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Original Article

Evaluating of Knowledge, Attitude, and Practice of Medical Students about Cutaneous Leishmaniasis in Gorgan, 2021–2022

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Abstract

Background: As medical students are the future doctors and healthcare providers of the country, it is essential to evaluate their awareness, attitude, and practice about leishmaniasis. Therefore, we have decided to assess the knowledge, attitude, and practice of medical students in the clinical phase about cutaneous leishmaniasis (CL).

Methods: This descriptive-analytical study was performed on 318 clinical students, including those in physiopathology, Extern-1, Extern-2, and internship phases at Golestan University of Medical Sciences. A questionnaire was designed, containing 28 questions divided into four sections: demographic, knowledge, attitude, and practice. Data were analyzed using the Spearman correlation coefficient and Chi-square tests.

Results: 318 individuals participated in the study, of which 193 (60.6%) individuals were female, and 125 (39.4%) individuals were male. 70 physiopathology students (100%), 72 Extern-1 students (93.5%), 73 Extern-2 students (92.4%), and 88 internship students (100%) had a good level of awareness. Among physiopathology students, 42 individuals (60%), 58 Extern-1 students, (75.3%), 71 Extern-2 students, (85.5%), and 88 (100%) internship individuals had a good attitude. The results of this research showed that 19 (27.1%) physiopathology students, 49 (63.6%) Extern-1 students, 27 (32.5%) Extern-2 students, and 42 (47.7%) interns had a good level of practice.

Conclusion: As future healthcare providers, medical students must possess a high level of knowledge, a positive attitude, and strong practice skills in managing conditions such as CL. Given the prevalence of this disease in the country, organizing targeted educational programs for medical students can significantly enhance their knowledge and abilities.

Keywords: Cutaneous leishmaniasis; Knowledge; Attitude; Practice; KAP survey

Introduction

Leishmaniasis is a widespread parasitic disease affecting both humans and animals. It is caused by over 20 species of parasites belonging to the *Leishmania* genus and is transmitted to mammals, including humans, through more than 90 species of sand flies from the *Phlebotomus* genus. Annually, an estimated 700.000 to 1000000 new infections and 20000–30000 deaths are attributed to this disease worldwide (1). Cutaneous leishmaniasis is endemic in over 98 countries, with approximately 87% of new cases `reported in 2019 occurring in Afghanistan, Brazil, Algeria, Colombia, Iran, Iraq, Libya, Pakistan, Syria, and Tunisia (2). These parasites cause various forms of disease, including cutaneous, visceral, mucocutaneous, and disseminated leishmaniasis. In Iran, cutaneous and visceral leishmaniasis are prevalent.

Cutaneous leishmaniasis is the most common form and results in skin lesions that often leave lifelong scars (1–3). This form of the disease is widely distributed across Iran and remains endemic in 19 Provinces (4). Environmental and ecological factors such as urbani-

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zation, arid landscapes, sparsely vegetated pastures, and low-lying terrains contribute to the high-risk areas for disease transmission (5). Golestan Province is recognized as an endemic region for zoonotic cutaneous leishmaniasis (ZCL). In this province, the reservoir for the disease is the rodent *Rhombomys opimus*, predominantly found in the eastern parts of Golestan, particularly in the city of Gonbad and its neighboring villages (6). ZCL remains one of the most significant public health challenges in this region. Golestan Province is situated in northern Iran, between latitudes 36°30′ to 38°8′ N and longitudes 53°57′ to 56°22′ E. It shares borders with the Republic of Turkmenistan to the north, Mazandaran Province and the Caspian Sea to the west, Semnan Province to the south, and North Khorasan Province to the east. Annually, a significant number of leishmaniasis cases are reported in Golestan, profoundly impacting the economic, mental, and psychological well-being of patients and their families. There is currently no vaccine available to prevent this disease (7, 8). Despite numerous efforts and substantial financial investments, cutaneous leishmaniasis has not been eradicated in Iran (9). The detection of new endemic foci and ongoing disease spread consume considerable resources from health centers dedicated to its control. Disease management programs prioritize measures such as early diagnosis, comprehensive prevention initiatives, public education, and targeted training for all healthcare workers (10). Among these efforts, educating medical students holds particular importance since they represent future healthcare providers who can guide communities on preventive measures and reduce long-term health system costs (8). Several studies have explored awareness and attitudes toward cutaneous leishmaniasis in Iran. For instance, Nasiri conducted a study among female students at Jundishapur University of Medical Sciences in Ahvaz and found a significant link between educational level and awareness about leishmaniasis (11). Similarly, Abdulsalam's study in Ilam focused on 178 residents of Mehran City and demonstrated that higher levels of education correlated with better knowledge and prevention practices for the disease (12).

Given that no similar study has been conducted in Gorgan, this research aims to evaluate the knowledge, attitudes, and practices of clinical students at Golestan University of Medical Sciences regarding cutaneous leishmaniasis.

Materials and Methods

This study employed a descriptive-analytical approach. The research population consisted of 318 clinical students from Golestan University of Medical Sciences, divided into four groups: 70 physiopathology students (22%), 77 Extern-1 students (24.2%), 83 Extern-2 students (26.1%), and 88 internship students (27.7 %). Data collection was conducted using a survey filled out by the clinical students. Nasiri's questionnaire (12) was utilized, whose validity and reliability had been previously verified. The reliability of the instrument was confirmed through a Cronbach's alpha coefficient exceeding 0.7. The questionnaire included 12 questions aimed at assessing participants' awareness. Answers to each question were scored as follows: correct answers received 2 points, "I don't know" responses earned 1 point, and incorrect answers were assigned 0 points. Awareness scores ranged from 0 to 24, categorized as weak (1–5), moderate (6–12), good (13–18), and excellent (19–24). To evaluate participants' attitudes, 7 questions were included, with a score range of 0 to 19. Attitude scores were classified into four levels: poor (0–4), moderate (5–9), good (10–14), and excellent (15–19). Additionally, student practices in managing rural cutaneous leishmaniasis were assessed through 5 questions, with scores divided into three categories: poor (0–1), moderate (2–3), and good (4–5).

Statistical Analysis

The data were analyzed using SPSS version 18 software. Quantitative variables were pre-

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sented as mean standard deviation, while qualitative variables were described using frequencies and percentages. The Shapiro-Wilk test tested the normality of quantitative variables. Associations between qualitative variables were analyzed using the Chi-square test, Kruskal-Wallis H test, and Mann-Whitney U test. Spearman's correlation coefficient was used to examine relationships between quantitative variables. A significance level of < 0.05 was considered for all statistical tests.

Results

Knowledge Levels

The study surveyed 318 medical students in the clinical stage at Golestan University of Medical Sciences. Of these, 125 participants (39.3%) were male, while 193 participants (60.7 %) were female. Analyzing the knowledge levels, 6 male students (4.8%) demonstrated a moderate level of awareness, 80 (64%) exhibited good awareness, and 39 (31.2%) achieved an excellent level of awareness. Among the female students, 5 individuals (2.8%) had a moderate level of awareness, 84 (43.5%) showed good awareness, and 104 (53.9%) displayed excellent knowledge. A Chi-square test indicated a statistically significant difference in awareness levels of cutaneous leishmaniasis between genders, with a p-value less than 0.001 (Tables 1–7). When considering the clinical stage, the levels of awareness varied. Among the 70 students enrolled in the physiopathology stage, 32 (45.7%) had an excellent level of knowledge. Among extern-1 students, 16 (20.8 %) exhibited excellent awareness; extern-2 students showed improved results with 33 (39.8 %) demonstrating excellent awareness. The highest percentage was observed among the interns, where 62 students (70.5%) reached an excellent level of knowledge (Table 8).

Attitude Level

The study assessed the attitude levels of medical students based on gender. Among male participants, 41 individuals (32.8%) demonstrated a moderate attitude, 70 individuals (56%) exhibited a good attitude, and 14 individuals (11.2 %) displayed an excellent attitude. For female participants, 18 individuals (9.3%) exhibited a moderate attitude, 137 individuals (71%) had a good attitude, and 38 individuals (19.7%) showed an excellent attitude. When analyzed by clinical stage, the results indicated that among physiopathology students, 19 individuals (27.1 %) exhibited an excellent attitude. This figure was 13 individuals (16.9%) for Extern-1 students, 2 individuals (2.4%) in Extern-2, and 18 individuals (20.5%) during the internship stage (Table 9).

Practice Levels

The study identified variations in participants' performance levels based on gender and clinical stage. Regarding gender, it was observed that a larger proportion of men exhibited moderate practice (80%), whereas a higher percentage of women demonstrated good practice (52.3%). A statistically significant relationship between gender and practice levels was found ($p< 0.05$). For the clinical stage, physiopathology students predominantly showed moderate practice (72.9%), while Extern-1 and Extern-2 students recorded higher percentages of good practice at 63.6% and 32.5%, respectively. In contrast, intern students displayed the highest percentage of moderate performance (46.6%). Chi-square analysis confirmed a significant association between clinical stage and performance levels ($p< 0.05$) (Table 10). Moreover, the study revealed a statistically significant link between levels of knowledge, attitude, and performance. Additionally, the findings suggested that participants' knowledge and attitudes toward cutaneous leishmaniasis had a direct impact on their performance levels. Overall, the results emphasize the importance of accounting for gender and clinical stage when assessing performance in the context of cutaneous leishmaniasis. The study also underscores the role of knowledge and attitudes in shaping performance outcomes. Tables 4 and

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5 highlight specific questions related to students' knowledge and practice (Tables 11 and 12).

Table 1. Knowledge of Golestan University of Medical Sciences medical students regarding the transmission methods of cutaneous leishmaniasis, 2021–2022

The way to get CL	Stagnant waters		Infected sand fly		I don't know	
	N	%	N	%	N	%
Clinical Stage						
Physiopathology	6	8.6	64	91.4	0	0
Extern-1	23	29.9	49	63.6	5	6.5
Extern-2	6	7.2	67	80.8	10	12
Intern	0	0	88	100	0	0

Table 2. Knowledge of Golestan University of Medical Sciences medical students regarding the reservoir host of cutaneous leishmaniasis, 2021–2022

The main Reservoir of CL	Rodents		Human		Other animals		I don't know	
	N	%	N	%	N	%	N	%
Clinical Stage								
Physiopathology	**6**	**8.6**	**64**	**91.4**	**0**	**0**	**0**	**0**
Extern-1	**23**	**29.9**	**49**	**63.6**	**12**	**15.6**	**5**	**6.5**
Extern-2	**6**	**7.2**	**67**	**80.8**	**13**	**15.7**	**10**	**12**
Intern	**0**	**0**	**88**	**100**	**3**	**3.4**	**0**	**0**
Total	**258**	**81.1**	**1**	**0.3**	**28**	**8.8**	**31**	**9.7**

Table 3. Knowledge of Golestan University of Medical Sciences medical students regarding the treatment of cutaneous leishmaniasis, 2021–2022

Treatment of CL	Chemical drugs		Herbal drugs		No treatment		I don't know	
	N	%	N	%	N	%	N	%
Clinical Stage								
Physiopathology	63	90	0	0	0	0	7	10
Extern-1	58	75.3	7	9.1	7	9.1	5	6.5
Extern-2	65	78.3	0	0	2	2.4	16	19.3
Intern	71	80.7	0	0	17	19.3	0	0
Total	257	80.8	7	2.2	26	8.2	28	8.8

Table 4. Knowledge of Golestan University of Medical Sciences medical students regarding the people at risk in endemic areas of cutaneous leishmaniasis, 2021–2022

People at risk in Endemic areas	Children		The youth		Elderly people		I don't know	
	N	%	N	%	N	%	N	%
Clinical Stage								
Physiopathology	32	45.7	0	0	31	44.3	7	10
Extern-1	57	74	0	0	11	14.3	9	11.7
Extern-2	41	49.4	5	6	6	7.2	31	37.3
Intern	66	75	0	0	7	8	15	17
Total	196	61.6	5	1.6	55	17.3	62	19.5

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Table 5. Knowledge of Golestan University of Medical Sciences medical students regarding the risk of cutaneous leishmaniasis by traveling to infected areas, 2021–2022

The possibility of getting CL by traveling to infected areas	Yes		No		I don't know	
	N	%	N	%	N	%
Clinical Stage						
Physiopathology	70	100	64	91.4	0	0
Extern-1	62	80.5	49	63.6	5	6.5
Extern-2	79	95.2	67	80.8	10	12
Intern	88	100	88	100	0	0
Total	299	94	3	0.9	16	5

Table 6. Knowledge about the timing of sand fly bites among medical students at Golestan University of Medical Sciences, 2021–2022

Probable time of sand fly bite	Sand fly		Night		Day		I don't know	
	N	%	N	%	N	%	N	%
Clinical Stage								
Physiopathology	32	45.7	0	0	31	44.3	7	10
Extern-1	57	74	0	0	11	14.3	9	11.7
Extern-2	41	49.4	5	6	6	7.2	31	37.3
Intern	66	75	0	0	7	8	15	17
Total	196	61.6	5	1.6	55	17.3	62	19.5

Table 7. Knowledge of Medical students of Golestan University of Medical Sciences about the transmission season of cutaneous leishmaniasis, 2021–2022

The season of transfer of the CL	Spring		Summer		Autumn		Winter		I don't know	
	N	%	N	%	N	%	N	%	N	%
Clinical Stage										
Physiopathology	22	31.4	48	68.6	0	0	0	0	0	0
Extern-1	23	29.9	27	35.1	0	0	19	24.7	8	10.4
Extern-2	5	6	47	56.6	0	0	31	37.3	0	0
Intern	6	6.8	63	71.6	3	3.4	16	18.2	0	0
Total	56	17.6	185	58.2	3	0.9	66	20.8	8	25

Table 8. Frequency distribution of the knowledge levels of students at Golestan University of Medical Sciences according to clinical stage, 2021–2022

Clinical Stage	Level of awareness				Total	P-Value
	Weak %	Moderate %	Good %	Excellent %	Number	
Physiopathology	0 (0)	0 (0)	38 (54.3)	32 (45.7)	70	<0.001
Extern-1	0 (0)	5 (6.5)	56 (72.7)	16 (20.8)	77	
Extern-2	4 (4.8)	6 (7.3)	40 (48.1)	33 (39.8)	83	
Intern	0 (0)	0 (0)	26(29.5)	62 (70.5)	88	

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Table 9. Frequency distribution of medical students' attitudes at Golestan University of Medical Sciences by clinical stage, 2021–2022

Clinical Stage	Level of attitude			Total Number	P-Value
	Moderate %	Good %	Excellent %		
Physiopathology	28 (40)	23 (32.9)	19 (27.1)	70	<0.001
Extern-1	19 (24.7)	45 (58.4)	13 (16.9)	77	
Extern-2	12 (14.5)	69(83.1)	2 (2.4)	83	
Intern	0 (0)	70 (79.5)	18 (20.5)	88	

Table 10. Frequency distribution of students of Golestan University of Medical Sciences practice level according to clinical stage, 2021–2022

Clinical Stage	Level of practice			Total Number	P-Value
	Weak %	Moderate %	Good %		
Physiopathology	0 (0)	51 (72.9)	19 (27.1)	70	<0.001
Extern-1	4 (5.2)	24 (31.2)	49 (63.6)	77	
Extern-2	11 (13.3)	45 (54.2)	27 (32.5)	83	
Intern	5 (5.7)	41 (46.6)	42 (47.7)	88	

Table 11. The practice of medical students of Golestan University of Medical Sciences about cutaneous leishmaniasis, 2021–2022

Questions	Physiopathology				Extern-1				Extern-1				Intern			
	yes		no		yes		no		yes		no		yes		no	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Do you use a mosquito net to prevent mosquitoes?	54	77.1	16	22.9	42	54.5	35	45.5	22	26.5	61	73.5	31	35.2	57	64.8
Do you install a net on the door and window to prevent searchers?	70	100	0	0	73	94.8	4	5.2	57	68.7	26	31.3	51	58	37	42
Do you see a doctor if you are sick?	70	100	0	0	77	100	0	0	81	97.6	2	2.4	88	100	0	0
Do you use repellents when traveling to contaminated areas?	19	27.1	51	72.9	46	59.7	31	40.3	28	33.7	55	66.3	38	43.2	50	56.8
Do you dress your wound when you have a sore throat?	70	100	0	0	44	57.1	33	42.9	43	51.8	40	48.2	70	79.5	18	20.5

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Table 12. The Attitude of Medical Students of the Clinical Stage of Golestan University of Medical Sciences about Cutaneous Leishmaniasis in 2021–2022

Questions	physiopathology								Extern-1								Extern-2								Intern							
	At all		little		moderate		high		At all		little		moderate		high		At all		little		moderate		high		At all		little		moderate		high	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
How are you worried about getting sick CL?	19	27.1	16	22.9	35	50	0	0	37	48.1	24	31.2	7	9.1	9	11.7	39	47	40	48.2	4	4.8	0	0	14	15.9	64	72.7	8	9.1	2	2.3
Do you believe in the prevention to CL?	0	0	19	27.1	32	45.8	19	27.1	0	0	22	28.6	23	29.9	32	41.6	3	3.6	17	20.5	44	53	19	22.9	1	1.1	37	42	15	17	35	39.1
How is it possible to have CL affect your beauty?	0	0	9	12.9	19	27.1	42	60	0	0	12	15.6	28	36.4	37	48	0	0	8	9.6	28	33.7	47	65.7	0	0	0	0	30	34.1	58	65.9
Is the education effective in preventing CL?	0	0	9	12.9	42	60	19	27.1	0	0	1	1.3	32	41.6	44	57.1	0	0	13	15.7	23	27.6	47	56.7	0	0	2	2.3	23	26.1	63	71.6
What is the role of health officials in control of CL?	0	0	0	0	51	72.9	19	27.1	3	3.9	12	15.6	24	31.2	38	49.3	0	0	0	0	25	30.1	58	69.9	0	0	2	2.3	21	23.9	65	73.8

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Discussion

Cutaneous leishmaniasis is one of the most important diseases that has caused many health problems in Iran. To prevent this disease in society, it is a very important and effective step to get to know the level of knowledge and attitude of the people of that society. This research targeted medical students in the clinical stage of Golestan University of Medical Sciences. Medical students know this disease in parasitology and infectious disease lessons and have experience dealing with patients with cutaneous leishmaniasis in the health field. The research population consisted of 318 medical students in the clinical stage and 100% of these students knew about this disease in the knowledge section.

In the present study, 84.3% of the students believed that the way to get infected with cutaneous leishmaniasis is the bite of an infected sand fly. In the study of Nasiri et al. (12), 62.8% and in the study by Moussa et al. (14), 69.4% of the participants in Saudi Arabia had correct knowledge of the disease vector. In the study by Saberi et al. (4), 95.4% of people mentioned sand fly bites as the way to transmit the disease to humans. In the study of Droodgar et al. (15), 69.8% of teachers did not know about the cause of the disease and they did not have enough knowledge in other fields of the disease. In the study of Wahabi et al. (16), 47.9% of the population knew about cutaneous leishmaniasis, 39.5% of the people knew that the sand fly is the vector of the disease, and 37.3% of them did not know about this vector. In this study, 81.1% of the participants considered rodents to be the reservoir of the disease. Of course, because in Golestan Province, zoonotic cutaneous leishmaniasis is endemic, whose reservoir is the rodent *R. opimus*. In Nasiri's study, 39.1% were aware of the reservoir (12). From this point of view, our study is similar to the study of Saberi et al. (4), where 83.3% of students knew rodents as a reservoir of disease. In the present study, 80.8% considered chemical drugs suitable for the treatment of cutaneous leishmaniasis, while 2.2% considered herbal drugs useful, and only 8.8% did not believe in the treatment of this disease. In this study, 94% and in Nasiri's study, 78.4% were aware of getting infected by traveling to the endemic areas of CL. In our study, 81.4% of physiopathology students were aware of the possible time of sand fly bites at night, while in Akram's study, this awareness was around 54.8% and 57.6% of the residents of different cities of Pakistan were aware of the time of sand fly bites (17). In Singh's study in India, it was also found that most people were aware of sand fly bites (18). In the current study, the level of knowledge of 164 students (51.5 %) was at a good level, and 143 people (44.9 %) had an excellent level of knowledge. In Nasiri’s study (12), 59.4% of students had a good level of knowledge, and only 6.5% of them had an excellent level of knowledge. In the study of Nasiri et al. (12), a significant relationship was observed between the clinical stages of students with their knowledge ($P< 0.0001$). In this study, the level of knowledge had a significant relationship with the gender and clinical stage of the students ($P< 0.001$). In the attitudinal questions of this research, 33% and in Nasiri's study (12), 34.9% believed that cutaneous leishmaniasis is preventable. In this study, 100% of people considered the role of education to be effective in preventing cutaneous leishmaniasis and 56.6% of students considered the role of health officials in controlling CL to be high. However, in Nasiri's study, 63% of the participants in the research mentioned education as very effective in preventing the disease, and 62% mentioned the role of health officials in controlling cutaneous leishmaniasis as very necessary and important (12). In this study, 34.3% were not worried about getting CL, while 3.5% were very worried about getting this disease. In Nasiri's

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study, only 9.6% of the respondents were very worried about contracting the disease (12). All participants in this study believed that this disease affects beauty.

In the present study, the student's attitude level was seen in 3 levels: average, good, and excellent, and none of the students was in a poor level. In the study of Zainali et al. (19), it was also shown that 1.9% of employees of health centers in Khorasan Razavi, Ilam, and East Azerbaijan provinces had a poor attitude about CL and 1.3% of students had poor attitudes. In this study, 259 students (81.4%) had an acceptable level of attitude (good and excellent), of which 52 (16.3%) had an excellent attitude. In the study of Nasiri et al. (12), 85.2% of participants had a favorable attitude level (good and excellent), of which 22.2% had an excellent attitude level. In the present study, students' attitude level had a significant relationship with their gender and clinical stage (P< 0.001). In the study of Nasiri et al. (12), there was a significant relationship between the level of education and the attitude of the participants (P= 0.019) and between different faculties and their attitudes (P= 0.002). In this study, in performance questions, 46.9% considered the use of mosquito nets, 78.9% installing nets at the door and window, and 41.2% to use repellent when traveling to contaminated areas to prevent sand flies. In Nasiri et al.'s study, less than half of the participants (46.6%) considered mosquito nets as a means to prevent sand flies (12). In the study of Tamiru et al. (20) in Northwestern Ethiopia, it was observed that a small number of people believed in health education, and the use of mosquito nets and insecticides to prevent sand flies. In this study, 99.4% recommended visiting a doctor after contracting the disease. While in Nasiri et al.'s study (12), only 2.6% of students stated that they would go to the doctor if they got CL. Sarkari et al. (21) reported that 37% of the people of Lepui City in Fars province used mosquito nets to prevent sand fly bites, and in general, the knowledge and performance of the respondents about ways to prevent the disease were low (21). Probably, the difference in the results of the studies is due to the difference in the level of education of the participants and their lack of knowledge and understanding of the disease (12). However, 40.7% of the people of Hill City in Saudi Arabia go to the hospital for treatment if they get CL (14). In this study, 49.4% believed in wound dressing when suffering from cutaneous leishmaniasis.

In the present study, 137 (43%) students had a good level of performance. In the study of Nasiri et al. (12), 44.5% of students performed well (12). According to the results of statistical analysis, a significant relationship was observed between students' performance level gender, and clinical stage (P< 0.001). In the study of Nasiri et al. (12), a significant relationship between different faculties and performance was reported (P= 0.041), but there was no significant relationship between the educational level of the participants and their performance (P= 0.405).

Conclusion

According to the leishmaniasis care guidelines of Iran's Ministry of Health, one of the reasons for the spread of CL in Iran is the inadequacy of education in public health and awareness about this disease. As medical students are future healthcare providers, it is crucial to ensure they have a high level of awareness, attitude, and performance in managing conditions like cutaneous leishmaniasis. Given the frequency of this disease in the country, organizing educational programs specifically targeted towards medical students can help enhance their knowledge and skills in dealing with such conditions. These programs can cover various aspects, including the identification, diagnosis, treatment, and prevention of cutaneous leishmaniasis. By doing so, we can ensure that

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medical students are well-prepared to provide optimal healthcare services to society.

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Ethical consideration

This research was conducted after obtaining ethical approval (IR.GOUMS.REC.1400. 397) from the Ethics Committee of the Deputy of Research and Technology at Golestan University of Medical Sciences.

Conflicts of interest statement

The authors declare that there is no conflict of interest.

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