

Effect of Educational Program on Health Consequences of Patients with Leprosy

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ABSTRACT

Context: Leprosy remains a leading cause of peripheral neuropathy and disability globally despite the extensive efforts to reduce the disease burden. It is associated with social stigma, and the patients sometimes suffer social discrimination because it often leads to visible physical deformities.

Aim: The present study aimed to evaluate the effect of educational program on the health consequences of patients with leprosy.

Methods: The study was conducted at outpatient clinics in Dermatology Hospital affiliated to the Ministry of Health and population. A quasi-experimental (pre/post-test) design was used on a purposive sample of 72 leprosy patients. Four tools were used to collect the data for this study: A structured interviewing questionnaire, a patients' reported practices checklist, an attitude assessment scale for patients with leprosy, and health consequences assessment questionnaire for patients with leprosy.

Results: The current study reveals a significant improvement in the patients' knowledge, reported practice, and attitude toward leprosy. A significant improvement in health consequences (problems and needs) after education compared with the preintervention level. An association between the total knowledge, practice, and attitude after health education was significant ($p < 0.001$). An association between the mean and standard deviation of knowledge, practice, and attitude before and after the health education program was significant ($p < 0.001$).

Conclusion: Educational program had a remarkable effect on improving patients' knowledge, practice level, patient attitude, and health consequences (problems and needs) of leprosy. The study recommended applying educational programs for patients with leprosy in different health care settings focusing on prevention from disabilities.

Keywords: Education program, leprosy patients, health consequences

1. Introduction

Leprosy or Hansen's disease is a chronic infectious disease, highly stigmatized, neglected tropical disease, caused by *Mycobacterium leprae*, inducing dermatological, neurological, and ophthalmic complications. Leprosy poses a risk of permanent and progressive disability. It affects mainly peripheral nerves and skin but may also affect sites such as the eyes, mucous membranes, bones, resulting in neuropathy and associated long-term consequences (Khanna *et al.*, 2021). The disease is associated with social stigma, and the patients sometimes suffer social discrimination because it often leads to visible physical deformities. It occurs at all ages ranging from early infancy to very old age, more commonly among poverty. It may severely impact a patient's daily living activities (Das *et al.*, 2020).

According to WHO, based on reports from 159 countries, 208,619 new leprosy cases were reported globally in 2018. The worldwide prevalence reported at the end of 2018 was 184,212 cases (rate, 0.2/10,000). Also, The WHO reported that about 180,000 people are infected with leprosy, most of them in Africa and Asia. About 100 people are diagnosed with leprosy in the United States every year (WHO, 2019).

The symptoms of leprosy disease usually take about 3 to 5 years to appear after contact with the leprosy-causing

bacteria. Some people do not develop symptoms until 20 years later (Barakat & Zaki, 2019). The early signs are spots on the skin that may have a different color compared to surrounding skin, appear on the arms, legs, back and remain for weeks or months. The skin patches are usually with decreased sensations, like touch, pain, and heat. Muscle weakness, numbness in the hands, legs, arms, known as "glove and stocking anesthesia," eye problems, enlarged nerves especially in the elbows or knees, stuffy nose and nosebleeds, curling of the fingers and thumb, caused by paralysis of small muscles (Reed & Duthie, 2017).

Health consequences of leprosy include blindness or glaucoma, disfiguration of the face (including permanent swelling, bumps, and lumps), erectile dysfunction and infertility in men, kidney failure, muscle weakness that leads to claw-like hands, inability to use hands and feet. Permanent damage to the inside of the nose can lead to nosebleeds and a chronic, stuffy nose, permanent damage to the nerves outside the brain and spinal cord, including those in the arms, legs, and feet. Nerve damage can lead to a dangerous loss of sensation (Raghavendra *et al.*, 2017).

Nursing is essential and fundamental in leprosy control, acting directly in disease control actions, affecting people either individually, families or community. The nursing role in education is an activity manner provided by the nurse to patient, in which health problems are identified;

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nursing actions are prescribed and implemented for promotion, protection, recovery, and rehabilitation of the patient (Browsers *et al.*, 2011). Leprosy is a matter of public health and public education; it is everyone's obligation to at least know that it is out there to break out prejudice and stigma. Nurses have an influential and educational role in society. They are among those who come in close contact with the health-related stigma, enhancing patients' awareness and participating in development planning activities to reduce stigma and discrimination against persons affected by leprosy (Cordeiro & Frade, 2014).

2. Significance of the study

Egypt has met WHO's global leprosy elimination goal of reducing prevalence to less than 1 per 10,000; however, leprosy cases were at a level of 537 in 2019, up from 407 the previous year. Almost 60% of new cases detected each year in Egypt originate from only six governorates, mainly located in the south. Approximately 6% of new cases reported annually are children under 15 years of age (WHO, 2018). Patients with leprosy suffer from many health problems as physical, social, and psychological problems that affect their daily lives, so the present research aimed to evaluate the effect of educational program on the health consequences of patients with leprosy.

3. Aim of the study

The present study aimed to evaluate the effect of the educational program on the health consequences of patients with leprosy. The aim will be achieved through

- Assessing patients' knowledge regarding leprosy disease.
- Assessing patients' reported practices regarding the care of leprosy disease
- Assessing patients' attitude regarding leprosy disease.
- Designing and implementing an educational program for improving knowledge, practices, attitude, and health consequences among leprosy patients according to their needs.
- Evaluating the effectiveness of the educational program on improving patients' knowledge, practices, attitude, and health consequences regarding leprosy disease.

3.1. Research Hypothesis

Patients with leprosy exposed to the health education program will have improved knowledge, practices, attitude, and health consequences compared to their pre-intervention level.

3.2. Operational definition

Health consequences of patients with leprosy are defined in this study as patient's physical, social, psychological problems.

4. Subjects & Methods

4.1. Research Design

A quasi-experimental (pre/post-test) design was used. An empirical interventional approach is used to estimate the causal impact of an intervention on its target population

(Rogers & Revesz, 2019). It was utilized to compare between study group pre/post-education program. The dependent variable is measured once before the intervention and once after its implementation. The dependent variable in this study is the health consequences of the patient with leprosy, and the independent variable is the educational program.

4.2. Study setting

The study was conducted at outpatient clinics in Dermatology Hospital affiliated to the Ministry of Health and Population as this hospital is specialized in skin diseases and is the only one that covered all patients with leprosy in the Kafr El Sheikh city. Also, it serves all areas (both rural and urban areas) around Kafr El-Sheikh Governorate.

4.3. Subjects

A purposive sample was used to study 72 patients. The standard deviation of the patient's knowledge was 1.07. Based on data from the pilot study (n=8), and power of study of 80%, the sample size can be calculated using the following formula:

$$n = [(Z\alpha/2 + Z\beta)^2 \times \{2(SD)^2\}] / (\text{mean difference between study group pre-post program})^2$$
 where SD = standard deviation $Z\alpha/2$: This depends on level of significance, for 5% this is 1.96 $Z\beta$: This depends on power, for 80% this is 0.84. Therefore, $n = [(1.96 + 0.84)^2 \times \{2(1.07)^2\}] / (0.5)^2 = 71.8$. Based on the above formula, the sample size required is 72.

Inclusion criteria

- Patients had never been received an educational program about the disease, its management, and free from other chronic diseases.
- Patients free from physical & mental handicapping.
- Patients were able to communicate with others.

4.4. Tools of data collection

Three tools were utilized in data collection:

4.4.1. Structured Interviewing questionnaire

The researcher designed this tool after reviewing the related literature. It is composed of the following parts.

Part 1 concerns the patients' sociodemographic characteristics of patients with leprosy as age, gender, marital status, residence, educational level, occupation, income, and family size.

Part 2 is related to the medical history of the leprosy patient and his family include the duration of suffering disease, positive family history of the disease, suffering from previous chronic diseases.

Part 3 is concerned with patients' knowledge assessment. The researcher designed it in the Arabic language to assess patients' knowledge about leprosy disease. It was used in pre- and post-implementation of an educational program after reviewing the related literature Nisar *et al.* (2007); Noce *et al.* (2018).

The questionnaire included 40 MCQs covering the following items: Meaning of disease, mode of transmission,

methods of leprosy infection, source of leprosy infection, symptoms, complications, treatment, and laboratory tests.

Scoring system

The scoring system for this part was as follows: Two grade was given for each correct answer and zero grade for the incorrect answer, with total grade = 80 grades. The total score for knowledge is then classified as:

- Good knowledge $\geq 60\%$ = 49-80 points.
- Average knowledge 50-60% = 40-48 points.
- Poor knowledge $< 50\%$ = 0-39 points.

4.4.2. Patients' Reported Practices Checklist

It was developed in the English language then translated into Arabic language and back translation to English to make sure of consistency based on the literature *World Health Organization (2018)*; to measure self-care practices of leprosy disease, it consisted of 26 items divided as following: Practices regarding nutrition (5 practices), practices for the skincare (10 practices), practices regarding follow up (8 practices), practices towards the use of prescribed medication (3 practices). This tool is used pre and post-intervention.

Scoring system

It was calculated as follows one score for done, while zero scores for not done. The score of each subsection was summed up and then converted into a percent score. Satisfactory practice level considered if the score was $\geq 60\%$ = (more than 15 scores for each patient). Unsatisfactory if score $< 60\%$ = (≤ 15 score for each patient).

4.4.3. Attitude Assessment Scale for Patients with Leprosy.

This tool was adopted from *Habib et al. (2007)*. The rating scale consists of three points scale. It has a score ranging from zero to two distributed as always=2, sometimes=1, never=0. The scale included eight statements as leprosy-affected social life, fired from the job, hesitation to talk with the people, not to go near to others, hesitation in attending a social gathering, leprosy-affected marital life, refusal of people to eat with the patient, and satisfaction of the patient with the treatment.

Scoring system

As the highest score is two, then the total scale scored 16 points. The final score of patients' responses was 60% and above, representing a positive attitude but less than 60% denoting a negative attitude.

4.4.4. Health Consequences Assessment Questionnaire

The researcher developed this tool from the literature *Barakat et al. (2019)* to evaluate the patients with leprosy disease regarding the following:

Part 1 is concerned with biopsychosocial consequences that are classified into three sections. It consisted of 16 statements divided as following:

- Physical consequences are composed of 7 questions as problems with the eye, nose, ear, hands, problems with

feet, problems in the reproductive system, and problems related to the working environment.

- Psychological consequences consisted of 5 questions about feeling sad and depressed, fear and anger, a lack of self-acceptance, satisfaction with physical appearance, and negative emotions such as suicide.
- Social consequences consisted of 4 questions regarding lack of acceptance of a leprosy patient, dissatisfaction with personal relationships with others, lack of help from community and friends, and a negative outlook from the society of a leprosy patient.

Scoring system

Measuring the score of patients' reported health consequences regarding leprosy diseases was calculated as follows, which were answered by yes if health consequences present and no if not present.

Part 2 is concerned with self-reported health needs. It contained 13 items and was classified into three domains. It was filled by the patient pre and post the program regarding the following:

- Physiological needs: It consisted of 4 questions regarding needs for rest periods, needs for follow-up monthly, needs for the dietary system, and needs to make neurological, eye, and skin follow up.
- Psychological needs: It consisted of 5 questions regarding needs for psychological support from family members, the need to understand the nature of the disease well, cope with psychological stress, and the necessity of psychiatrist consultation.
- Social needs: It consisted of 4 questions as needs for a fund to cover the cost of medication, needs to share his/her family in daily activities, trust during dealing with others, and needs for rehabilitation programs and centers for leprosy patients.

Scoring system

The health needs scoring system measured the total level of reported health needs regarding leprosy diseases. It was calculated as follows (1) score for yes answer, while (0) for no answer, health needs were considered present if score $> 70\%$ which equal (≥ 9 questions) and no if score $< 70\%$ which equal (< 9 questions)

4.5. Procedures

The content validity of the tools, its clarity, comprehensiveness, appropriateness, and relevance was reviewed by three experts, one Medical-Surgical Nursing professor from the Faculty of Nursing, Kafr Elsheik University, one Community Health Nursing professor from the Faculty of Nursing; Ain shams University and Dermatologist from Faculty of Medicine, Kafr elsheik University to test the content validity before using it in the study. Modifications were done according to the panel judgment to ensure clarity of sentences and appropriateness of the content. The same experts revised the developed educational program that covered all items related to the health consequences for patients with leprosy based on the current literature, and all recommended modifications were made.

The Cronbach's α test was used to assess the reliability of the questions relating to knowledge, which was 0.86, the reliability of the attitude questions was 0.76, and the reliability of the questions relating to reported practices was 0.89.

A pilot study was conducted on eight patients with leprosy, representing 10% of the patients with leprosy. Data obtained from those patients were not included in the existing study. The pilot study was performed to test the clarity and applicability of the instruments and estimate the time needed to collect data and test the research process's feasibility. Necessary modifications were done.

Ethical consideration: Before data collection, all approval letters were obtained to conduct the study after explaining the purpose of the study. Official permission was obtained through an issued letter from the Dean of Faculty of Nursing, Kafr Elsheikh University, to the Director of Dermatology Hospital to conduct this study and obtain permission to collect the research data. Then, the patient's verbal agreement to contribute to this study was obtained after clarification of the purpose of the study. The researchers initially introduced themselves to all patients; then, they were reassured that any information obtained would be confidential and only would be used for the study purpose. The researcher emphasized that participation in the study is completely voluntary, and the clients' anonymity was assured through the coding of data. Patients were also informed that refusal or withdrawal from participation would not affect their care.

Fieldwork: After official permissions to carry out the study, the aim of the study was explained to the selected subjects. The study was carried out in three months, from January 2021, until March 2021. The average time consumed to fill the tool was 40 minutes. The researchers visited the previously mentioned setting two days/week (Saturday and Tuesday) from 9.00 am to 2.00 pm. The researchers followed the preventive measures against COVID19 infection during the explanation of the educational program through wearing masks to researchers and patients, and washed the hands regularly with soap and water, or rubbed the hands with alcohol. Maintain a distance of at least 1 meter between researchers and patients with leprosy.

Educational Program construction included 4 phases as following:

Preparatory phase: The educational program was designed by the researchers and based on the result obtained from the needs assessment and the review of recent, current, national, and international related literature in various aspects of leprosy disease.

Assessment phase: By using a pre-testing tool to assess the patient's physical problems and needs, as well as to identify patient's demographic data, knowledge, attitude, practices, as reported by patients suffering from leprosy. The researchers introduced themselves to patients, explained the aim of the study, and ensures their cooperation. Then verbal consent of patients was obtained.

Planning and implementing phases: The educational program was developed for patients based on the needs

assessment, priorities, goals, and expected health consequences.

- The general objective of the educational program was to improve the knowledge, practice, and attitude of patients with leprosy, and the aim was explained to all patients.
- Based on the result of the pre-test questionnaire, the researcher constructed the program's content, and the number of sessions needed was five sessions (3 theory & 2 for practices). Each session was around 1-2 hours for each group (6 groups).
- Each session started by giving the objectives, taking into consideration using the simple and clear Arabic language.
- Patients with leprosy were divided into six groups, and each group consisted of 12 patients. The researchers followed the preventive measures against COVID19 infection.
- By the end of each session, the patients were informed about the content of the next session and its time.
- Methods used through the sessions were discussions, role play, followed by demonstration and re-demonstration. Also, audiovisual aids were used to facilitate understanding and application, such as posters, handouts, booklets, using the simple Arabic language.
- The content of the program was tailored to suit patients' needs.
- Theoretical content included (concept of leprosy disease, causes, and risk factors, symptoms, modes of transmission, complications, and illustration of different degrees of leprosy disease.
- The practical part includes (Demonstration of a healthy diet, demonstration of skincare, prescribed medications, follow-up, safety measures, and daily living activities).

Evaluation phase: Each patient in the study was evaluated after implementing the developed educational program. The same pre-test format was used in the evaluation of patients' knowledge and practice. Post-test was done at the end of the three months post-implementation of the educational program.

4.6. Data analysis

The data collected were revised, coded, tabulated, and statistically analyzed were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). All continuous data were normally distributed and were expressed in mean \pm standard deviation (SD). Categorical data were expressed in number and percentage. The student's t-test was used for comparison between two variables with continuous data. The Chi-square test was used for the comparison of variables with categorical data. Statistical significance was set at $p < 0.05$.

- Non statistically significant difference ($p > 0.05$)
- Statistically significant difference ($p < 0.05$)
- A high statistically significant difference ($p < 0.001$)

5. Results

Table 1 shows that 44.4 % of the study sample were less than 30 years with a mean \pm SD of 34.0 ± 10.6 , 81.9% were males, 43.1 % were singles, but 59.7% lived in a rural area.

Regarding education, 43.1% had secondary school education, 66.7% were working, 63.9% had not enough income, 61.1% had between two to four family members.

Table 2 illustrates that 86.1% of patients suffer from leprosy disease for less than five years with a mean±SD of 5.5±2.5 with a positive family history of the disease among 40.3%. Regarding chronic disease, 48.6% suffering from diabetes mellitus.

Table 3 demonstrates that 66.7% of study patients have a poor level of knowledge pre the educational program. In comparison, 27.8 % of patients had average knowledge, and 61.1% had a good knowledge level after the educational program.

Table 4 shows that 22.2 % of the study sample reported doing nutritional practice pre-educational program compared to 68.1% after program implementation. Skincare practices were reported from 25% of the study sample pre-educational program, compared to 91.7% after the educational program. Also, 30.6% of the studied patients reported they have followed up in the pre-educational program phase, compared to 81.9% post-educational program. Last, 29.2% of the study sample had used their prescribed medications before the educational program, compared to 90.3% post educational program, with statistically significant differences between the two phases regarding all reported practices (p<0.001).

Figure 1 displays the total reported practices of leprosy patients as 73.6% had an unsatisfactory level pre-educational program, but 83.3% had a satisfactory level after the educational program.

Figure 2 illustrates that 93.1% of the study sample had a negative attitude before the educational program, but 80.6% showed a positive attitude after the educational program.

Table 5 demonstrates the health problems and health needs of leprosy patients; 95.8%, 86.1%, and 75% of the study patients suffer from physical, psychological, social problems before the educational program. While after the educational program, the patients' health problems declined to 29.2%, 34.7%, 26.4%, respectively. Regarding health needs, 94.4%, 81.9%, 72.2% of the patients respectively reported physical, psychological, social needs before the educational program. While after the educational program, the patients' health needs were fulfilled as 18.1%, 26.4%, and 15.3% reported the same needs, with statistically significant differences between the two phases regarding all reported health problems and needs.

Table 6 reveals a statistically significant relation between the total level of knowledge for patients with leprosy and their gender, marital status, education (higher level shows better knowledge), and monthly income at P= 0.05. pre and post educational program.

As shown in table 7, there is a statically significant relation between total knowledge, practice, and attitude in pre and post-program phases (p<0.001).

Table 8 clarifies a statistically significant difference between pre and post-program regarding total knowledge, practice, and attitude mean scores.

Table (1): Frequency and percentage distribution of leprosy patients' sociodemographic characteristics (n=72).

Variables	N	%
Age (years)		
<30	32	44.4
30 – 40	11	15.3
>40	29	40.3
Mean ±SD	34.0±10.6	
Gender		
Females	13	18.1
Males	59	81.9
Marital Status		
Single	31	43.1
Married	29	40.3
Divorced	8	11.1
Widow	4	5.6
Residence		
Urban	29	40.3
Rural	43	59.7
Education		
Illiterate	17	23.6
Basic	13	18.1
Secondary	31	43.1
Higher	11	15.3
Occupation		
Not working	24	33.3
Working	48	66.7
Income		
Not enough	46	63.9
Enough	12	16.7
Enough and save	14	19.4
Family size		
2-4 family members	44	61.1
5-8 family members	28	38.9

Table (2): Frequency and percentage distribution of the leprosy patients’ medical history (n=72).

Medical history	N	%
Duration of leprosy (years)		
≤5	49	86.1
>5	23	31.9
Mean ±SD		5.5±2.5
Positive family history for leprosy	29	40.3
Chronic diseases		
Cardiac	11	15.3
Hypertension	7	9.7
Diabetes Mellitus	35	48.6

Table (3): Comparison of the total knowledge level of leprosy patients between pre-and post-educational program (n=72).

Knowledge level	Pre-educational program		Post-educational program		X ²	p
	n	%	n	%		
Poor	48	66.7	8	11.1	55.658	<0.001
average	17	23.6	20	27.8		
Good	7	9.7	44	61.1		

Table (4): Comparison of the patient-reported practice regarding care of leprosy disease pre-and post- educational program (n=72).

Patient-reported practice	Pre-educational program		Post-educational program		X ²	P
	N	%	N	%		
Nutrition	16	22.2	49	68.1	30.539	<0.001
Skincare	18	25.0	66	91.7	65.829	<0.001
Practices toward Follow-up	22	30.6	59	81.9	38.631	<0.001
Practices toward the use of prescribed medications	21	29.2	65	90.3	55.891	<0.001

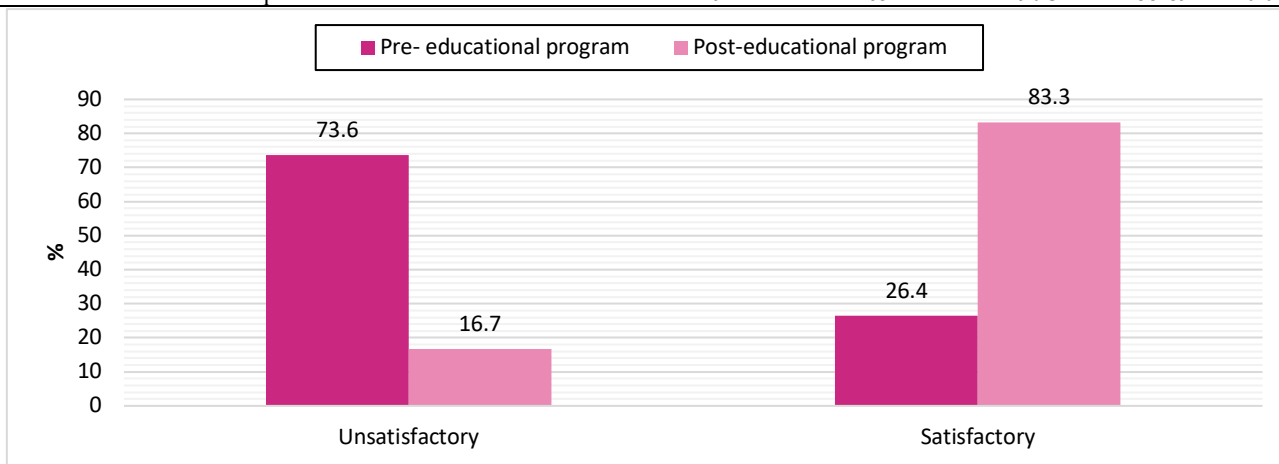


Figure (1): Comparison of the total practice level of leprosy patients between the pre-and post- educational program.

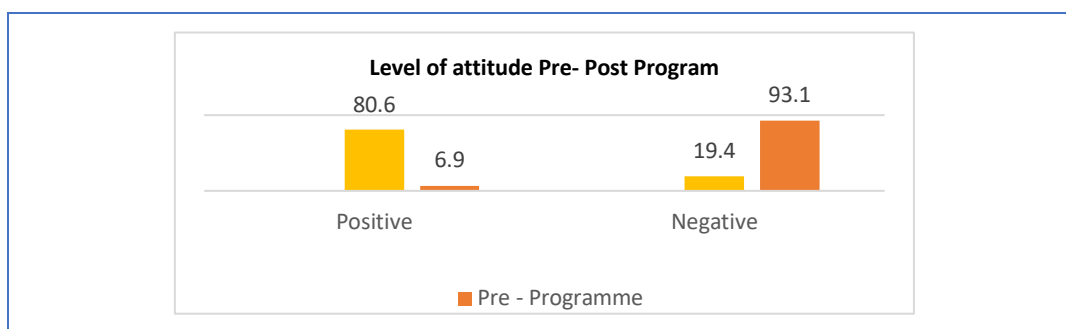


Figure (2): Comparison of the total attitude of leprosy patients between the pre-and post- educational program.

Table (5): Comparison of the leprosy patients' health problems and needs between pre-and post-educational program (n=72).

Health problems and needs	Pre-educational program		Post-educational program		X ²	P
	N	%	N	%		
Health Problems						
Physical problems	69	95.8	21	29.2	68.267	<0.001
Psychological problems	62	86.1	25	34.7	39.753	<0.001
Social problems	54	75.0	19	26.4	34.034	<0.001
Health Needs						
Physical needs	68	94.4	13	18.1	85.362	<0.001
Psychological needs	59	81.9	19	26.4	44.755	<0.001
Social needs	52	72.2	11	15.3	47.436	<0.001

Table (6): Association between total Knowledge level pre-and post- educational program and the sociodemographic characteristics of the leprosy patients.

Sociodemographic characteristics	Knowledge level pre- educational program						Knowledge level post- educational program						X ²	p		
	Poor (n=48)		Fair (n=17)		Good (n=7)		Poor (n=48)		Fair (n=17)		Good (n=7)				X ²	p
	N	%	N	%	n	%	N	%	N	%	N	%				
Age (years)																
<30	22	45.8	9	52.9	1	14.3	4.002	0.406	3	37.5	9	45.0	20	45.5	2.622	0.623
30 – 40	7	14.6	3	17.6	1	14.3			1	12.5	5	25.0	5	11.4		
>40	19	39.6	5	29.4	5	71.4			4	50.0	6	30.0	19	43.2		
Gender																
Females	7	14.6	2	11.8	4	57.1	8.074	0.018	0	0.0	1	5.0	12	27.3	6.593	0.037
Males	41	85.4	15	88.2	3	42.9			8	100	19	95.0	32	72.7		
Marital Status																
Single	23	47.9	3	17.6	5	71.4	14.997	0.020	4	50.0	3	15.0	24	54.5	15.299	0.018
Married	14	29.2	13	76.5	2	28.6			1	12.5	13	65.0	15	34.1		
Widow	8	16.7	1	5.9	0	0.0			2	25.0	4	20.0	3	6.8		
Divorced	3	6.2	0	0.0	0	0.0			1	12.5	0	0.0	2	4.5		
Residence																
Rural	16	33.3	9	52.9	4	57.1	2.923	0.232	3	37.5	12	60.0	14	31.8	4.569	0.102
Urban	32	66.7	8	47.1	3	42.9			5	62.5	8	40.0	30	68.2		
Education																
Illiterate	10	20.8	7	41.2	0	0.0	23.827	0.001	1	12.5	7	35.0	9	20.5	16.011	0.014
Basic	24	50.0	6	35.3	1	14.3			7	87.5	7	35.0	17	38.6		
Secondary	8	16.7	4	23.5	1	14.3			0	0.0	6	30.0	7	15.9		
Higher	6	12.5	0	0.0	5	71.4			0	0.0	0	0.0	11	25.0		
Occupation																
Not working	16	33.3	6	35.3	2	28.6	0.951	0.101	2	25.0	8	40.0	14	31.8	0.695	0.706
Working	32	66.7	11	64.7	5	71.4			6	75.0	12	60.0	30	68.2		
Income																
Not enough	32	66.7	13	76.5	1	14.3	14.396	0.006	8	100	16	80.0	22	50.0	11.530	0.021
Enough	9	18.8	2	11.8	1	14.3			0	0.0	3	15.0	9	20.5		
Enough & save	7	14.6	2	11.8	5	71.4			0	0.0	1	5.0	13	29.5		
Family size																
2:4	26	54.2	13	76.5	5	71.4	2.975	0.226	5	62.5	13	65.0	26	59.1	0.209	0.901
5:8	22	45.8	23.5	2	28.6	3			37.5	7	35.0	18	40.9			

Table (7): Association between total knowledge pre-and post- educational program and the total practice and attitude of the leprosy patients.

Variables	Knowledge level pre- educational program						X ²	p	Knowledge level post- educational program						X ²	p
	Poor (n=48)		Average (n=17)		Good (n=7)				Poor (n=8)		Average (n=20)		Good (n=44)			
	N	%	N	%	N	%			N	%	N	%	N	%		
Total practice level																
Unsatisfactory	39	81.2	13	76.5	1	14.3	14.196	<0.001	8	100	4	20.0	0	0.0	48.960	<0.001
Satisfactory	9	18.8	4	23.5	6	85.7			0	0.0	16	80.0	44	100		
Total attitude level																
Negative	48	100	16	94.1	3	42.9	30.908	<0.001	8	100	6	30.0	0	0.0	45.186	<0.001
Positive	0	0.0	1	5.9	4	57.1			0	0.0	14	70.0	44	100		

Table (8): Comparison of the mean knowledge, practice, and attitude scores between pre-and post-educational program.

Variables	Pre-educational program		Post-educational program		t-test	P
	Mean	±SD	Mean	±SD		
Total knowledge score (80)	2.1	±1.0	12.8	±2.3	36.202	<0.001
Total practice score [26]	6.9	±2.5	15.9	±3.1	19.176	<0.001
Total attitude score (16)	1.0	±0.5	11.3	±2.7	31.829	<0.001

6. Discussion

Leprosy is one of the most ostracized diseases due to its resultant physical deformity and social stigmatization. The physical deformities due to no treatment or delayed treatment cause psychological and social disabilities. These disabilities can lead to social stigmatization, resulting in the isolation of the patient from society and a decrease in the quality of life (Das et al., 2020). Good knowledge and a positive attitude of the general public towards leprosy would improve the hidden case detection rate, eliminate stigma and reduce deformity (Abdela et al., 2020). The present study aimed to evaluate the effect of the educational program on the health consequences among leprosy patients.

As regard socio-demographics, the finding of the present study shows that more than one-third of studied patients are in age less than thirty with a mean age of 34.0±10.6. This finding agrees with Das et al. (2020). They studied the quality of life among patients with leprosy attending the dermatology OPD of a Tertiary Care Center of Eastern India and found that the mean age for the studied participants was 38.11±12.16. About gender, the present study finds that more than three-quarters of the studied patients having leprosy were males. It may be due to males are exposed to greater chances of infection during work. This result agrees with a study conducted by Al-Mutairi et al. (2010), in a study entitled "Changing demography of leprosy: Kuwait needs to be vigilant." and reported that males constituted the majority of patients in their study.

Concerning marital status, the present study reveals that more than one-third of the studied patients are singles. This finding may be due to a negative social consequence of the disease. This result agrees with Shokre and Souilm (2018). They studied "Effectiveness of psychiatric nursing program for coping in improving self-concept among leprosy patients" and stated that most of the sample were unmarried.

Regarding residence, more than half of the studied patients residing in rural areas. The current study findings are consistent with Mahendra et al. (2018), who studied the psychiatric comorbidity in patients with Hansen's disease and reported that most patients belong to rural areas. Regarding educational level, more than one-third of the studied sample had secondary education. This finding was in line with Li (2017), who studied the correlation analysis of Yunnan minority average life and average education years of schooling and found that low educational level was one of the features in study participants.

Regarding occupation, the results of the present study demonstrate that two-thirds of the sample is working. This result agrees with Ramasamy et al. (2018), who studied the effect of progressive muscle relaxation technique on anxiety and depression among persons affected by leprosy and showed that nearly one-third of the study sample were farmers. On the other hand, the result disagreed with Shokre and Souilm (2018), who stated that more than half were unemployed.

The present study shows that around two-thirds of the sample their monthly income was not enough. This finding may be due to a lack of community support for these patients. This result is consistent with Azad-uz-zaman et al. (2017). They studied improving ways with the current status of leprosy services in Bangladesh and founded that income lower or equal to the minimum wage among the studied patients.

Regarding medical history, the present study reveals that the duration of illness in most studied patients is less than five years with a mean of 5.5±2.5; it may be due to the young age of the study sample and the long incubation period of leprosy. This finding agrees with Tabah et al. (2018), in the study titled "Community knowledge, perceptions and attitudes regarding leprosy in rural Cameroon," who found that most studied samples with leprosy had a mean duration

of illness of 6.2 ys. The result also agrees with a study carried by *Govindharaj et al. (2018)* entitled "Perception toward the disease of the people affected by leprosy and showed that more than half of their study sample had a disease duration of more than three years.

Results of the present study also illustrate that less than half of the studied patients had a positive family history; from the researcher's point of view, the positive family history might be because the patient and family are residing in the same environment that predisposes to leprosy infection. This finding is in the same line with *Zhu et al. (2019)*, who studied the internal migration and leprosy in Shanghai from 2000 to 2019: An epidemiological study of new cases. The study found that the majority of the studied patients had a family history of leprosy disease. This finding agrees with *Nisar et al. (2007)* in the study titled "knowledge, attitude, and practices about leprosy in a fishing community in Pakistan." They reported that the precise cause of leprosy is inherent factors.

Regarding leprosy patients suffering from chronic diseases, this study reveals that around half of the studied patients complain from diabetes mellitus. It may be due to providing steroids to a treatment program as a core part. Similar findings have also been reported by *Saraya et al. (2012)*, who studied the Diabetic status of patients with leprosy in Kuwait and reported the highest incidence of diabetes was in lepromatous leprosy.

Concerning the total level of knowledge, the study illustrates that two-thirds of patients had poor knowledge regarding leprosy disease before the educational program. In contrast, more than one-quarter of patients had an average knowledge level, and more than half of them had a good knowledge level after the educational program, with a statistically significant difference between the two phases. It is reflecting the improvement after the program.

Similar results have been reported in other studies by *Rodrigues (2015)*, who carried out a study about "Knowledge and practice of the patient about leprosy: Actions of control and elimination." The study mentioned that the collected, studied sample had sufficient knowledge about the educational program proposed by the Brazilian Ministry of Health. Also, *Habib et al. (2007)* supported it. They conducted a study about the effect of health education on Leprosy patients. The study showed that a health education program had improved the knowledge of 86% of leprosy patients.

Regarding the self-reported practices of the patient as their nutrition practice pre-educational program, the current study demonstrates that less than one-quarter of the study sample having correct nutrition practices. However, more than two-thirds take care of their nutrition after the nursing education program, improvements were made, with a statistically significant difference between the two phases. These findings might be referred to the psychological problems of leprosy patients that might lead to a lack of interest in life and anorexia so that even if food is available, the person affected neglects their diet.

This result is in the same line with *Montenegro et al. (2011)*, who studied the nutritional and dieting profiles of

patients diagnosed with leprosy treated in the primary healthcare units of Greater Vitória, State of Espírito Santo, Brazil. They found that people with leprosy were likely to be more undernourished than people of the same socioeconomic level who did not have leprosy.

According to practices of patients with leprosy towards skincare, one-quarter of the studied sample had taken care of their skin pre-educational program. The majority of them did after the educational program with a statistically significant difference between the two phases. This finding agrees with *Stephen et al. (2014)* in a study entitled "Assessment of knowledge, attitude and practice about leprosy among patients and their families in a rural community in Tamil Nadu." They reported an inconsistency and deficiencies in care practice among leprosy-affected patients. The prepared educational program acted as an initial source of information about leprosy health care. An increase in education can lead to better health through the enhancement of an individual's skills.

Concerning the regular follow-up practices of the patient with leprosy, approximately one-third of patients do follow-up pre-educational program, while more than three-quarters of patients do follow-up post-educational program with a statistically significant difference between the two phases. From the researchers' point of view, it reflects the distinctiveness of the educational program. This study disagrees with *Fischer et al. (2015)*, who said in his study about the long-term effect of current and new interventions on the new case detection of leprosy that the proportion of cases detected at first follow-up and third follow-up was less than one third in both.

Regarding practices of patients with leprosy towards prescribed medications, the current study shows that more than one-quarter of patients had proper medication use before the educational program. In contrast, most of them had proper practices after the educational program, with a statistically significant difference between the two phases. This study agrees with *Thangaraju et al. (2015)* in a study about drug sensitivity and the changing patterns of bacterial isolates of infected ulcers of leprosy. They reported that the drug prescriptions were effective in proper patterns after developing an explanation plan.

The total practices regarding leprosy diseases show that around three-quarters of the studied patients had an unsatisfactory level of practice pre-educational program, but more than three quarters had satisfactory level after the educational program. *Gautham et al. (2011)* expressed similar findings in a study entitled "Community-based needs assessment of Leprosy patients in Chamrajanagar District, Karnataka, India," and mentioned that total practices for leprosy patients illustrated that two-third of the studied patient had unsatisfactory practices regarding the disease.

As concerning patient attitude, most of the study sample expressed a negative attitude toward leprosy before the educational program, but less than one-quarter still had a negative attitude after program implementation with a highly statistically significant improvement of the attitude mean score ($p < 0.001$). It was contradicted with *Noordende et al. (2019)*, who studied "The role of perceptions and knowledge

of leprosy in eliminating leprosy.” A small proportion of participants said some people refuse to visit their homes even after being treated. In the same line, *Atinkut et al. (2018)* conducted a study about “Knowledge, belief, and attitude of the community towards leprosy patients in Gindeberet Woreda, West Shewa Zone,” and founded that more than one-third of study subjects had a favorable attitude toward the disease ($P < 0.001$).

Most study patients suffer from physical, psychological, and social problems before the educational program. While after the educational program, the patients' health problems were declined to approximately one-third of the study sample, with a statistically significant difference between the two phases. From the researchers' point of view, leprosy is considered a social stigma. Leprosy is a disabling disease that affects the patient physically as well as mentally. This result is in the same line with *Govindasamy et al. (2021)*, who conducted a study about the burden of depression and anxiety among leprosy-affected and associated factors: A cross-sectional study from India. They found that more than two-thirds of them were having comorbid psychiatric disorders. It contradicted *Singh's (2013)* study entitled “Psychosocial aspects of Hansen's disease” and reported that the physical deformity ratio is approximately around one-quarter in these patients. These findings could reflect that educating the patients could improve health consequences and directly satisfy the patients' needs.

Concerning health needs, most studied patients express physical, psychological, and social needs before the educational program. While after the educational program, the minority of them reported these needs with a statistically significant difference between the two phases. These findings mean that after implementing the educational program, the biopsychological needs of the patients decreased. This study in the same line with *Calcraft (2015)* in the study about the effects of the stigma of leprosy on the income generation of leprosy-affected people in the Terai area of Southeast Nepal, the loss of income is a very serious matter, given the lack of formal safety nets, and the likelihood that relatives and friends may have limited resources themselves, and therefore, may be unable to assist. These findings are supporting the current research hypothesis.

About total knowledge level for patients with leprosy and their gender, marital status, higher level of education, and monthly income, there was a statistically significant relationship at $p < 0.05$ before and after the educational program. It was discussed as patients with higher educational status were shown to have a good knowledge of leprosy. This result is in the same line with *Sing et al. (2019)*, who studied “Community knowledge, attitude, and perceived stigma of leprosy amongst community members living in Dhanusha and Parsa districts of Southern Central Nepal” and founded that knowledge score was found to have a highly significant association with age, gender, ethnicity, religion, education, and occupation of the respondents ($P < 0.001$).

The relation between the total knowledge, practice, and attitude level pre and post-educational program was significant ($p < 0.001$). The fact that education is more likely

to increase patients' health and safety practices that can subsequently prevent the complication of the disease this result is in the same line with *Tabah et al. (2018)*, who found significantly high stigmatizing attitudes among the respondents who had low overall knowledge of leprosy ($p < 0.001$).

Another study supported these findings, *Urgesa et al. (2020)* in a study entitled “Knowledge of and attitude toward leprosy in a leprosy endemic district, Eastern Ethiopia: A Community-based study risk management and healthcare policy.” They mentioned that having a high knowledge of leprosy was significantly associated with favorable attitudes toward leprosy. Also, it was supported by *Saha et al. (2015)*, who study the current perceptions and practices (KAP) about leprosy among leprosy patients: A comparative study. They mentioned that the place of residence and the level of education attributed to better knowledge score of the patients, whereas the place of residence and the age were attributed to better attitude score of the patients.

The comparison between the mean and standard deviation of knowledge level, practice level, and attitude level pre/post-educational program was significant ($p < 0.001$). This finding might be due to the effectiveness of the education provided to the patient under study, increasing patient knowledge and improving their practices. This finding follows *Habib et al. (2007)*, who founded that health education programs had a significant and positive impact upon the knowledge and attitude of the patients regarding leprosy.

7. Conclusion

Patients with leprosy exposed to the health education program had improved knowledge, reported practices, attitudes, and health consequences compared to their pre-intervention level.

Educational programs greatly improved patients' knowledge, practice level, patient attitude, and health needs with leprosy as physiological needs, psychological needs, social needs.

8. Recommendations

Based on the findings of this study, the following are recommended:

- Health education programs should also be conducted for the general public to improve their attitude towards patients with leprosy.
- Media should be used to enhance the general public's awareness about different modes of spread of infection, early presentation of leprosy.
- Efforts and research must continue for finding out better methods of early detection and effective management of leprosy.

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