

## Evaluation Of Medical Students' Awareness, Attitudes, And Preferences Regarding Tele dermatology

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**ABSTRACT** **Introduction:** Tele dermatology enables remote evaluation of dermatological conditions through digital imaging and communication technologies and is considered particularly feasible due to the visual nature of dermatological examination. **Objectives:** To assess medical students' awareness, knowledge, attitudes, experiences, and preferences regarding tele dermatology. **Methods:** This cross-sectional descriptive study included 286 medical students. Data were collected via a questionnaire developed from the literature and reviewed by dermatologists, administered both online and face-to-face. Statistical analyses were performed using SPSS 26.0. Categorical variables were analyzed with the chi-square test, with Bonferroni correction for post hoc comparisons. A p-value <0.05 was considered significant. **Results:** The mean age was 20.38 ± 1.68 years, with equal sex distribution. Overall, 50.3% had never heard of tele dermatology, and only 32.2% were familiar with it. Most participants (76.2%) did not believe tele dermatology could match face-to-face diagnostic accuracy. Support for official implementation was 30.8%, while 26.9% preferred tele dermatological consultation. Only 4.5% had prior experience. Reported advantages included improved access to dermatologists (70.6%), increased patient evaluation capacity (56.3%), and reduced cost and time (54.5%). Disadvantages included misdiagnosis risk (72.7%), reliance on technical infrastructure (39.2%), and image quality issues (37.8%). Sex differences were significant only for misdiagnosis perception (P=0.001). Awareness increased with age (P=0.000), and prior awareness influenced preferences (P=0.012). No association was found with class level or economic status. **Conclusions:** Medical students show limited awareness but generally positive attitudes toward tele dermatology. Concerns include infrastructure, image quality, and diagnostic reliability. Integrating telemedicine training into medical curricula may improve knowledge, confidence, and adoption.

## Introduction

In today's world, the rapid advancement of technology has made its integration into all areas of professional life, particularly in the healthcare sector, inevitable. The term "tele" originates from the Greek word meaning "distance" and is commonly used as a prefix to describe actions performed remotely. In this context, teledermatology refers to the performance of dermatological examination and evaluation through the remote transmission of images [1]. This innovative concept was first introduced into the scientific literature in 1995 in an article published by Perednia and Brown [2].

Dermatology, by its nature, relies more heavily on visual examination than many other medical specialties. This characteristic makes teledermatology a highly suitable and rapidly implementable discipline within telemedicine, as skin lesions can be readily observed, appropriately recorded, and transmitted using imaging technologies. Teledermatology practices are primarily classified into two main categories: real-time (synchronous) teledermatology and store-and-forward (asynchronous) teledermatology. Each method has its own advantages, limitations, and distinct application protocols [3]. In addition, depending on the clinical context in which they are used, these approaches may be further categorized as primary-, secondary-, or tertiary-level teledermatology services.

Contemporary healthcare systems are increasingly adopting telemedicine applications in order to overcome geographical barriers and limitations in healthcare resources. Within this transformation process, the readiness and awareness of medical students, who represent the future healthcare workforce, regarding such innovative approaches are of critical importance. Modern medical education must adequately prepare students for evolving models of healthcare delivery. The pandemic that began at the end of 2019 as well as the major earthquake that occurred in the region where this study was conducted in 2023 have concretely demonstrated the significance of telemedicine applications in ensuring the continuity of healthcare services. During the pandemic and the post-disaster period, damage to physical infrastructure and restricted access to healthcare facilities led to the active use of telemedicine solutions, particularly in the management of chronic diseases and in the initial assessment of dermatological complaints [4].

These experiences have shown that teledermatology can make a substantial contribution to healthcare delivery not only in routine clinical practice but also in extraordinary circumstances [5,6]. Therefore, when evaluating medical students' perspectives on teledermatology, it should be taken into account that such disaster-related experiences may increase awareness and acceptance of telehealth applications.

## Objectives

In this context, the present study aimed to comprehensively assess medical students' level of knowledge about teledermatology, their ability to evaluate its applicability in daily clinical practice, their perceived feasibility of the method, their trust in teledermatology, and their preferences regarding its use. Furthermore, by elucidating the perspectives of young professionals who will shape future healthcare delivery models, this study sought to provide insights that may inform the development of medical education curricula and healthcare policies.

## Materials and Methods

The study sample consisted of a total of 286 students enrolled in a medical faculty, ranging from the preparatory year to the sixth year of medical education. A questionnaire-based survey method was used to assess the participants' opinions and experiences regarding teledermatology. Data were collected using a structured questionnaire developed by the researchers based on a review of the relevant literature and expert opinions. The questionnaire included items related to demographic characteristics as well as questions assessing knowledge and attitudes toward teledermatology (Table 1).

The questionnaire comprised items addressing demographic variables such as age, sex, and year of study in addition to questions evaluating the students' level of knowledge, including whether they had previously heard of the term teledermatology and whether they were familiar with its meaning. Participants were also asked whether they had ever undergone a dermatological consultation using teledermatology.

The questionnaire consisted of two main sections: demographic information and teledermatology-related questions. During the development process, all questions and response options were carefully reviewed and revised by three experienced dermatologists in order to minimize potential misunderstandings and linguistic inaccuracies. This revision process represented an important step in enhancing the validity and reliability of the survey tool. The finalized questionnaire items are presented in detail in Table 1. Data collection was carried out using both online (web-based) and face-to-face survey methods. The web-based questionnaire was designed using Google Forms, a platform widely recognized for its reliability and common use in academic research, ensuring ease of access for participants. Face-to-face surveys were administered to directly reach students and minimize potential data loss. This hybrid approach facilitated access to a broad participant pool and provided flexibility in data collection.

**Table 1. Survey.**

1. What is your sex?
2. How old are you?
3. What year are you currently attending in medical school? a) 1st b) 2nd c) 3rd d) 4th e) 5th f) 6th
4. Teledermatology is an alternative examination method that allows clinical information and digital or video-camera images of patients at a certain distance to be evaluated electronically, without traditional face-to-face examination. Have you heard of the term teledermatology before? a) I have never heard of it. b) Yes, I have. c) I have heard of it but didn't know what it meant.
5. Which of the following do you think are advantages of teledermatology? (You may choose more than one option.) a) Patients in areas without access to dermatologists can still receive a dermatologist's opinion. b) It allows a greater number of patients to be evaluated. c) It reduces face-to-face consultations and therefore lowers infection risk from hospital visits. d) Costs and workforce loss due to hospital visits are eliminated, improving access to healthcare.
6. Which of the following do you think are disadvantages of teledermatology? (You may choose more than one option.) a) It is affected by factors such as internet accessibility and speed. b) The cost of telemedicine technologies is high. c) The lack of physical examination and verbal communication may lead to misdiagnosis. d) Whether the patient can provide high-resolution, quality images affects performance. e) Transmitted images may sometimes fail to reflect lesion characteristics. f) When conducted via non-secure systems such as mobile phones or email, patient confidentiality may not be protected.
7. Do you believe teledermatology can provide accurate diagnosis and treatment comparable to face-to-face examinations? a) Yes b) No
8. Would you like teledermatology to be officially used in our country? a) Yes b) Undecided c) No
9. Would you prefer to be examined via teledermatology? a) Yes b) Undecided c) No
10. Have you ever been examined through teledermatology? a) No b) Yes, once c) Yes, more than once

### Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 26.0. Continuous variables, including age, were summarized using mean, standard deviation (SD), and minimum, and maximum values. Categorical variables are expressed as frequencies (N) and percentages (%). The chi-square ( $\chi^2$ ) test was used to evaluate the distribution of awareness, attitudes, preferences, and risk perceptions regarding teledermatology according to sociodemographic variables. For multi-categorical variables with statistically significant differences in chi-square analyses, Bonferroni post hoc tests were conducted to identify the specific groups contributing to the differences. Groups showing statistically significant differences in Bonferroni analyses were indicated in the tables using letters (a, b, c). A p-value of  $< 0.05$  was considered statistically significant for all analyses.

### Results

A total of 286 medical students were included in the study. The distribution of participants' sociodemographic characteristics is presented in detail in Table 2. The sex distribution was equal, with 50% female and 50% male participants. The ages of the students ranged from 18 to 24 years, with a mean age of  $20.38 \pm 1.68$  years. Regarding age groups, 36.7% of the participants were aged 18–19 years, 36.4% were 20–21 years, and 26.9% were 22–24 years. Analysis of class distribution revealed that the majority of the sample consisted of first-year (32.9%) and second-year (34.3%) students, whereas students in the clinical phase (years 4–6) constituted 18.5% of the total sample. With respect to monthly personal expenditure, 24.5% of the students were in the low, 37.4% in the moderate, and 38.1% in the high expenditure groups.

**Table 2. Distribution of Sociodemographic characteristics of medical students.**

Variable	Group	N	%
Gender	Male	143	50,0
	Female	143	50,0
Age	18-19 years	105	36,7
	20-21 years	104	36,4
	22-24 years	77	26,9
	Mean ± SD (Min–Max)	20,38±1,68 (18-24)	
Class	1.	94	32,9
	2.	98	34,3
	3.	41	14,3
	4.	36	12,6
	5.	10	3,5
	6.	7	2,4
Monthly personal expenditure	Low	70	24,5
	Medium	107	37,4
	High	109	38,1
	<b>Total</b>	<b>286</b>	<b>100</b>

Mean ± SD: Mean ± Standard Deviation; Min–Max: Minimum–Maximum values.

Students' levels of awareness, attitudes, and experiences regarding teledermatology are summarized in Table 3. More than half of the participants (50.3%) reported that they had never heard of the term teledermatology, while only 32.2% stated that they were familiar with the concept (Figure 1). The majority of students did not believe that teledermatology could provide diagnostic accuracy comparable to face-to-face examinations (76.2%). The proportion of students who supported the official implementation of teledermatology was 30.8%, whereas more than half of the participants (55.6%) reported being undecided. Similarly, only 26.9% stated that they would prefer to undergo examination via teledermatology, while 42.3% reported being undecided. Only 4.5% of the participants reported having previously undergone a teledermatology-based consultation. These findings indicate limited knowledge of teledermatology among students and considerable uncertainty regarding its practical use.

When students' evaluations of the advantages of teledermatology were examined, the most frequently reported benefits were increased access to dermatologists (70.6%), the ability to evaluate a greater number of patients (56.3%), and reductions in cost, time, and workforce loss (54.5%). In addition, 37.1% of students indicated that a reduced frequency of face-to-face visits and the consequent lower risk of infection constituted an important advantage. In contrast, regarding perceived disadvantages, the lack of physical examination and verbal communication leading to a risk of

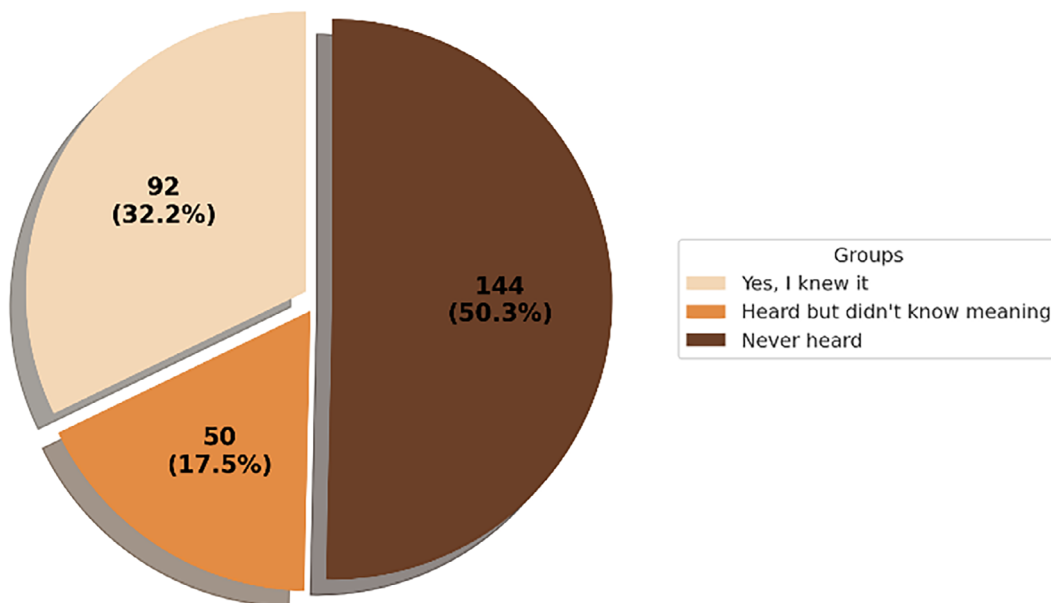
misdiagnosis (72.7%) was the most commonly reported concern. Other notable disadvantages included dependence on internet access and connection speed (39.2%), diagnostic difficulty related to image quality (37.8%), digital inequalities and cost-related issues (32.2%), inadequate representation of lesion characteristics in images (27.6%), and privacy concerns (10.0%). Findings related to the advantages of teledermatology are illustrated in Figure 2, while students' views on disadvantages are shown in Figure 3.

Table 4 presents the distribution of students' awareness, attitudes, and risk perceptions regarding teledermatology according to sex and age groups. Although no statistically significant sex difference was found in having heard of teledermatology ( $P=0.095$ ), female students more frequently reported "Yes, I knew it" compared with male students (37.1% vs. 27.3%). Conversely, the response "I have never heard of it" was more common among male students (56.6%). No statistically significant sex difference was observed in belief in diagnostic accuracy, openness to official implementation, preference for teledermatology-based examination, or prior teledermatology experience ( $P>0.05$ ). However, a statistically significant sex difference was identified in the perception of misdiagnosis risk ( $P=0.001$ ). The proportion of students who believed that there was a risk of misdiagnosis was significantly higher among females (81.8%) than males (63.6). This finding suggests that female students may adopt a more cautious or critical approach toward the diagnostic reliability of teledermatology. No

**Table 3. Awareness, attitudes, and experience of medical students regarding teledermatology.**

Variable	Group	N	%
Awareness of teledermatology	Yes, I knew it.	92	32.2
	I had heard of it but did not know its meaning	50	17.5
	I had never heard of it	144	50.3
Belief in the accuracy of teledermatology	Yes	68	23.8
	No	218	76.2
Openness to official use	Yes	88	30.8
	No	39	13.6
	Undecided	159	55.6
Preference for examination via teledermatology	Yes	77	26.9
	No	88	30.8
	Undecided	121	42.3
Experience with teledermatology	Yes	13	4.5
	No	273	95.5

**Awareness of the Term 'Teledermatology' (N = 286)**

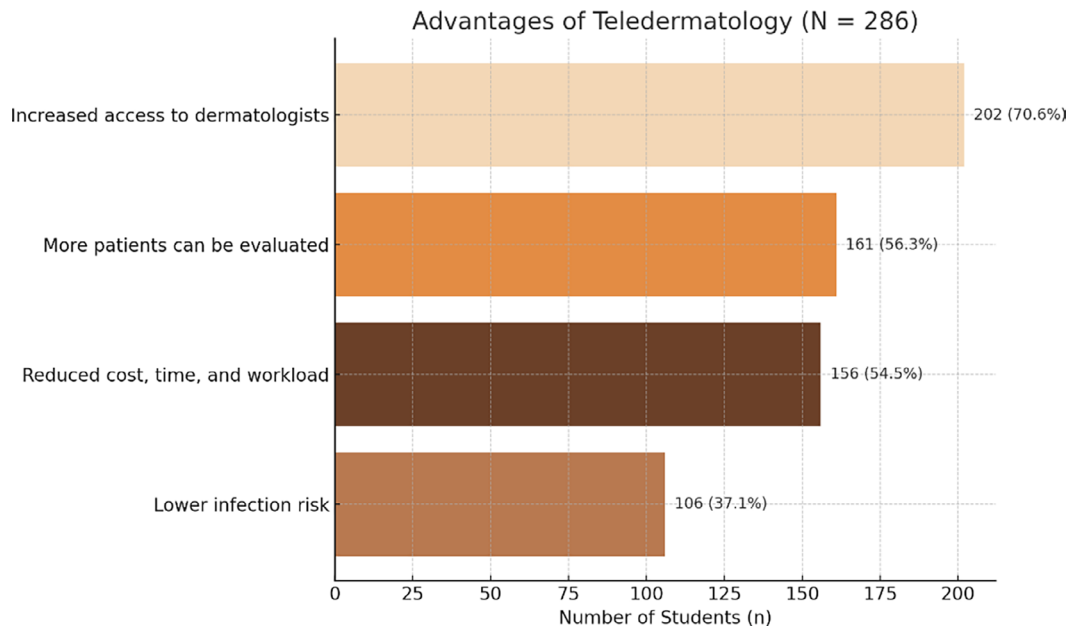


**Figure 1.** Awareness levels of the term “teledermatology” among medical students.

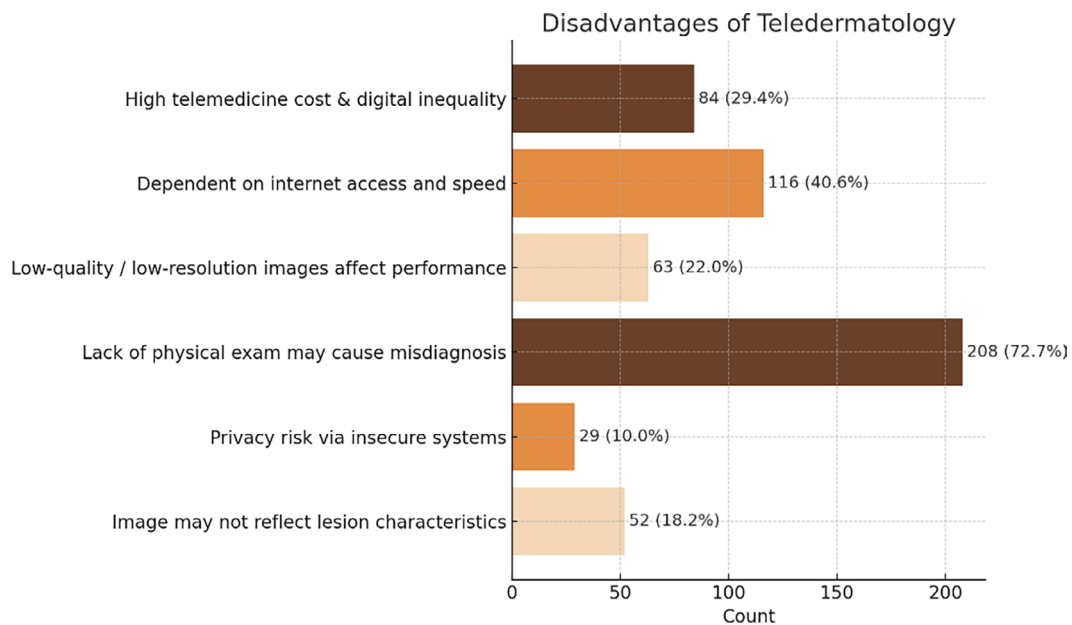
significant sex difference was observed regarding perceived privacy risk ( $P=0.433$ ).

Awareness of teledermatology differed significantly across age groups ( $P=0.000$ ). Students aged 20–21 years most frequently reported being familiar with teledermatology (“Yes, I knew it,” 50.0%), whereas the highest proportion of students who had never heard of teledermatology was observed in the 18–19 age group (63.8%). These findings indicate that awareness of teledermatology increases

with age or educational progression. No significant difference was found among age groups in belief in diagnostic accuracy, openness to official use, or teledermatology experience ( $P>0.05$ ). However, a significant difference was identified in preference for teledermatology-based examination ( $P=0.042$ ). The proportion of students responding “Yes” was higher in the 20–21 age group (34.6%), indicating a more favorable attitude toward teledermatology use, whereas the highest rate of indecision was observed in the 22–24 age



**Figure 2.** Distribution of students' views regarding the advantages of teledermatology (N=286). Since the question allowed multiple responses, participants could select more than one option; therefore, total percentages may exceed 100%.



**Figure 3.** Distribution of students' views regarding the disadvantages of teledermatology (N=286). As this was a multiple-response item, each participant could mark several disadvantages, which explains why cumulative percentages surpass 100%.

timeframe, students receive intensive training focusing primarily on conditions frequently encountered in primary care settings. Nevertheless, the broad range of differential diagnoses in dermatology may pose significant challenges. We believe that the establishment of a regional communication network and teledermatology services could play a substantial role in facilitating diagnosis and initiating treatment for a subset of patients. Moreover, such applications may partially reduce outpatient clinic workloads, thereby

allowing physicians to allocate more time to individual patients [9-11].

The findings of this study demonstrate that medical students' awareness of teledermatology is notably low. The fact that more than half of the participants had never heard the term suggests that digital health applications have not yet been adequately integrated into medical education. Similarly, the observation that only one third of students reported familiarity with the concept and that the majority did not

Table 4. Distribution of awareness, attitudes, and risk perceptions regarding teledermatology by sex and age groups.

Variable	Group	Sex				P	Age group						p
		Male		Female			18-19 years		20-21 years		22-24 years		
		N	%	N	%		N	%	N	%	N	%	
Awareness of teledermatology	Yes, I knew it	39	27.3	53	37.1	0.095	20a	19.0	52b	50.0	20a	26.0	0.000**
	Partial awareness	23	16.1	27	18.9		18a	17.1	22a	21.2	10a	13.0	
	No	81	56.6	63	44.1		67a	63.8	30b	28.8	47a	61.0	
Belief in the accuracy of teledermatology	Yes	41	28.7	27	18.9	0.071	24	22.9	24	23.1	20	26.0	0.868
	No	102	71.3	116	81.1		81	77.1	80	76.9	57	74.0	
Openness to official use	Yes	49	34.3	39	27.3	0.295	31	29.5	32	30.8	25	32.5	0.995
	No	16	11.2	23	16.1		15	14.3	14	13.5	10	13.0	
	Undecided	78	54.5	81	56.6		59	56.2	58	55.8	42	54.5	
Preference for examination via teledermatology	Yes	41	28.7	36	25.2	0.773	21a	20.0	36a	34.6	20a	26.0	0.042*
	No	42	29.4	46	32.2		36a	34.3	34a	32.7	18a	23.4	
	Undecided	60	42.0	61	42.7		48ab	45.7	34b	32.7	39a	50.6	
Experience with teledermatology	Yes	8	5.6	5	3.5	0.570	5	4.8	4	3.8	4	5.2	0.903
	No	135	94.4	138	96.5		100	95.2	100	96.2	73	94.8	
Perceived risk of misdiagnosis	No	52a	36.4	26b	18.2	0.001**	23	21.9	32	30.8	23	29.9	0.297
	Yes	91a	63.6	117b	81.8		82	78.1	72	69.2	54	70.1	
Perceived privacy risk	No	126	88.1	131	91.6	0.433	95	90.5	90	86.5	72	93.5	0.291
	Yes	17	11.9	12	8.4		10	9.5	14	13.5	5	6.5	

Note:  $P < 0.05$ ;  $P < 0.01$ . Categorical variables were analyzed using the chi-square test. Lettering indicates statistically significant differences between groups; comparisons were performed using the Bonferroni correction.

group (50.6%). No significant difference was found among age groups regarding perceptions of misdiagnosis or privacy risk ( $P>0.05$ ).

Table 5 presents the distribution of awareness, attitudes, and risk perceptions regarding teledermatology according to class level and monthly personal expenditure. No statistically significant difference was observed between preclinical (years 1–3) and clinical (years 4–6) students in terms of teledermatology awareness, attitudes, or experiences. The proportion of students who reported being familiar with teledermatology was 33.0% in the preclinical group and 28.3% in the clinical group, with no statistically significant difference ( $P>0.05$ ). Similarly, belief in diagnostic accuracy, openness to official implementation, preference for teledermatology-based examination, prior teledermatology experience, and perceptions of misdiagnosis and privacy risk did not differ significantly between the two groups ( $P>0.05$ ). In both class groups, the vast majority of students reported having no prior experience with teledermatology. These findings suggest that students' awareness and attitudes toward teledermatology are distributed similarly regardless of class level.

When students' teledermatology awareness, attitudes, and experiences were examined according to monthly personal expenditure levels, no statistically significant difference was identified for any variable. The proportion of students who reported being familiar with teledermatology was 30.0% in the low expenditure group, 29.0% in the moderate group, and 36.7% in the high expenditure group, with no statistically significant difference ( $P>0.05$ ). Belief in diagnostic accuracy, openness to official implementation, preference for teledermatology-based examination, and perceptions of misdiagnosis and privacy risk were similarly distributed across expenditure groups ( $P>0.05$ ). In all three groups, the majority of students reported having no prior teledermatology experience. These results indicate that awareness, attitudes, and risk perceptions regarding teledermatology are not associated with students' economic status.

Comparisons of attitudes and experiences regarding teledermatology according to prior awareness of the concept are presented in Table 6. The level of awareness of teledermatology ("yes," "partially," or "never heard") resulted in some statistically significant differences in students' attitudes and preferences. Belief in diagnostic accuracy was similar among students who were familiar with or partially familiar with teledermatology, and no significant difference was observed between groups for this variable ( $P=0.667$ ). Openness to official implementation also did not differ significantly according to awareness level, with the highest proportion of respondents in all groups reporting indecision. In contrast, preference for teledermatology-based examination was significantly influenced by awareness level ( $P=0.012$ ). The highest preference rate was observed among students who were

familiar with teledermatology (39.1%), whereas this rate was markedly lower among those who had never heard of the concept (20.1%). Conversely, the proportion of students reporting indecision was highest among those who had never heard of teledermatology (47.2%), indicating that lack of knowledge directly affects decision-making processes.

A statistically significant difference was also observed in prior teledermatology experience according to awareness level ( $P=0.015$ ). The highest rate of experience was found among students who were partially familiar with teledermatology (12.0%), while the lowest rate was observed among those who had never heard of it (2.1%). This finding suggests that students with partial awareness may have a higher likelihood of encountering teledermatology in practice. Perceptions of misdiagnosis and privacy risk were not significantly influenced by awareness level ( $P>0.05$ ). In all groups, the majority of students reported the presence of a misdiagnosis risk, whereas the proportion of those perceiving a privacy risk remained low and similar across groups.

## Discussion

Teledermatology, a rapidly developing subspecialty of telemedicine over the past two decades, enables the remote evaluation of dermatological conditions through digital imaging and communication technologies. The visually oriented nature of dermatology renders it particularly well suited to telemedical applications [7]. In telemedicine practice, diagnoses, treatment decisions, and clinical recommendations can be made based on patient data and documentation transmitted via telecommunication systems. Teledermatology may be conducted directly between the patient and the physician or in the form of dermatology consultations, particularly involving primary care physicians or other healthcare professionals.

The COVID-19 pandemic, which affected populations worldwide and necessitated quarantine measures, markedly accelerated the adoption of remote examinations and telemedicine applications, facilitated by technological advances and increased accessibility to digital tools. During this period, continuity of daily life, including education and healthcare delivery, was largely maintained through remote access. Teledermatology likewise experienced a substantial increase in utilization during the pandemic [8].

Telemedicine applications have long been employed in visually-dependent medical fields such as radiology and pathology. How these approaches can be effectively integrated into dermatology, where accurate diagnosis is critical, and how medical students who were trained during the pandemic perceive such technologies constitute the core rationale of the present study. Although medical education is prolonged, dermatology rotations are relatively short. Within this limited

**Table 5. Distribution of awareness, attitudes, and risk perception regarding teledermatology by year of study and monthly personal expenditure.**

Variable	Group	Class						p	Monthly Personal Expenditure						p
		Preclinical (Grade 1-3 years)			Clinical (Grades 4-6)				Low		Medium		High		
		N	%	N	%	N	%		N	%	N	%	N	%	
Awareness of teledermatology	Yes, I knew it	77	33.0	15	28.3	0.797	21	30.0	31	29.0	40	36.7	0.505		
	Partial awareness	40	17.2	10	18.9		15	21.4	16	15.0	19	17.4			
	No	116	49.8	28	52.8		34	48.6	60	56.1	50	45.9			
Belief in the accuracy of teledermatology	Yes	53	22.7	15	28.3	0.497	15	21.4	24	22.4	29	26.6	0.670		
	No	180	77.3	38	71.7		55	78.6	83	77.6	80	73.4			
	Yes	67	28.8	21	39.6	0.071	18	25.7	30	28.0	40	36.7	0.420		
Openness to official use	No	29	12.4	10	18.9		8	11.4	16	15.0	15	13.8			
	Undecided	137	58.8	22	41.5		44	62.9	61	57.0	54	49.5			
	Yes	63	27.0	14	26.4	0.873	19	27.1	23	21.5	35	32.1	0.517		
Preference for examination via teledermatology	No	73	31.3	15	28.3		22	31.4	34	31.8	32	29.4			
	Undecided	97	41.6	24	45.3		29	41.4	50	46.7	42	38.5			
	Yes	11	4.7	2	3.8	1.000	4	5.7	2	1.9	7	6.4	0.238		
Experience with teledermatology	No	222	95.3	51	96.2		66	94.3	105	98.1	102	93.6			
	No	62	26.6	16	30.2	0.721	21	30.0	30	28.0	27	24.8	0.727		
	Yes	171	73.4	37	69.8		49	70.0	77	72.0	82	75.2			
Perceived privacy risk	No	210	90.1	47	88.7	0.949	65	92.9	96	89.7	96	88.1	0.584		
	Yes	23	9.9	6	11.3		5	7.1	11	10.3	13	11.9			

Note: P<0.05; P<0.01. Categorical variables were analyzed using the chi-square test.

Table 6. Attitudes toward teledermatology: comparison of experience and risk perception according to awareness of teledermatology.

Variable	Group	Teledermatology hearing									p
		Yes			Partially			Never			
		N	%		N	%		N	%		
Belief in the accuracy of teledermatology	Yes	24	26.1	13	26.0	31	21.5	0.667			
	No	68	73.9	37	74.0	113	78.5				
Openness to official use	Yes	35	38.0	12	24.0	41	28.5	0.118			
	No	15	16.3	4	8.0	20	13.9				
	Undecided	42	45.7	34	68.0	83	57.6				
Preference for examination via teledermatology	Yes	36a	39.1	12ab	24.0	29b	20.1	0.012**			
	No	28a	30.4	13a	26.0	47a	32.6				
	Undecided	28a	30.4	25ab	50.0	68b	47.2				
Experience with teledermatology	Yes	4ab	4.3	6b	12.0	3a	2.1	0.015*			
	No	88ab	95.7	44b	88.0	141a	97.9				
Risk of misdiagnosis	No	27	29.3	13	26.0	38	26.4	0.862			
	Yes	65	70.7	37	74.0	106	73.6				
Privacy risk	No	82	89.1	46	92.0	129	89.6	0.853			
	Yes	10	10.9	4	8.0	15	10.4				

Note:  $P < 0.05$ ;  $P < 0.01$ . Categorical variables were analyzed using the chi-square test. Letter annotations indicate significant differences between groups, with Bonferroni post hoc tests applied.

believe teledermatology to be as diagnostically accurate as face-to-face examination indicates that insufficient knowledge adversely affects trust in the method. This trend is consistent with the existing literature, in which several studies have reported low baseline awareness of teledermatology, with significantly increased acceptance following appropriate education.

Evaluation of the perceived advantages and disadvantages of teledermatology indicates that students are receptive to its potential contributions while harboring fundamental concerns regarding its implementation. Most students emphasized benefits such as increased access to dermatologists, the ability to evaluate a larger number of patients, and savings in cost and time. Conversely, the risk of misdiagnosis, diagnostic challenges related to image quality, and dependence on internet infrastructure emerged as the most prominent disadvantages. These findings suggest that students are aware of both the technical and clinical limitations of teledermatology, underscoring the importance of strengthening infrastructure, standardizing imaging quality, and establishing robust data security measures to ensure effective implementation.

When assessed according to demographic variables, teledermatology awareness was found to increase with age and educational progression. The highest level of awareness in the 20–21 age group suggests that exposure to digital health applications increases as students advance in their training. Furthermore, the significantly higher preference for teledermatology-based examinations among students who had heard of the concept indicates that knowledge level plays a decisive role in acceptance and preference. The higher perception of misdiagnosis risk among female students may reflect differences in risk assessment tendencies. In contrast, the absence of any significant difference in attitudes based on class level or economic status supports the notion that perspectives on teledermatology are more strongly influenced by knowledge and experience than by social or economic factors. These findings suggest that, if appropriately introduced and supported, teledermatology could be widely accepted, particularly in resource-limited settings [3,12]. Our results further indicate that although students theoretically view teledermatology favorably, they remain hesitant about personal use due to a lack of confidence and practical experience [13,14].

The present study highlights insufficient knowledge of telemedicine among medical students, despite generally positive perceptions of its feasibility and benefits. This suggests that integrating telemedicine and digital health education into the medical curriculum could effectively address knowledge gaps. Incorporating such programs into the core of medical education may accelerate patient access to healthcare, reduce costs, and mitigate geographical barriers, advantages

that underscore the growing importance of telemedicine in future healthcare delivery.

Despite the lengthy duration of medical education, dermatology rotations are relatively brief. Within this constrained period, students receive concentrated instruction on conditions commonly encountered in primary care settings, yet they may struggle due to the wide spectrum of differential diagnoses. In this context, regionally established communication networks and teledermatology services are expected to contribute significantly to diagnostic accuracy and timely initiation of treatment. Additionally, these applications may alleviate outpatient clinic congestion, enabling physicians to dedicate more time to patient care.

When compared with the literature, our findings are largely consistent with previous studies. For example, Sharma et al. reported that more than 70% of participants during the COVID-19 pandemic believed teledermatology improved access to care and reduced the burden on healthcare systems [11]. Similarly, Kaliyadan et al. emphasized the effectiveness of teledermatology in rural and underserved areas with limited access to dermatologists [3]. However, alongside these positive perspectives, fundamental limitations have also been reported. Smith et al. identified technical and ethical challenges such as internet speed, image quality, and patient privacy as major barriers to teledermatology implementation. The concerns expressed by more than half of students in our study regarding access, image quality, and privacy are consistent with infrastructure limitations and regulatory gaps described in the literature [14,15]. These findings indicate that, in parallel with its potential benefits, successful teledermatology implementation requires concurrent development of infrastructure, education, and legal frameworks.

Another survey study conducted in Turkey, involving some of the authors of the present study, evaluated public perspectives on teledermatology and found that only 23.3% of participants were well informed about the concept, while 41.9% were completely unfamiliar with it, highlighting a substantial gap between awareness and support for implementation. Nevertheless, the majority of participants (57.2%) supported the official implementation of teledermatology in Turkey, in line with evidence from countries such as Chile and Spain, where a significant proportion of dermatological consultations have been effectively managed without face-to-face visits. It is believed that the COVID-19 pandemic, by restricting patient mobility, may have further increased reliance on teledermatology. These findings emphasize the considerable potential of teledermatology in healthcare delivery, while underscoring the need for increased public awareness, systematic evaluations, and supportive health policies, including prioritization of publicly reimbursed medications [16].

Following the major earthquake in the region where this study was conducted, a teledermatology-based consultation network was established under the coordination of the national dermatology society in Turkey to support the continuity of dermatological services. Through a social media-based messaging platform, remote dermatological consultation and guidance were provided to primary care physicians, mobile health teams, and other healthcare professionals actively working in the disaster area. This initiative demonstrated that teledermatology can serve as a valuable complementary tool in disaster settings by ensuring rapid access, flexibility, and specialist expertise, thereby offering a contextual framework for interpreting medical students' attitudes toward teledermatology [17].

## Conclusion

This study reveals that medical students' awareness of teledermatology remains limited; however, students are able to recognize its potential benefits. Incorporating telemedicine and digital health awareness-enhancing content into medical curricula may facilitate students' adaptation to these systems. In this regard, case-based learning, simulation-based training, and online platforms may serve as effective educational tools. Implementation of targeted educational strategies could substantially increase both awareness and practical applicability, ultimately improving healthcare delivery. Furthermore, addressing ethical and privacy-related concerns through appropriate legal regulations would significantly contribute to the acceptance and safe use of telemedicine.

## Study Limitations

This study is descriptive in nature, and the questionnaire was developed based on the literature and expert opinions. However, no psychometric analysis of the survey instrument, such as Cronbach's alpha, pilot testing, or validity and reliability assessments, was performed. This should be considered a major methodological limitation of the study.

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