the prescribers (herbalists) and those using the herbs (patients with diabetes) understand what generally diabetes mellitus is, its signs and symptoms, the sources of their herbs, and also the side effects of the herbs they are using.

Aim: The investigation aims to determine the knowledge of herbalists and patients with diabetes about diabetes mellitus disease and its herbal treatment.

Methods: The study was conducted in Baringo County, Kenya, known for using herbal medication. A prevalence study design was utilized. The sample size included thirty-nine (39) patients with diabetes and twelve (12) herbalists. The data collection instruments were an investigator-directed questionnaire and a face-to-face interview study guide for patients with diabetes and herbalists.

Results: One-third (33% [4/12]) of the herbalists define diabetes mellitus as high and low blood sugar, while a few 16.7% (2/12) see it as 'blood sugar instability.' More than three-quarters of the diabetic patients (77% [30/39]) described diabetes as a disease with no cure, and slightly more than half (54% [21/39]) testified that hospital treatment of diabetes was exorbitant. According to patients with diabetes mellitus, xerostomia (69.2%), recurrent micturition (56.4%), and polyphagia (51.3%) were the major signs and symptoms of diabetes mellitus, while according to herbalists, asthenia (66.67% [8/12]), polydipsia (33.30% [4/12]), and chronic wounds (25% [3/12]). Only one (8% [1/39]) patient with diabetes reported using herbal medications alone, while the rest used in combination with other conventional drugs (medicines prescribed in health care settings). More than half (51% [20/39]) of patients diagnosed with diabetes used their herbal medications with metformin. Most (66.7% [8/12]) herbalists prescribe their herbs alone. Regarding the side effects of the herbs, patients with diabetes reported pruritus (46% [18/39]), and nausea (23% [9/39]), while a few herbalists (16.7% [2/12]) reported nausea, decreased desire for food, and stomach upset. The other herbalists (83.33% [10/12]) said they have not yet received any complaints or side effects from their clients (patients with diabetes). For most of the patients with diabetes, their index information on herbal medicine use was from their family members, acquaintances, and work colleagues (85% [33/39]). Patients with diabetes obtained their medications directly from the woodlands surrounding their homes (bush) (76.92%) and herbal clinics (69.23% [27/39]). At the same time, herbalists got their medications from either their kitchen garden (25% [3/12]), or a woodland surrounding areas of operation (bush) (75% [9/12]).

Conclusion: Both patients with diabetes and herbalists obtain their herbs mainly from the woodland surrounding them. Acquaintances and family members are the major information sources on herbal medication for patients with diabetes. Most herbs are combined with the existing prescribed drugs in healthcare facilities. Nevertheless, there is a need for more scientific studies to ascertain the types, efficacy, and safety of the herbs that patients with diabetes mellitus are using and the ones prescribed by the herbalists.

Keywords: Diabetes, herbal treatment, herbalists, knowledge, patients

Citation: *Chebor, A. K. (2025).* Knowledge of diabetes and its herbal treatment among patients with diabetes and herbalists living in Baringo County-Kenya. *Evidence-Based Nursing Research, 7*(3), 12-23. https://doi.org/10.47104/ebnrojs3.v7i3.393

1. Introduction

Previous studies regarding the knowledge of persons diagnosed with diabetes on causes of diabetes disease found that most patients with diabetes mellitus perceive diabetes as a hereditary disease; some view diabetes as a result of the failure of organs such as the pancreas, some view it as a result of drinking 'beer' and fair number see it, as being triggered by a high-carbohydrate diet *(Kasole et al., 2019; Sriraman et al., 2023).* A finding similar to a study done in Ethiopia by *Mekashaw Bayked et al. (2022) and Shiferaw et al. (2020).* Views necessitate a further study on indigenous knowledge of diabetes mellitus.

Regarding the use of traditional herbal in combination with conventional medicines, one systematic review study done on diabetic herbal medicine found that most (75%) of people diagnosed with diabetes mellitus saw that it is okay to combine herbs with conventional medicine because of the belief that there will be a better result in sugar regulation *(Sriraman et al., 2023),* however, in another study in Jamaica, most participants (85%) had a contrary finding about the combination, they saw the combination as not appropriate *(Adeniyi et al., 2021).*

Most patients with diabetes received information on herbal use from herbalists, conventional herbal providers, friends, and relatives. In contrast, others got it from social media, though a fair number (74%) do not bother to ask

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their doctors about their choice to self-medicate with herbs *(Alqathama et al., 2020).*

However, there is still limited knowledge of the potential adverse effects and rational use of herbs in managing diabetes mellitus; additionally, the promising results of some medicinal plants and traditional medicines on disease control, management, and treatment *(Kasole et al., 2019).*

2. Significance of the study

The utilization of phytomedicines globally is on a steady upward trajectory. Available reports indicate that more than 80% of Africans use them in one way or another to manage their ailments *(Cho et al., 2018; Piero et al., 2012).* Its use is rampant in Kenya, where the study was done, especially in resource-limited Counties like Baringo County *(Chebor et al., 2020).*

This utilization of herbs in Baringo County is persistent even though there is still a scarcity of information on whether the herbalists understand what diabetes mellitus is, whether patients with diabetes and herbalists know the side effects of the herbs they are prescribing, and whether the sources of those herbs, which this study attempted to find out. The study will not only shed some light on the understanding of herbalists and patients with diabetes-on-diabetes mellitus management, but it will also inform the policymakers in Kenya on the extent, source, and how people diagnosed with diabetes use diabetic herbal medications to manage their ailments.

3. Aim of the study

The investigation is aimed at finding out the knowledge of herbalists and patients with diabetes about diabetes mellitus disease and its herbal treatment.

3.1. Operational definitions

- As used in the study, *Herbal medicine/medication* refers to botanical medicine or phytomedicine used in treating diabetes mellitus, often prescribed by traditional herbal medicine men
- *Herbalists* refer to a person who uses plant parts to manage diseases exclusively.
- *Patients with diabetes* refers to persons who have been diagnosed with diabetes mellitus disease.

4. Subjects & Methods

4.1. Research Design

A prevalence study design was utilized to provide data on a certain phenomenon or relationships among phenomena at a fixed point in time *(Ihudiebube-Splendor et al., 2020).*

4.2. Study setting

The study was done in one of the 47 counties in Kenya-Baringo County. A county that covers an area of 11,075.3 km^2. It is located at a latitude of 00^{o}13" south and 1^{o}40" north and longitudes of 35^{o}6" and 36^{o}30" east in mid-western Kenya. Its headquarters is Kabarnet township. The other townships in this county include Eldama-Ravine, Mogotio, and Kabartonjo. Fifty-eight (58%) percent of Baringo County residents live below the poverty line. Their major economic activities include micro and small-sized business creativities and peasant farming, particularly animal rearing [cows and goats, mainly] and beekeeping *(KNBS, 2019).* Herbal medication use is prevalent in this county, with most herbal medicine men working from the headquarters of Baringo County-Kabarnet, Kabartonjo, and Eldama-Ravine townships *(Chebor et al., 2020).*

4.3. Subjects

The 39 patients with diabetes and the 12 herbalists were recruited using Fisher's formula and census methods, respectively.

A. Patients with Diabetes

Sample size determination

$$N=\frac{Z^2P\,(1-P)}{e}$$

Key:

N Anticipated sample size.

Z^2 = (1.96).

P = Prevalence of diabetes in Kenya in 2018 was at 3.6%] *(Mohamed et al., 2018).*

e = confidence level [95%]

Sample size calculated = $\frac{1.96^2 x 0.036 x 0.964}{0.05^2} = 53$

Based on Baringo County records in 2021, the diabetic population of Baringo County was less than ten thousand [approx. 600] A finite Population Correction Formula (FPC) *(Kasiulevičius et al., 2006)* was then utilized;

$$N = \frac{n_o}{1+\frac{(n^0 -1)}{N}}$$

$$N = \frac{53}{1+\frac{(53-1)}{600}}$$

N = 48

Forty-eight [48] diabetic patients were then enrolled in the study. Nine [9] patients were dropped during analysis because of inconsistencies. The remaining 39 were equivalent to the (39/48x100) 81.25% of patients studied.

Sampling technique

The sample size was determined via snowballing. The index client was enrolled in the study at Kabarnet County Referral Hospital [KCRH] diabetic clinic, after which he/she helped recruit the second patient. The second patient recruited, directed the researcher to the third patient. The third patient directed the researcher to the fourth patient. This trend went on until the 48 patients were recruited.

Inclusion criteria

- Patients should have been 18 years and above,
- Must have been of psychologically sound mind,
- Must have been using herbal antidiabetics sourced from Baringo County-Kenya,
- Must have been residents of Baringo County and have been getting management in Baringo County for their metabolic disorder for at least half a year prior to the commencement of the investigation.

Exclusion criteria
- Unwillingness to be part - and parcel of the investigation due to sickness and any other reasons.

B. Herbalists

Sample size; Twelve (12) Herbalists prescribing diabetic herbal medications recruited via census method.
Sampling technique – was done purposefully.
Inclusion criteria
- Diabetic herbal medicine men who manage diabetes mellitus using products of nature [phytomedicine] procured from Baringo County.
- Diabetic herbal medicine men who have been practicing in Baringo for at least half a year before the commencement of the investigation.

Exclusion criteria
- Those incapable or unwilling to pass information concerning diabetic herbal medicine during the investigation period.

4.4. Tools of Data Collection

An interviewer-administered questionnaire and a face-to-face interview guide were used to gather information from patients with diabetes and herbalists, respectively.

4.4.1. Interviewer-Administered Questionnaire (for patients diagnosed with diabetes disease)

The researcher developed an interviewer-administered questionnaire based on *Schnall et al. (2018).* The questionnaire had three parts. The first part (part 1) consisted of 6 closed-ended questions to collect data on demographic variables. The second part (part 2) consisted of 9 open-ended questions to collect data on knowledge about diabetes mellitus. The last part (part 3) consisted of 5 open-ended questions to collect data on patients with diabetes and knowledge of herbal medication therapies.

4.4.2. Face to Face Interview (for the herbalists)

The face-to-face interview guide had 17 questions, made up of open-ended questions only. The researcher used it as a guide to elicit some responses on the definition and source of their herbs from the herbalists. The development of the interviewer guide, was guided by the works of *(Roulston, 2018).* The language used to draft the data collection instruments was English since both tools were researcher-administered.

4.5. Procedures

The Human and Animal Research and Ethics Committee (HAREC) of the University of Eastern Africa-Baraton, Kenya, approved the investigation, which was registered by the National Commission of Science Technology and Innovation, Kenya (license number NACOSTI/P/18/23407/22472).

During the study stint, the Baringo County Management and the medical officer-in-charge of Baringo County Hospital authorized the investigation. Both the diabetic patients and the herbalists were required to append their signatures on a consent form as a sign of their readiness to participate in the study.

The data collection instruments' consistency and accuracy were checked before conducting the actual study. Research collection instruments (questionnaires and a face-to-face interview guide) were validated through a pilot study done in one of the neighboring County of Baringo County-Kenya- Elgeyo-Marakwet County, using fifteen [15) known diabetic patients and five [5] known herbalists. The validation was done for the study collection instruments by research specialists from the University of Eldoret Kenya.

The data of fifteen (15) diabetic patients and five (5) known herbalists were subjected to Cronbach's alpha test. The results showed an acceptable internal consistency of (α) = 76.4 and 81.4 percent for the questionnaire and interview guide, respectively.

During these tests, the principal researcher was also available in person to clarify any problem encountered during data collection. Any inconsistencies that arose in both the questionnaire and interviewer guide were rectified. The data collection took six Months (June to December 2021). Data was collected concurrently on both herbalists and patients with diabetes.

4.6. Data analysis

The resultant data was cleaned and coded using Excel Office 19 and analyzed using SPSS version 27 software. The analysis was descriptive, and the findings were presented in tables of frequencies and figures.

5. Results

Demographic characteristics of the participants
Patients with diabetes

Figure 1 illustrates the demographic variables of the patients diagnosed with diabetes. The age range of the diabetic patients was from 27 to 70 years, with an average of 46.8±11.2 years, out of which fifty percent (50%) were below 47 years (IQR 37, 56). The male gender formed around 53.85% of the total research participants. In terms of education, diabetic patients who had finished high school (Secondary) were 30.77% (12/39), and post-high school education level [Colleges/Tertiary] were 38.46% (15/39).
Herbalists

Concerning herbalists' gender and education status, Table 1 reveals the ages between 43 and 69. The mean age was 53.8±8.0 years. Most of them, 66.7% (8/12), were female gender. Close to sixty percent (58% [7/12]) of the research participants were not educated, 25% (3/12) or participated in adult basic education, and 33.3% (4/12) had gone to formal school (terminated their studies at primary school level). The duration of herbal medicine practice by herbalists ranged between 9 and 30 years, with an average of 17.4±7.1 years.

Knowledge of the definition of diabetes Mellitus
Patients with diabetes

Concerning Figure 2, more than three-quarters of the diabetic patients (77% [30/39]) described diabetes as a disease with no cure. Slightly more than half (54% [21/39]) testified that hospital treatment of diabetes was exorbitant. Nearly fifty percent (49% [19/39]) mentioned diet as a control measure of diabetes. Less than half (46% [18/39])

underscored the importance of using diabetic medications as prescribed without fail.

Herbalists

Table 2 reveals that a quarter of the herbalists, 25% (3/12), referred to diabetes mellitus as the unpredictability of sugar levels in the body. A third of them (33% [4/12]) referred to high and low blood sugar, while 16.7% (2/12) understood diabetes as 'blood sugar instability.' Only one herbalist (8.3% [1/12]) mentioned this metabolic disorder as a problem with sugars in the body.

Signs and symptoms

Patients with diabetes

Figure 3 illustrates that the top three signs and symptoms were xerostomia (69.2%), recurrent micturition (56.4%), and polyphagia at 51.3%. The other reported signs and symptoms *[represented by the first horizontal column]* were 25.6% (10/39) fast heartbeats (1/39), ocular pruritus (1/39), paresthesia (1/39), indigestion (1/39), blurred vision (1/39), chills (1/39), dyspnea (1/39), episodes of delirium (1/39), hypertension (1/39), and syncope episodes (1/39).

Herbalists

Figure 4 illustrates the signs and symptoms according to herbalists. The highest percentage, 66.67% (8/12), is for asthenia, followed by polydipsia (33.33% [4/12]), chronic wounds (25% [3/12]), polyphagia (25% [3/12]), and recurrent micturition (16.67% [2/12]).

Use of medications by patients

Figure 5 reveals that slightly more than half of patients diagnosed with diabetes used their herbal medications with metformin (51% [20/39]), closely followed by insulin (28% [11/39]). Around three patients (8% [3/39]) reported using herbal medicines alone.

Administration of herbal medications by herbalists

Figure 6 illustrates how herbalists prescribe their herbs. More than a third (66.7% [8/12]) of herbalists prescribe their herbs alone, and a quarter (25% [3/12]) prescribe their herbs in combination.

Side effects of the herbs

Patients with diabetes

Figure 7 illustrates the responses of persons diagnosed with diabetes regarding side effects. Pruritus was the most frequently mentioned side effect, 46% (18/39), followed by nausea, 23% (9/39), and emesis, 15% (6/39). Slightly less than a quarter reported no signs and symptoms.

Herbalists

Regarding Figure 8, very few herbalists (17% [2/12]) mentioned having recorded side effects from their clients; such side effects include nausea, decreased desire for food, and stomach upset. The other remaining herbalists (83% [10/12]) reported no complaints or side effects from their clients (patients with diabetes)

Source of information on diabetic herbal medication use

Table 3 reveals that the patients with diabetes, index information on diabetic herbal medicine treatment was from family members, acquaintances, and colleagues at work 85% (33/39). Seldomly, do they get information from media outlets and herbalists 2.56%.

Source of the herbs

Table 4 demonstrated that more than three-quarters (76.92% [30/39]) of the people diagnosed with diabetes got their herbs from the woodlands surrounding their homes and diabetic herbal clinics 69.23% (27/39), while a few obtained their herbs from their kitchen gardens and marketplaces (7.69% [3/39]).

Figure 9 reveals that the herbalists obtained their herbs from either their kitchen gardens 25% (3/12) or the woodlands surrounding their areas of operation 75% (9/12).

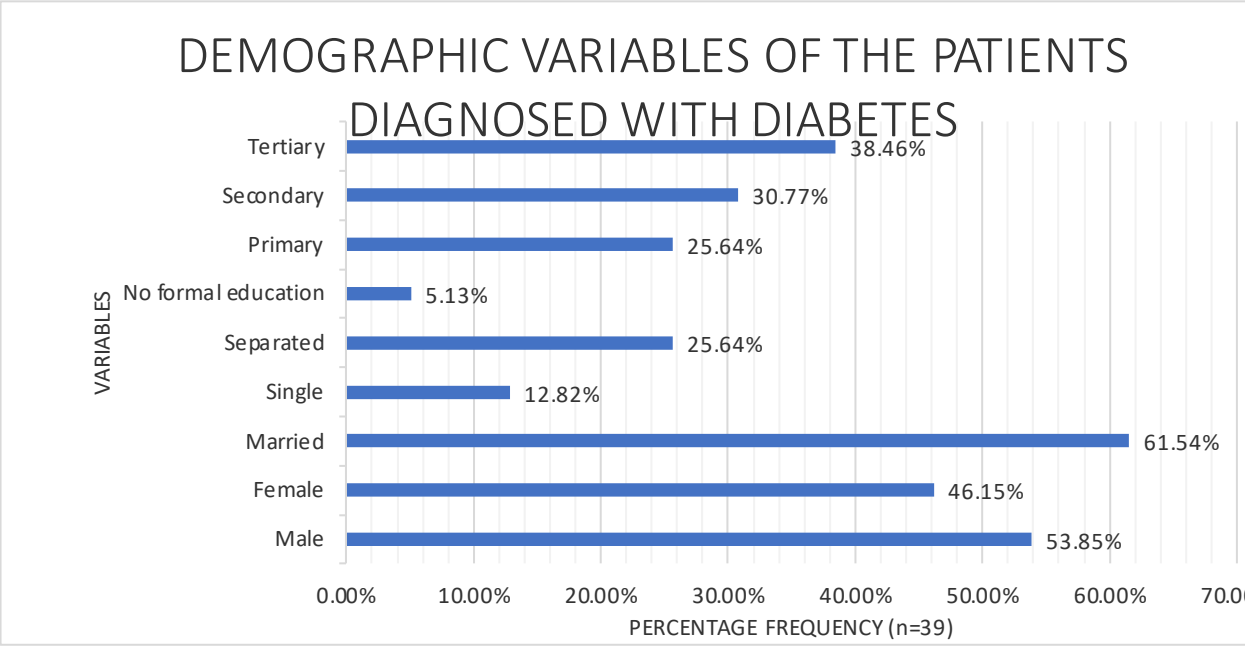

Figure (1): Percentage distribution of the demographic variables of the patients diagnosed with diabetes (n=39).

Table (1) Frequency and percentage distribution of the demographics of the herbalists interviewed (n=12).

Variables	Frequency	%
Age		
Range	43-69	
Mean±SD	53.8±8.0	
Gender		
Men	4	33.3
Women	8	66.7
Education status		
No formal education	7	58
Went to an adult education	3	25
Terminated studies at the primary school level	4	33.3
Duration of herbal medicine practice		
Range	9-30	
Mean±SD	17.4±7.1	

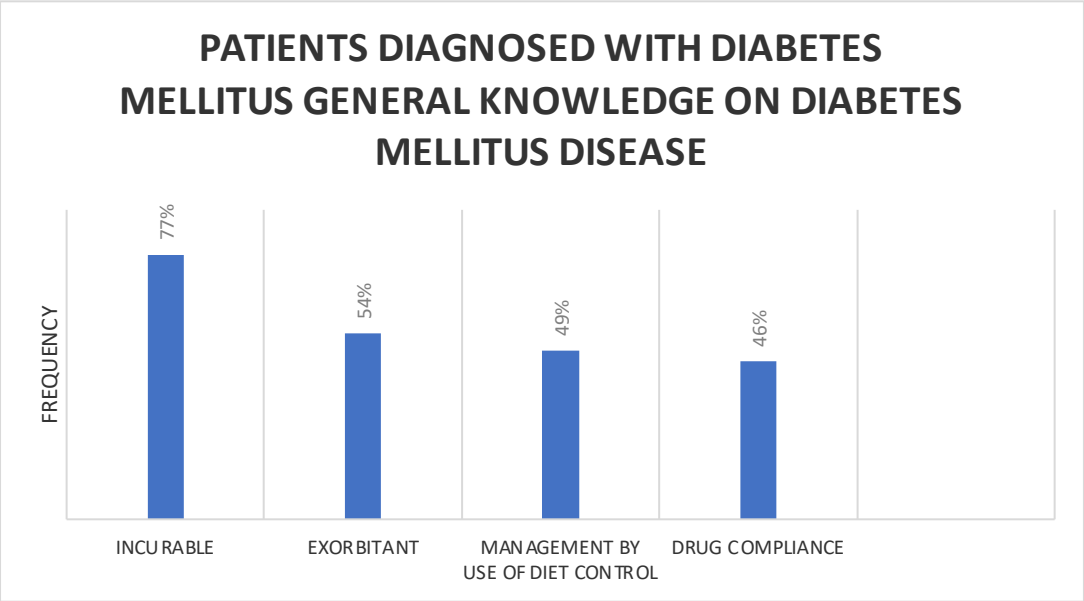

Figure (2): Percentage distribution of patients with diabetes general knowledge about diabetes mellitus disease (n=39).

Table (2) Frequency and percentage distribution of the herbalist's definition of diabetes mellitus disease (n=12).

Herbalists' definition of diabetes mellitus	Frequency	%
Unpredictability of sugar levels in the body	3	25
To high and low blood sugar	4	33.3
'Blood sugar instability'	2	16.7
Problem with sugars in the body.	1	8.3
Failed to respond	2	16.7

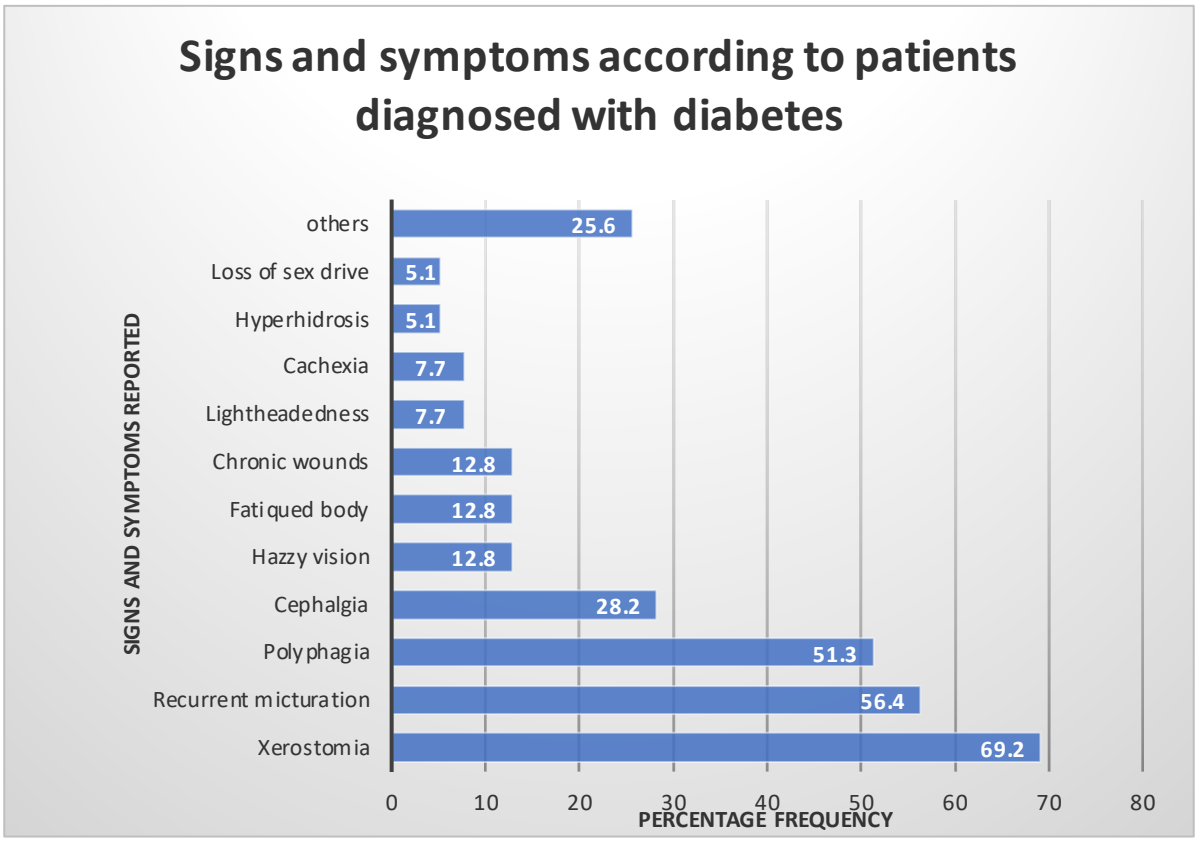

Figure (3): Percentage distribution of signs and symptoms as reported by patients with diabetes (n=39).

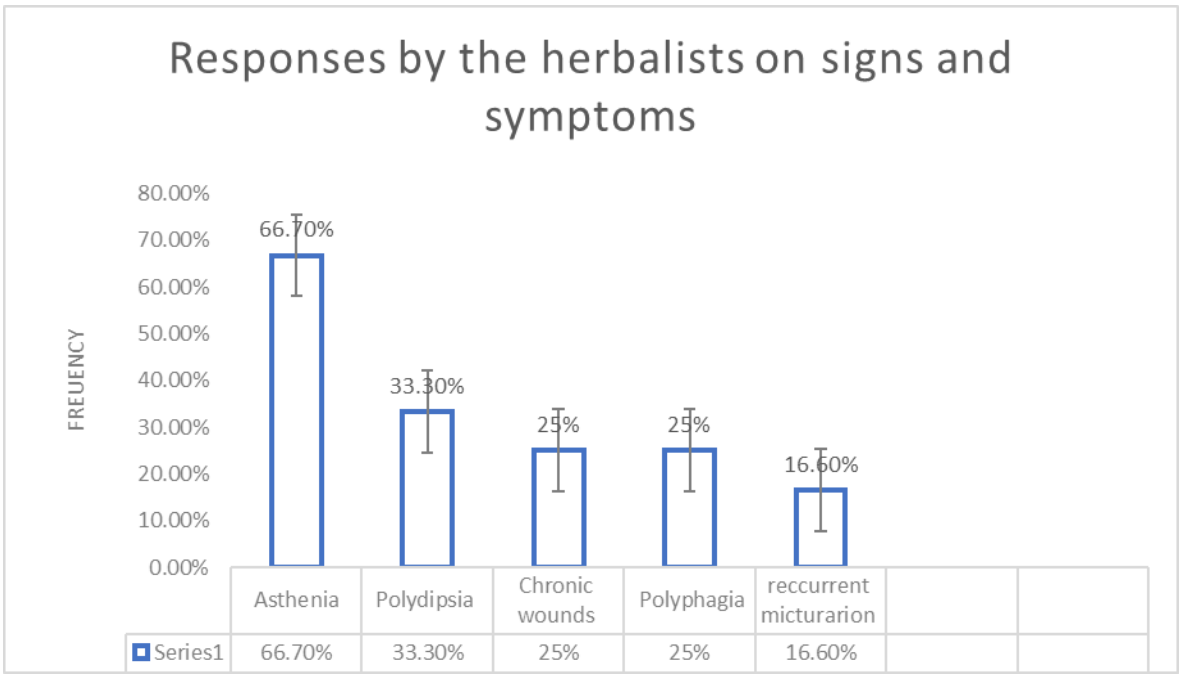

Figure (4): Percentage distribution of signs and symptoms of diabetes mellitus as reported by the herbalists (n=12).

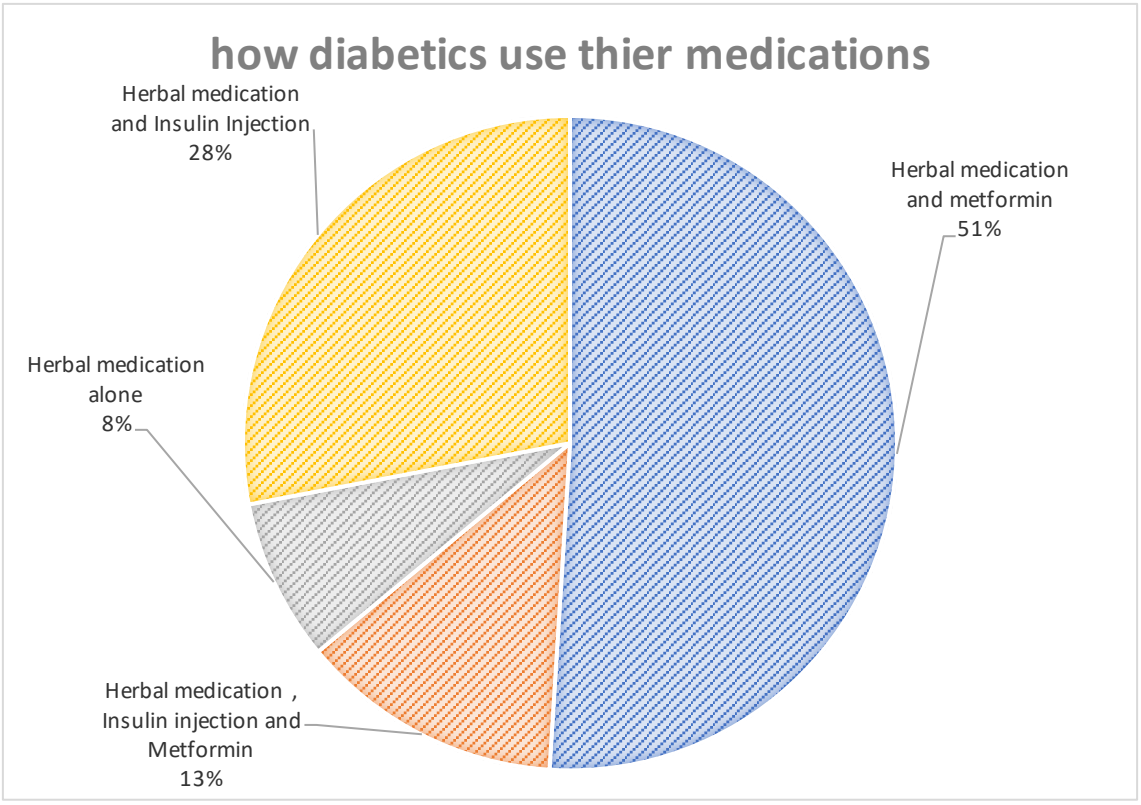

Figure (5): Percentage distribution of usage of herbal medicines as reported by patients with diabetes (n-39).

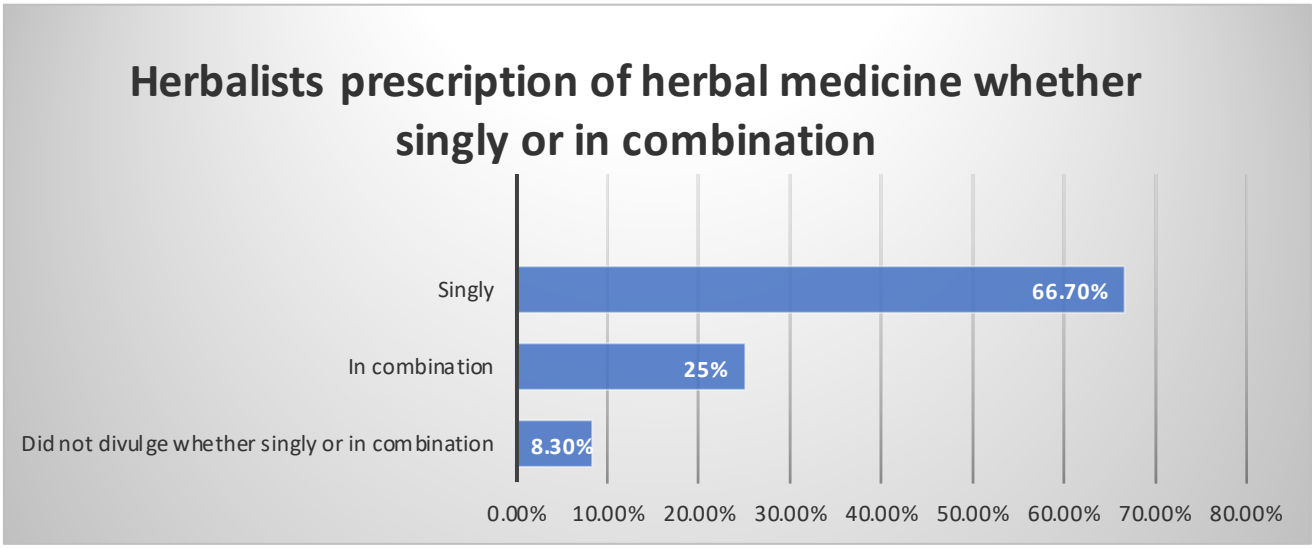

Figure (6): Percentage distribution of prescription of herbal medication by herbalist (n-12).

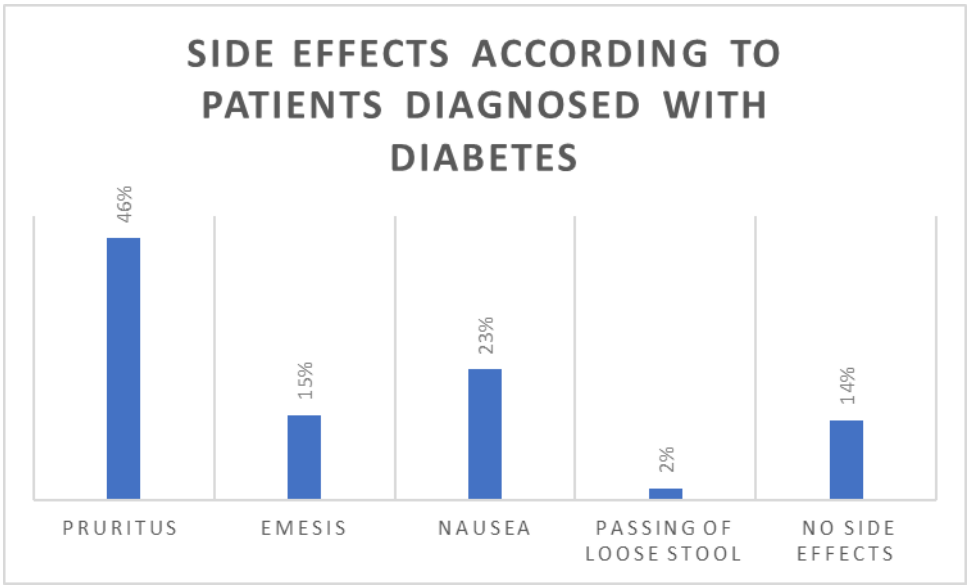

Figure (7): Percentage distribution of reported side effects by the patients with diabetes (n-39).

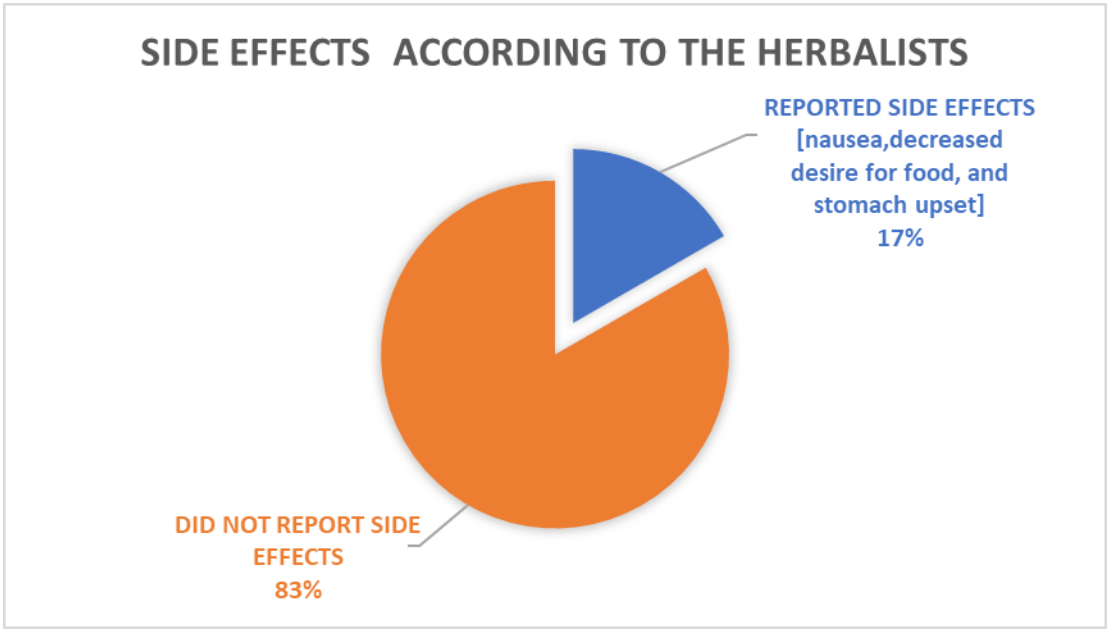

Figure (8): Percentage distribution of reported side effects according to the herbalists (n-12).

Table (3): Frequency and percentage distribution of source of information about herbal drugs as reported by patients with diabetes (n=39).

Information source	No.	%
Family members, acquaintances, colleagues at work	33	85
Posters	9	23
Mobile Telephony	8	21
Local administrative officers' meetings.	4	10
Written public media points	2	5
WEB	1	2.56
Audiovisual services	1	2.56
Herbalists	1	2.56

Table (4): Frequency and percentage distribution of source of herbs as reported by the diabetic patients (n=39).

Source of herbs	No.	%
Woodlands surrounding their homes	30	76.92
Herbalist clinic	27	69.23
Kitchen Garden	9	23.08
Own Home compound	3	7.69
Market in townships	3	7.69

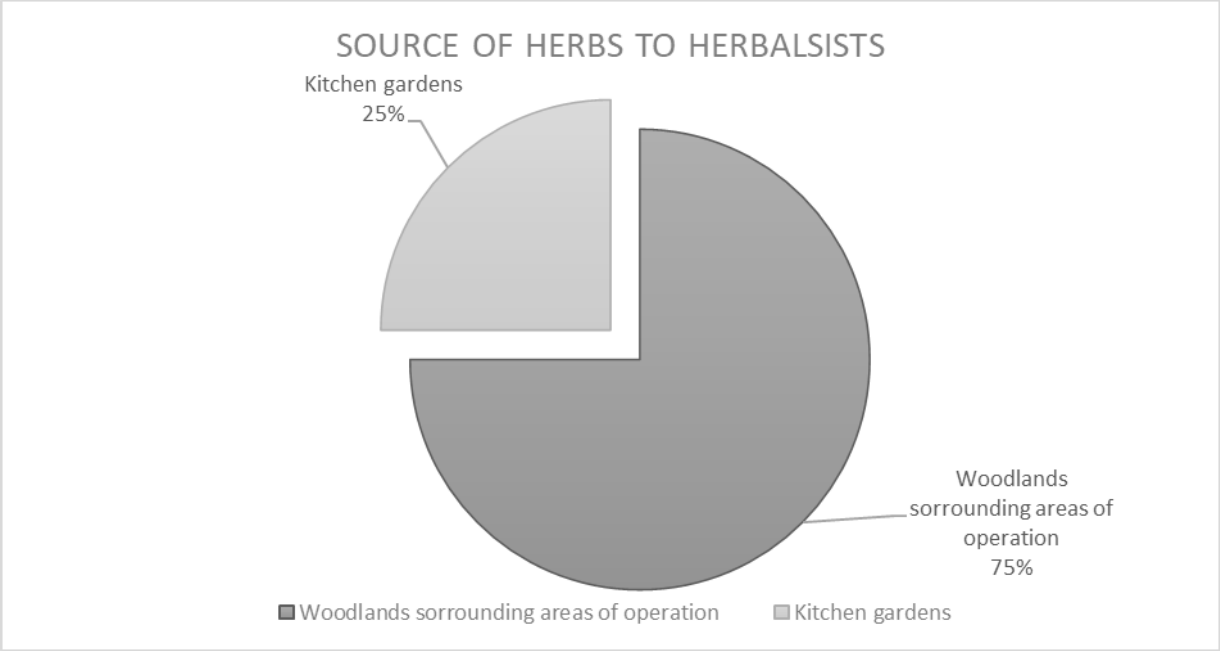

Figure (9): Percentage distribution of sources of herbal medicines according to the herbalists (n=12).

6. Discussion

The knowledge of patients diagnosed with diabetes mellitus and diabetic herbal medication practitioners about diabetes mellitus disease and its herbal treatment is paramount in managing the disease and its eventual outcome *(Alqathama et al., 2020)*. The investigation is aimed at finding out the knowledge of herbalists and patients with diabetes about diabetes mellitus disease and its herbal treatment.

With regards to the ages of patients with diabetes interviewed, the findings of this investigation found that diabetic patients ranged between 27 and 70 years, which indicates that most patients interviewed suffered from Type II diabetes mellitus. This result is comparable to that of *Agyare et al. (2009).*

Herbalists' ages ranged between 43 to 69 years. A finding demonstrating that herbal medicine practitioners are mostly adults and in agreement with the works of *Abdelhalim et al. (2017), Cheikh Youssef et al. (2011), Frimpong and Nlooto (2019), Mathibela et al. (2015)* at a mean of around 50 yrs, though not in congruence with the studies done by *Agyare et al. (2009); Boadu and Asase, (2017);* which indicated that most of their participants had a mean age of above 60.

Most of the herbalists (more than two-thirds) were women, probably because, in the Tugen community, women are primarily considered the storekeepers of culture and largely the caretakers of families. This finding is in covenant with that of *Nnko et al. (2024)* in a study done in Uganda on diabetic herbal medicines.

With regards to the level of education, patients with diabetes had a higher level of education (almost two-thirds had education levels above secondary school) compared to the herbalists – quite a number of them (more than a half) were not educated, a finding relatively similar to studies done by *Frimpong and Nlooto, (2019); Chege et al. (2015)* on the management of diabetes type II in Kwazulu-Natal, South Africa at fifty-one percent and study done in Kenya at fifty- four percent respectively, divergent to the works of *Boudjelal et al. (2013)* at around forty percent. A finding indicates that the level of education regarding herbal medication prescription is likely not a prerequisite for one to work as an herbalist. Diagnosing of conditions and prescription of herbal medication could be due to apprenticeship.

Nevertheless, though the herbalists had no formal education, a good number of them had some good knowledge of the definition of diabetes, as evidenced by the following excerpts – 'Diabetes Mellitus is unsteadiness of sugars in the body, [approximately a third defined] diabetes a condition is manifested by a 'high or low levels sugar in the blood,' this is probably because of the frequency of coming in contact with diabetic patients, and also the duration they have been practicing their trade that ranged

between 9-30 years with a mean of around seventeen years, responses which are comparable to that of *Frimpong and Nlooto, (2019), Chege et al. (2015)* and conflicting to the findings of *Akanbonga, (2015),* who found that, only slightly more than a third ([38.2%] -a number lower than the current finding) of the herbalists he interviewed, positively defined, what diabetes mellitus is.

Concerning how diabetic patients view diabetes mellitus, most of them described diabetes based on what they go through - in terms of finances and chronicity, a finding which underscores the difficulty that most of these patients go through during the management of their condition.

Herbalists' understanding of the manifestations of diabetes ranged from 'body malaise (approximately more than a half), polydipsia (approximately one third), chronic wounds (a quarter), polyphagia (also a quarter) to recurrent micturition, an outcome, partially in congruence with that of *Frimpong and Nlooto (2019),* who had more or less sentiments with regards to signs and symptoms of diabetes, and on the issue of recurrent micturition and polydipsia, especially. A finding denotes that most herbalists have some understanding of the signs and symptoms of diabetes mellitus.

In addition to what herbalists described, patients with diabetes pronounced that diabetes mellitus is a condition manifested by 'xerostomia' (approximately more than two-thirds) and 'recurrent micturition' (fifty-six percent), a finding signifying more detailed responses compared to the answers brought forward by herbalists. This finding can be attributed to their education status and innate metabolic disorder.

Most patients with diabetes use herbs in combination, which makes it difficult to conclude whether the herbs they use work. These combinations are with conventional medicine (medicines prescribed at health care facilities), and this could be because they believe that the sugar reduction process would be enhanced, a result that is in agreement with *Sriraman et al. (2023)* and contrary to *Adeniyi et al. (2021).*

When it comes to prescriptions, more than two-thirds of herbalists prefer prescribing most of their herbal medication singly rather than in combination. This finding is probably because they believe that a single herb can achieve the desired result of sugar level management instead of mixing many herbs. It could also be because it is easier to report and link the effectiveness to a particular herb.

With regards to side effects, though two-thirds of the patients mentioned some of the side effects as a result of the herbal medications they were using, it is almost difficult to agree with them since their use is mostly in combination with conventional medication.

Regarding the sources, both the herbalists and patients with diabetes mostly obtained their herbs from the surrounding woodlands; this is so, perhaps because of the proximity and freeness of the herbs in terms of cost, an outcome that is in agreement with the studies of *Abdelhalim et al. (2017); Chege et al. (2015); Sriraman et al. (2023),* who stated that most of their diabetic herbal medicines were sourced, either from the wild or grown specifically for use, within their home environment.

Patients with diabetes utilize these herbal medications because of the influence of acquaintances and family. This result agrees with the works of *Alami et al. (2015), Azizi-Fini et al. (2016), Putthapiban et al. (2017), and Tulunay et al. (2015),* who also found friends, neighbors, and families to be a source of information for patients with diabetes. It is also important to note that family members and friends are important in patient healthcare behavior decision-making.

7. Conclusion

Herbalists in Baringo County, Kenya, have some understanding of diabetes mellitus (DM), though more than half of them are not educated. They obtain their herbs mainly from the surrounding woodlands because of their proximity, which probably costs them nothing.

Equated to herbalists, most patients with diabetes are better educated and have a better understanding of diabetes. Friends and relatives are the major sources of information on herbal medication use for patients with diabetes.

8. Recommendations

- Many more awareness studies are needed, especially among diabetic patients and the citizens of Baringo County, on herbal diabetic medicine types, efficacy, and safety.
- There is also a need for more formal education of herbal medicine prescribers to enhance their understanding of diabetes mellitus. This formal education will help them make more accurate diagnoses and precise prescriptions for their herbal medication in the future.

9. References

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