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Medical Students' Knowledge, Attitudes, and Behaviors Regarding Skin Cancer, Sun Exposure, and Vitamin D: An Evaluation for Curriculum Integration

Tıp Fakültesi Öğrencilerinin Deri Kanseri, Güneş Maruziyeti ve D Vitamini Konusundaki Bilgi, Tutum ve Davranışları: Müfredat Entegrasyonuna Yönelik Bir Değerlendirme

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Abstract

Objectives: Skin cancer is among the most common preventable cancers worldwide, and adequate knowledge about sun exposure and Vitamin D is essential for early prevention. Medical students, as future physicians, should acquire appropriate knowledge and health-promoting behaviors during their undergraduate training. According to the National Core Curriculum for Undergraduate Medical Education (UÇEP 2020), skin tumors are addressed under the competency area of "early diagnosis and prevention (ÖnT-K)." This framework emphasizes not only diagnostic knowledge but also preventive counseling and risk reduction strategies.

This study aimed to evaluate medical students' knowledge, attitudes, and behaviors regarding skin cancer, sun exposure, and Vitamin D, and to identify gaps that may inform curriculum development.

Material and Methods: A cross-sectional survey was conducted among undergraduate medical students at a public university. "The Skin Cancer and Sun Knowledge Scale" (SCSKS) that has a Turkish validity and reliability was used. The validated questionnaire assessed knowledge about skin cancer risk factors

and prevention, attitudes toward sun-protective behaviors, personal sun-exposure practices, and awareness of Vitamin D-related health issues. Descriptive statistics and comparative analyses were used to evaluate knowledge levels and associated factors.

Results: Of the individuals participating in the study 60.2% (n=77) were female. The mean age was 21 years. The median total score of the participants' SCSKS was calculated as 17 points (IQR: 4). Overall, students demonstrated moderate knowledge about skin cancer but showed variability across specific domains, particularly regarding Vitamin D physiology and safe sun exposure practices. When the behavioral status of the participants regarding vitamin D was evaluated; it was observed that 7.8% consumed oily fish at least twice a week, 17.2% took vitamin D supplements, and 21.1% knew the level of vitamin D in their blood findings. Although most students held positive attitudes toward sun protection, many reported inconsistent personal protective behaviors. Significant gaps were identified between knowledge and practice, suggesting limited translation of theoretical information into daily habits. Students across all years expressed a need for more structured curricular content on these topics.

Conclusions: Medical students appear to have important gaps in their knowledge and behaviors regarding skin cancer, sun exposure, and vitamin D. These findings highlight the need to strengthen medical school curricula with integrated content addressing vitamin D intake, sun protection, and skin cancer prevention. Enhancing students' conceptual understanding of sun exposure and vitamin D may improve their personal health behaviors and support more effective preventive counseling in their future clinical practice. Furthermore, these findings underscore the importance of incorporating targeted educational content into medical curricula to promote preventive competencies and encourage healthier behavioral practices among future physicians.

Özet

Amaç: Deri kanseri, dünya çapında en sık görülen önlenebilir kanserler arasında yer almakta olup, güneş ışığına maruz kalma ve D vitamini hakkında yeterli bilgi sahibi olmak erken önleme için oldukça önemlidir. Geleceğin hekimleri olan tıp öğrencileri, lisans eğitimleri sırasında uygun bilgi ve sağlığın geliştirilmesi yönünde davranışlar edinmelidir. Ulusal Çekirdek Eğitim Programı'nda (UÇEP 2020) deri tümörleri, "ön tanı ve korunma (ÖnT-K)" yeterlik alanı kapsamında ele alınmaktadır. Bu yaklaşım, yalnızca tanısal bilgiye değil, aynı zamanda risk faktörlerinin yönetimi, koruyucu hekimlik ve danışmanlık becerilerine de vurgu yapmaktadır.
Bu çalışma, tıp fakültesi öğrencilerinin deri kanseri, güneş ışığına maruz kalma ve D vitamini ile ilgili bilgi, tutum ve davranışlarını değerlendirmeyi ve müfredat geliştirme konusunda yol gösterici olabilecek eksiklikleri belirlemeyi amaçlamıştır.

Gereç ve Yöntem: Kesitsel tanımlayıcı tipte tasarlanan bu çalışmada Türkçe geçerliliği ve güvenilirliği yapılmış olan "Cilt Kanseri ve Güneş Bilgi Ölçeği" kullanılmıştır. Geçerliliği kanıtlanmış anket, deri kanseri risk faktörleri ve önlenmesi hakkındaki bilgiyi, güneşten korunma davranışlarına yönelik tutumları, kişisel güneş ışığına maruz kalma uygulamalarını ve D vitamini ile ilgili sağlık sorunlarına ilişkin farkındalığı değerlendirmiştir. Bilgi düzeylerini ve ilişkili faktörleri değerlendirmek için tanımlayıcı istatistikler ve karşılaştırmalı analizler kullanılmıştır.

Bulgular: Çalışmaya katılan bireylerin %60,2'si (n=77) kadındır. Ortalama yaş 21 idi. Katılımcıların Cilt Kanseri ve Güneş Bilgi Ölçeği'nin medyan toplam puanı 17 puan (IQR: 4) olarak hesaplandı. Katılımcıların D vitamini ile ilgili davranışsal durumları değerlendirildiğinde; %7,8'inin haftada en az iki kez yağlı balık tükettiği, %17,2'sinin D vitamini takviyesi aldığı ve %21,1'inin kan testlerindeki D vitamini seviyesini bildiği gözlemlendi. Öğrencilerin çoğu güneşten korunmaya karşı olumlu tutum sergilese de, birçoğu tutarsız kişisel koruyucu davranışlar sergilediğini bildirdi. Bu çalışmada elde edilen bulgular, tıp öğrencilerinin bilgi düzeylerinin orta düzeyde olmasına ve tutumlarının genel olarak olumlu olmasına karşın, güneşten korunma ve D vitamini ile ilişkili davranışların tutarlı olmadığını göstermektedir. Bu durum, söz konusu kazanımların müfredatta daha çok teorik düzeyde ele alındığını düşündürmekte ve davranışa yansıyan, uygulama temelli eğitim yaklaşımlarına olan gereksinimi ortaya koymaktadır. Tüm sınıflardaki öğrenciler, bu

konularda daha yapılandırılmış müfredat içeriğine ihtiyaç duyduklarını ifade ettiler.

Sonuç: Tıp öğrencilerinin deri kanseri, güneş ışığına maruz kalma ve D vitamini ile ilgili bilgi ve davranışlarında önemli eksiklikler olduğu görülmektedir. Bu bulgular, D vitamini alımı, güneşten korunma ve deri kanseri önlenmesi konularında bütünleşik içerikle tıp fakültesi müfredatlarının güçlendirilmesi ihtiyacını vurgulamaktadır. Güneşe maruziyet ve D vitamini konularında öğrencilerin kavramsal anlayışlarının güçlendirilmesi, kişisel sağlık davranışlarının iyileştirilmesine ve gelecekteki klinik uygulamalarında daha etkili koruyucu danışmanlık sunmalarına katkı sağlayabilir. Bu bulgular ayrıca, geleceğin hekimleri arasında önleyici yetkinlikleri artırmak ve daha sağlıklı davranışsal uygulamaları teşvik etmek için tıp fakültesi müfredatlarının hedefli eğitim içeriğiyle güçlendirilmesinin gerekliliğini de vurgulamaktadır.

Introduction

Skin cancer is among the most common malignancies worldwide, and ultraviolet radiation (UVR) exposure remains its most significant modifiable risk factor (1, 2). While sunlight is responsible for DNA damage leading to skin cancer, it is simultaneously the primary source of vitamin D synthesis in humans (3-6). This dual relationship presents a public health challenge, particularly in regions with high UV indexes such as Türkiye.

Skin cancer can be triggered by multiple risk factors (7). These factors involve both internal (such as eye hue, skin pigmentation, nevi count, presence of atypical nevi, and skin cancer personal and familiar background) and external factors (quantity and intensity of accumulated sun exposure, history of sunburn, and exposure to sunlight) (8). Several relative risk factors are important for the prognostic indicators of the disease. Therefore, clinicians are advised to assess risk factors in detail (9).

Vitamin D plays a central role in musculoskeletal health, immunological regulation, and potentially cancer prevention. Despite its physiological importance, vitamin D deficiency remains a global health concern. Studies indicate widespread insufficiency even among health-literate groups, with misconceptions about sunlight exposure, dietary sources, and supplementation contributing to inadequate intake. Vitamin D levels are shaped by multiple determinants, such as individual characteristics (age, skin pigmentation, comorbidities), environmental conditions (geographical location, season, time of day), and dietary intake including fortified foods, fish, and supplements (10-13). Public health guidelines emphasize limiting UV exposure to prevent rising skin cancer rates, while also recognizing that brief sun exposure is generally sufficient for maintaining physiological vitamin D levels (14, 15). According to the UÇEP 2020, skin tumors are addressed within the competency domain of early diagnosis and prevention. This framework emphasizes not only diagnostic knowledge but also preventive counseling and risk reduction strategies. Research also shows that knowledge about sun protection and skin cancer does not always translate into correct health behaviors, especially among young adults. Recent studies conducted among medical students in Türkiye indicate that while students generally possess high awareness of skin cancer risk factors, this knowledge often fails to manifest in daily protective behaviors. For instance, a 2025 study by Karaoglu and Kucuk Bicer highlighted significant gaps, revealing that despite high recognition of UV risks, only 53.2% of students avoided midday sun, and many held misconceptions regarding SPF. These findings suggest that the integration of more comprehensive, behavior-oriented education into the medical curriculum is a pressing necessity (16). Medical students represent a critical population because they will become future healthcare providers and educators. Their knowledge, attitudes, and behaviors regarding sun protection and vitamin D have the potential to influence not only their personal health but also the advice they give to patients. However, in Türkiye, there is limited evidence evaluating medical students' understanding of vitamin D, sun exposure, and skin cancer collectively. Therefore, this study contributes to medical education by identifying curriculum gaps and informing the integration of preventive health content into undergraduate medical training.

This study aims to assess medical students' knowledge, attitudes, and behaviors regarding vitamin D and to examine how these relate to their knowledge about skin cancer and sun exposure. By identifying these gaps, the study seeks to inform future educational interventions targeting medical

curricula and public health strategies.

Methods

The sample of the study consisted of students enrolled in a Public School of Medicine in Istanbul. Data were collected using a questionnaire prepared by reviewing the literature, which included sociodemographic characteristics and a questionnaire evaluating knowledge, attitudes, and behaviors related to vitamin D, as well as the Turkish validity and reliability-tested SCSKS (17, 18). Participants were provided with necessary information about the study and obtained consent. The survey was created using Microsoft Forms software and conducted online.

The questionnaire used in the research was developed based on information from the literature. The first section of the form investigates participants' general knowledge levels regarding vitamin D. In this section, participants' responses were evaluated with three options: true/false/unknown.

The second section of the form explores participants' attitude levels regarding vitamin D, with responses evaluated on a scale of agree/uncertain/disagree.

The final section of the form pertains to behavior assessment related to vitamin D. In this section, individuals' behaviors related to vitamin D were evaluated with responses ranging from frequently/sometimes/never.

The SCSKS, developed by Day et al. (2014), was used in our study to assess knowledge related to skin cancer and sun health (18). The scale consists of 25 items evaluating adults' knowledge levels about skin cancer and sun health. The scale was developed following a systematic literature review of the best practices in research and scale items related to skin cancer and sun health. The scale assesses adults' knowledge in five areas: sun protection (items 1, 16-22), tanning (items 2-12), skin cancer risk factors (items 13-14, 23), skin cancer prevention (item 15, 24), and symptoms of skin cancer (item 25). The scale items comprise 15 true-false questions and 10 multiple-choice questions. Each correct option is assigned a score of 1, while incorrect options are assigned a score of 0. The total score obtained by summing the items ranges from 0 to 25, with a higher score indicating a higher level of knowledge. After obtaining content validity through expert opinion, the reliability analysis conducted with data obtained from 514 university students yielded an internal consistency reliability coefficient (KR-20) of 0.69, and a test-retest reliability coefficient (r) of 0.83 with a 2-week interval. Exploratory factor analysis confirmed that the scale had a single-factor structure. The scale's discriminant validity was found to be high. The Turkish validity and reliability study of the scale was conducted by Öztürk Haney et al. (2018) (17). The Turkish SCSKS demonstrated a content validity index (CVI) of 93.71%, an internal consistency reliability coefficient (KR-20) of 0.51, and a test-retest reliability coefficient of 0.52 (n=34) with a 2-week interval, with $p<0.001$. The discriminant validity of the scale was evaluated with a single-item question and confirmed ($p<0.001$) (17, 18).

Data Analysis

The survey data were transferred to SPSS 22.0 software for analysis. Analysis between categorical variables was performed using the Chi-square test. If the assumptions for parametric tests were met with normal distribution in the groups, the t-test was applied for comparison between the two groups; otherwise, the non-parametric Mann-Whitney U test was used. For comparison among more than two groups, if the assumptions for parametric tests were met with normal distribution in the groups, ANOVA was applied; otherwise, the non-parametric Kruskal-Wallis test was used. Descriptive statistics are given as mean ± standard deviation, numbers, and percentages. $p < 0.05$ was taken as the limit of significance.

Variables

Independent variables included age, sex, year of study, and total SCSKS.

Dependent variables were vitamin D–related attitudes and behaviors, including vitamin D supplement use, awareness of serum vitamin D level, sun protection practices, and nutrition label reading behaviors.

Ethical considerations

The study was conducted with the Ethics committee's approval nr. 09.2020.658 of Marmara University University Clinical Trials Ethics Committee. General information about the study was supplied to individuals participating in the study and an informed consent form was read and signed by each participant.

Results

Participant characteristics

This study included a total of 128 participants. Table 1 presents the demographic features of the participants. 60.2% of the participants were female, and the mean age of all participants was 21.6 ± 2.0 years (Min. 18, max. 28).

Sun Awareness and its Influence on Skin Cancer Risk

The results of the SCSKS for the participants are presented in Table 2. It was determined that the average score was 17.2 (minimum 8, maximum 24). Researchers divided the participants into two groups based on the average score, with 64.8% scoring above the average and 35.2% scoring below. These findings suggest that while sun awareness is generally satisfactory among participants, there remains a significant subgroup at potential risk due to insufficient knowledge.

Table 1. Participants' Demographic Characteristics (n=128)

Demographic Characteristics		n	%
Gender	Male	51	39.8
	Female	77	60.2
Marital status	Married	-	-
	Single	128	100.0
Year of study	1 st year undergraduate	26	20.3
	2nd year undergraduate	19	14.8
	3rd year undergraduate	32	25.0
	4th year undergraduate	9	7.0
	5th year undergraduate	35	27.3
	6th year undergraduate	7	5.5
SCSKS	<17 points	45	35.2
	≥ 17 points	83	64.8

Table 2. Participants's skin cancer and sun knowledge scale

		n	%
SCSKS	<17 points	45	35.2
	≥ 17 points	83	64.8
Mean SCSK points*		17.2 ± 3.0	

** $\bar{x}$±SD * SCSK: "The Skin Cancer and Sun Knowledge Scale"*

When students were grouped as preclinical (years 1–3) and clinical (years 4–6), clinical students had significantly higher skin cancer knowledge scores. The median score was 17 in the preclinical group and 19 in the clinical group (Mann–Whitney U test, $p < 0.001$). These findings indicate that progression through medical training and increased clinical exposure may contribute to improved skin cancer knowledge.

Vitamin D Knowledge Status

The distributions of the participants' responses to items aimed at determining their knowledge about vitamin D are shown in Table 3. Overall, it was observed that there was a high rate of "don't know" responses to questions regarding the sources of vitamin D in food. For the item inquiring about adults' daily vitamin D needs, the percentage of participants choosing "don't know" was 57.8%. According to the SCSKS, there was no statistically significant difference in the distributions of responses to vitamin D knowledge questions between the groups scoring below or above the average ($p>0.05$). These findings suggest that vitamin D knowledge is generally insufficient and appears to be independent of overall skin cancer awareness. Based on the total knowledge score classification, the majority of participants demonstrated poor knowledge regarding vitamin D (69.1%), while 24.4% had a moderate level of knowledge and only 6.5% demonstrated good knowledge. Most students correctly identified the relationship between vitamin

Table 3. Participants' responses to vitamin D–related knowledge statements (N=128)

Knowledge statement	Correct n (%)	Incorrect n (%)	Do not know n (%)
Bone diseases such as osteoporosis are associated with vitamin D deficiency	120 (93.8)	2 (1.6)	6 (4.7)
Vitamin D can be produced from sunlight	91 (71.1)	33 (25.8)	4 (3.1)
The ideal time for sun exposure is before 10 a.m.	45 (35.4)	9 (7.1)	73 (57.5)
Only the face needs to be exposed to sunlight to produce vitamin D	4 (3.1)	104 (81.3)	20 (15.6)
Individuals with darker skin require longer sun exposure to produce vitamin D than those with fair skin	33 (25.8)	38 (29.7)	57 (44.5)
People who work indoors have a lower risk of vitamin D deficiency	16 (12.6)	93 (73.2)	18 (14.2)
Adequate use of sunscreen can prevent sunlight from penetrating the skin	71 (55.5)	32 (25.0)	25 (19.5)
Fatty fish such as salmon, tuna, and sardines are sources of vitamin D	76 (59.4)	10 (7.8)	42 (32.8)
Egg yolk is a dietary source of vitamin D	57 (44.5)	18 (14.1)	53 (41.4)
Vegetables are sources of vitamin D	53 (41.4)	25 (19.5)	50 (39.1)
Dairy products are examples of vitamin D–fortified foods	54 (42.2)	6 (4.7)	68 (53.1)
Cod liver oil is a supplement containing vitamin D	41 (32.0)	10 (7.8)	74 (57.8)

Values are presented as number (percentage).

D deficiency and bone diseases (93.8%) and the role of sunlight in vitamin D synthesis (71.1%); however, knowledge regarding dietary sources and recommended intake levels was lower. Only 35.4% of participants correctly identified the recommended timing of sun exposure, while more than half of the students (57.5%) reported that they did not know the appropriate time. Similarly, knowledge regarding dietary sources of vitamin D was limited; fewer than half of the participants correctly identified egg yolk (44.5%) and dairy products (42.2%) as sources of vitamin D. Additionally, a substantial proportion of students were uncertain about certain aspects of vitamin D supplementation and metabolism, with 57.8% reporting that they did not know whether cod liver oil contains vitamin D. Detailed responses to all knowledge items are presented in Table 3. Overall, vitamin D knowledge was limited among participants, particularly regarding dietary sources and recommended intake levels.

Attitude Regarding Vitamin D

The distributions of participants' responses to items aimed at determining their attitudes toward vitamin D are shown in Supplementary Table 1. Most knowledge, attitude, and behavior items did not differ significantly between students with lower and higher SCSK scores. However, students with higher SCSK scores were significantly more likely to agree that the absence of public recreation parks reduces the chance of sunlight exposure (94.0% vs. 75.6%, $p = 0.011$). In addition, students with higher SCSK scores reported significantly greater awareness of their blood vitamin D levels compared to those with lower scores ($p = 0.047$). In summary, attitudes toward vitamin D were largely similar across groups; however, students with higher skin cancer awareness demonstrated greater recognition of environmental factors affecting sun exposure and higher awareness of their own vitamin D status. Detailed responses to all questionnaire items are presented in Supplementary Table 1.

Behaviors Regarding Vitamin D

The distributions of participants' responses to items aimed at determining their behaviors related to vitamin D are shown in Supplementary Table 1. When evaluating the participants' behaviors related to vitamin D, it was found that 7.8% consumed oily fish at least twice a week, 17.2% took vitamin

D supplements, and 21.1% knew their vitamin D levels in blood test results. It was observed that 64.8% of the participants did not read the nutritional information of foods (food labels). According to the SCSKS, in the group scoring below the average, the percentage of those who did not know their vitamin D levels in blood test results was higher compared to the other group, and this difference was statistically significant ($p<0.05$). Protective behaviors were inconsistent despite moderate knowledge levels.

Table 4. Selected knowledge, attitude, and behavior items according to SCSK score groups

Item	SCSK <17 n (%)	SCSK ≥17 n (%)	p value
The absence of public recreation parks reduces the chance of exposure to sunlight	34 (75.6)	78 (94.0)	**0.011**
I know the level of vitamin D in my blood test results	10 (22.2)	17 (21.1)	**0.047**

Values are presented as n (%). Comparisons were performed using the Chi-square test. The original table including all of the items was presented in Supplement. SCSK: "The Skin Cancer and Sun Knowledge Scale"

Discussion

This study evaluated medical students' knowledge, attitudes, and behaviors regarding vitamin D and examined their relationship with sun and skin cancer knowledge. Overall, students demonstrated a moderate level of knowledge on sun-related risks, yet notable gaps were present in vitamin D knowledge, particularly regarding dietary sources and daily requirements. This finding aligns with previous research indicating that even well-educated groups experience uncertainty about vitamin D intake and sunlight exposure recommendations (19–21).

Several studies conducted in Türkiye have investigated sun exposure awareness and protective behaviors among medical students. Our findings are consistent with Öztekin et al. (2020), who reported that although medical students demonstrate higher awareness than non-medical populations, gaps persist in routine protective behaviors such as sunscreen use (22). Similarly, Altaş et al. identified insufficient sun protection practices despite awareness of risk factors (23), and Karaoglu and Küçük Biçer highlighted inconsistencies between knowledge and behavior among Turkish medical students (16).

According to UÇEP 2020 (24), skin tumors are addressed under the competency domain of early diagnosis and prevention. This framework emphasizes not only diagnostic knowledge but also preventive counseling and risk reduction strategies. However, the present findings suggest that although students demonstrate moderate knowledge and generally positive attitudes, these do not consistently translate into protective behaviors.

From a medical education perspective, this gap between knowledge and behavior is particularly important. Physicians' personal health behaviors may influence the counseling they provide to patients; therefore, strengthening behavioral competencies during undergraduate training is essential. Educational strategies such as case-based learning, preventive medicine modules, and community-based health promotion activities may support the translation of knowledge into practice. Previous studies have demonstrated that targeted educational and knowledge-based interventions can improve skin cancer awareness and promote protective behaviors (25–27). For example, case-based learning focused on sun protection counseling could help students translate theoretical knowledge into clinical practice. Similarly, clinical scenarios discussing the balance between ultraviolet (UV) exposure and vitamin D synthesis may improve students' understanding of the risks and benefits of sun exposure. In addition, incorporating preventive dermatology training during primary care rotations could strengthen students' competencies in providing evidence-based counseling on sun protection and vitamin D–related health behaviors.

In alignment with the UÇEP 2020, which categorizes skin tumors under the competency of 'early diagnosis and prevention,' medical education

should shift from purely theoretical instruction to experiential learning. To bridge the gap between knowledge and behavior, we recommend the following application-based approaches:

Simulation-Based Counseling: Students should engage in standardized patient scenarios focusing on 'preventive lifestyle counseling' for high-risk phenotypes.

Peer Mentorship Models: Utilizing clinical-year students to mentor preclinical students on sun safety and Vitamin D management can reinforce role-model behaviors.

Case-Based Vitamin D Management: Rather than memorizing daily requirements, students should analyze clinical cases involving dietary assessment and personalized supplementation guidelines to enhance practical understanding.

Improving students' understanding during medical education may enhance their personal health behaviors and support more effective patient counseling in their future clinical practice. In this context, educational approaches that move beyond factual knowledge and promote deeper conceptual understanding are particularly important.

The finding that clinical-year students had significantly higher knowledge scores than preclinical students suggests that clinical exposure contributes to improved understanding. In Türkiye, dermatology training is typically delivered during clinical years, which may explain this difference. However, the lower knowledge levels observed among preclinical students indicate that preventive topics such as sun protection and vitamin D awareness should also be introduced earlier in the curriculum. Similar findings have been reported by Altaş et al. (23).

In addition to sun-related knowledge, important gaps were identified in vitamin D–related knowledge. Although most students were aware of the role of vitamin D in bone health, substantial uncertainty remained regarding optimal sun exposure timing and dietary sources. Similar deficiencies have been reported among healthcare providers and patient populations, where limited awareness of vitamin D sources and supplementation needs has been documented (28,29).

While most students recognized the importance of sunlight in vitamin D synthesis, their protective behaviors were inconsistent. This supports previous evidence suggesting that knowledge alone does not reliably predict behavior, particularly among young adults (30,31).

An additional finding was that students with lower SCSK scores were less likely to know their vitamin D levels, suggesting that general health awareness and preventive behaviors may cluster together. This reinforces the importance of integrating preventive medicine topics, including nutrition and UV protection, into medical education.

Overall, these findings highlight a gap between knowledge and behavior and emphasize the need for curriculum development. Strengthening undergraduate medical curricula with integrated, behavior-oriented educational strategies may improve both personal health behaviors and future patient counseling practices.

Limitations

This study has several limitations. First, the sample size is relatively small and the study was conducted at a single institution, which may limit the generalizability of the findings to all medical students in Türkiye. Second, all measures were based on self-reported data and may therefore be subject to reporting bias. Although the study compared preclinical and clinical year students, we did not compare students who had completed dermatology clerkships with those who had not, which may have influenced knowledge and behavioral outcomes. Future multi-center studies with larger cohorts are needed to provide a broader perspective on these educational gaps.

Conclusion

Medical students show important deficiencies in knowledge and behaviors related to skin cancer, sun exposure, and Vitamin D. These findings highlight the need to strengthen undergraduate medical curricula with integrated content on vitamin D intake, sun safety, and skin cancer prevention. The present findings indicate that although medical students demonstrate moderate knowledge and generally positive attitudes, these do not consistently translate into protective behaviors related to sun exposure and vitamin D intake. This gap suggests that current curricular coverage may remain largely knowledge-based, with limited emphasis on behavioral competencies and preventive counseling skills. Integrating experiential and behavior-oriented educational approaches

into the curriculum may better align undergraduate medical education with UÇEP 2020 expectations. Enhancing students' understanding during training may improve their personal health behaviors and support more effective patient counseling in their future clinical practice. These findings also highlight the necessity of strengthening undergraduate medical curricula with targeted educational content to enhance preventive competencies and promote healthier behavioral practices among future physicians.

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