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# Two year change in tobacco use prevalence and associated factors among medical students

## Tıp fakültesine başlayan öğrencilerin iki yıllık süreçte tütün kullanım sıklığı değişimi ve etkileyen faktörler

Büşra YETİŞ[1]
Türkan GÜNAY[1]

[1] Department of Public Health, Faculty of Medicine, Dokuz Eylül University, İzmir, Türkiye

**Tobacco Use Trends in Medical Students**
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Corresponding author
**Büşra YETİŞ**
**ORCID ID: 0009-0003-8091-7547**
busra94334@gmail.com

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**ABSTRACT**

**BACKGROUND**

Tobacco use remains a major public health concern worldwide, including among medical students who will serve as future health professionals. This study aimed to examine the two-year change in tobacco use prevalence among medical students and to identify factors associated with smoking in the third year.

**METHODS**

A cross-sectional study was conducted among first-year medical students in 2022 and the same cohort in their third year in 2024 in a single medical faculty. Data were collected using a structured questionnaire. Descriptive statistics, chi-square tests, t-tests, and logistic regression analyses were applied.

**RESULTS**

The prevalence of tobacco use increased from 29.8% in the first year to 33.9% in the third year. Cigarette smoking prevalence rose from 24.8% to 29.5%. Male sex, working to cover expenses, exposure to peer pressure, and having close friends who smoked were significantly associated with smoking. Students whose closest friends mostly smoked were more than six times more likely to smoke themselves. A considerable proportion of tobacco users reported an intention to quit.

**CONCLUSION**

Tobacco use increased during the course of medical education and was strongly influenced by peer factors. Targeted tobacco control interventions and tobacco-free campus policies may help to reduce tobacco use among medical students.

**KEYWORDS**

Medical students, peer influence, smoking, tobacco

**ÖZ**

**AMAÇ**

Tütün kullanımı, geleceğin sağlık profesyonelleri olacak tıp öğrencileri dahil olmak üzere dünya genelinde önemli bir halk sağlığı sorunu olmaya devam etmektedir. Bu çalışma, tıp öğrencileri arasında tütün kullanım prevalansındaki iki yıllık değişimi incelemeyi ve üçüncü sınıfta sigara kullanımı ile ilişkili faktörleri belirlemeyi amaçlamıştır.

**GEREÇ YÖNTEM**

2022 yılında bir tıp fakültesinde birinci sınıf öğrencileri ve 2024 yılında aynı kohortun üçüncü sınıf öğrencileri arasında kesitsel bir çalışma yürütülmüştür. Veriler yapılandırılmış bir anket aracılığıyla toplanmıştır. Tanımlayıcı istatistikler, ki-kare testleri, t-testleri ve lojistik regresyon analizleri uygulanmıştır.

**BULGULAR**

Tütün kullanım prevalansı birinci sınıfta %29,8 iken üçüncü sınıfta %33,9'a yükselmiştir. Sigara içme prevalansı %24,8'den %29,5'e artmıştır. Erkek cinsiyet, giderleri karşılamak için çalışma, akran baskısına maruz kalma ve yakın arkadaşların sigara içmesi sigara kullanımı ile anlamlı olarak ilişkili bulunmuştur. En yakın arkadaşlarının çoğu sigara içen öğrencilerin sigara içme olasılığı altı katından fazladır. Tütün kullanıcılarının önemli bir kısmı bırakma niyeti bildirmiştir.

**SONUÇ**

Tütün kullanımı tıp eğitimi süresince artmış ve güçlü biçimde akran faktörlerinden etkilenmiştir. Hedefe yönelik tütün kontrol müdahaleleri ve dumansız kampüs politikaları, tıp öğrencileri arasında tütün kullanımının azaltılmasına yardımcı olabilir.

**ANAHTAR KELİMELER**

Akran etkisi, sigara, tıp öğrencileri, tütün

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Tobacco products are created using tobacco leaf as a raw material, either fully or partially. These products come in various forms, including cigarettes, waterpipes (hookah), e-cigarettes, roll-your-own tobacco, pipes, cigars, and Maraş powder. The consumption of tobacco in various forms poses a significant threat to public health, making tobacco control a global health priority (1). Globally, approximately one in three adults uses tobacco (2). Broken down by sex, one in three men and one in ten women are tobacco users (2). Tobacco products are responsible for more than 8 million deaths each year; over 7 million of these deaths are directly attributable to tobacco use, while approximately 1.3 million people die from exposure to secondhand smoke despite not being smokers themselves (3). Most adult cigarette users began smoking in their teenage years, with 88% smoking their first cigarettes before the age of 18 (4). Tobacco use ranks as the second leading risk factor for mortality worldwide, following hypertension (5). In 2022, the prevalence of daily tobacco use among all individuals aged 15 years and older in Türkiye was 28.3% (6). Among young people aged 15–25 in Türkiye in the same year, the prevalence of tobacco use was 19.3%. The main reasons for starting tobacco use were peer influence (31.3%), curiosity (23.8%), and emulation (23.2%) (6). The use of addictive substances such as nicotine, alcohol, and caffeine is widespread among young adults, especially university students (7). Factors contributing to the use of these substances include separation from family, which can lead to stress, as well as the desire for acceptance in new social settings, peer encouragement, imitation or curiosity, and concerns or fears about the future (8).

The prevalence of smoking among medical students is comparable to that of the general population. Recent studies highlight this trend, showing a smoking prevalence of 6.8% among 4438 students from 17 medical faculties in Canada (9). In contrast, a survey conducted during the 2018–2019 academic year with 1304 medical students in Northern Cyprus revealed a significantly higher prevalence of 33.7% (10). Similar studies conducted in Türkiye reveal diverse smoking rates among medical students. A 2018 survey of first-, second-, third-, and sixth-year medical students at Ege University reported an overall smoking prevalence of 18.1% (11). In a study conducted during the 2018–2019 academic year among medical students at Kahramanmaraş Sütçü İmam University, the prevalence of tobacco use was 22.9% and the smoking rate was 17.1% (12). At Balıkesir University, a study involving first-, second-, and third-year medical students reported a smoking prevalence of 13.8% (13). Another study conducted in 2019 in the Eskişehir Osmangazi University Faculty of Medicine found that 28.3% of 1002 medical students smoked (14). Finally, a survey conducted in 2022 among first- and fifth-year students in the Dokuz Eylül University Faculty of Medicine indicated a smoking prevalence of 28% (15). A review of the literature shows that smoking is prevalent in medical faculties and is influenced by multiple factors. This study aims to examine changes in smoking behavior among Dokuz Eylül University Faculty of Medicine students from the first to the third year and to investigate the factors affecting smoking in the third year.

## Materials and Methods

This study was planned as a prospective cohort study, and its population consisted of 453 first-year students enrolled in the Dokuz Eylül University Faculty of Medicine between November 2022 and December 2022. Data were collected again from the same student group between November 2024 and December 2024, when they had reached their third year of enrollment (n = 352). To increase the students' honest responses and the participation rate, names were not collected from the students. Students were asked to choose a pseudonym for themselves; however, during the second data collection process, it was observed that they did not remember those pseudonyms and matching could not be performed. Since the research data could not be matched, cross-sectional analysis was performed. Instead of selecting a sample, it was aimed to reach the entire population in both years. The response rate was 72% (326 students) in the first year and 84% (295 students) in the third year.

The dependent variable of the study was the prevalence of tobacco use. Tobacco use status was categorized into four groups: "Daily users," "Occasional users," "Former users," and "Never users" (16). "Daily users" and "Occasional users" were considered as current tobacco users, whereas "Former users" and "Never users" were classified as non-users. The independent variables included students' age, sex, place of residence during their medical education, family income status, parental education level, perceptions of body

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image, perceptions of health, exercise habits, participation in any faculty club activities, peer pressure to use tobacco products, communication with family and friends, tobacco use among family members and peer groups, knowledge about the harms of tobacco products, having ever used any tobacco product and age at first use, exposure to tobacco smoke, age of initiation of tobacco use, amount of tobacco consumption, level of nicotine dependence, and changes in thoughts and methods regarding quitting tobacco use.

Among smokers, nicotine dependence was assessed using the Fagerström Test for Nicotine Dependence (FTND), the Turkish validity and reliability of which were established by Uysal et al. (17). Intention to quit tobacco use was measured using questions addressing stages of change.

Data were collected using a 51-item questionnaire prepared with Google Forms. The first section of the questionnaire comprised 30 questions addressing sociodemographic characteristics, body and health perceptions, engagement in arts and sports, communication with family and friends, and tobacco use. The second section included 7 questions addressing characteristics of tobacco use. The third section consisted of 8 questions including the FTND and items assessing the reasons for tobacco use. The final section comprised 6 questions evaluating the stages of change in thoughts regarding tobacco use.

Data were analyzed using IBM SPSS Statistics 29.0. For data analysis, means and standard deviations were calculated. Chi-square tests and independent-samples t-tests were used in univariate analyses, and logistic regression was performed for multivariate analyses.

Ethical approval for the first phase of the study was granted by the Dokuz Eylül University Non-Interventional Clinical Research Ethics Committee on 2 November 2022 (No: 2022/35-10), and subsequent approval for the second phase was obtained from the same committee on 20 November 2024 (No: 2024/39-16).

## Results

The mean age of the students participating in the study was 18.8 years at the time of the first data collection (first-year students) and 21 years at the time of the second data collection (third-year students). While 54.6% of the participating students were male in the first year, 47% were male in the third year. Most students were single, the majority had families living in urban areas, and most came from nuclear families. The percentage of students simultaneously working to cover their expenses increased from 2.8% in the first year to 8.1% in the third year. The percentage of students receiving scholarships increased from 25% in the first year to 54.5% in the third year. While most students perceived their bodies as normal, they perceived their health statuses as moderate or poor. The percentage of students who exercised regularly increased from 42% in the first year to 48% in the third year. Most students reported good communication with their friends and families. In the third year, 58% of students reported having tried a tobacco product at some point in their lives, and half of them had begun tobacco use before entering medical school. Eight percent of students in the first year and 15% in the third year reported being exposed to peer pressure to use tobacco. The sociodemographic characteristics of the students are presented in Table 1.

Students' prevalence of tobacco product use was 29.8% in the first year and 33.9% in the third year; specifically, the prevalence of cigarette use was 24.8% and 29%, the prevalence of waterpipe use was 14.1% and 13%, the prevalence of e-cigarette use was 5.5% and 5.8%, and the prevalence of use of other tobacco products, such as pipes and cigars, was 7.7% and 8%, respectively. The mean FTND score was 2.72 ± 0.36 in the first year and 3.79 ± 0.44 in the third year (Table 2).

Among students who used tobacco products, 83% had received information about quitting tobacco products in the third year and 71% were considering quitting. More specifically, 55% of students were considering quitting tobacco use within the next 6 months and 40% were considering quitting within the next 1 month. Forty-four percent of the students had previously attempted to quit using tobacco (Table 3).

In the third year, 36% of male students and 23% of female students were smoking. Cigarette use was statistically significantly higher among male students compared to female students ($p = 0.015$). When examined according to the place of residence of the students' families, the prevalence of tobacco use in the third year was 30.3% among those whose families lived in urban areas and 20.8% among those whose families

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lived in rural areas; however, this difference was not statistically significant (p = 0.235). In the third year, 62.5% of students who were working to cover their expenses were smoking compared to 26.6% of those who were not working. Thus, the prevalence of cigarette smoking was statistically significantly higher among students who were working to cover their expenses compared to those who were not (p < 0.001). In the third year, students who were exposed to peer pressure to use tobacco (52%) had a significantly higher prevalence of cigarette smoking compared to those who were not exposed to peer pressure (25%) (p < 0.001). Students whose communication with their families was rated as moderate or poor (29.5%) had a higher prevalence of cigarette smoking compared to those whose communication was rated as good (24.9%) (p = 0.001). Similarly, students whose communication with their friends was rated as moderate or poor (40%) had a higher prevalence of cigarette smoking compared to those whose communication was rated as good (26.5%) (p = 0.036). The prevalence of cigarette smoking increased significantly as the proportion of closest friends who smoked increased from "none" to "all" (p < 0.001). The prevalence of cigarette smoking in the third year increased significantly as exposure to tobacco smoke increased from "never exposed" to "always exposed" (p < 0.001). Among students who believed that physicians do not need to set an example to society by refraining from tobacco use, 49.2% were smokers compared to 24.4% among those who believed that physicians should set an example, and this difference was statistically significant (p < 0.001). The prevalence of cigarette smoking was significantly higher among students who had ever tried any tobacco product, including even a single puff (48.8%), compared to those who had never previously tried a tobacco product (3.3%) (p < 0.001) (Table 4).

**Table 1.** Sociodemographic characteristics of first-year and third-year medical students.

| Sociodemographic characteristics | | First year (n = 326) | | Third year (n = 295) | |
|---|---|---|---|---|---|
| | | n | Mean ± SD | n | Mean ± SD |
| **Age, years** | | 326 | 18.8 ± 0.1 | 292 | 21.0 ± 2.2 |
| | | n | % | n | % |
| **Sex** | | | | | |
| | Male | 178 | 54.6 | 139 | 47.1 |
| | Female | 148 | 46.4 | 156 | 52.9 |
| **Marital status** | | | | | |
| | Single | 323 | 99.1 | 290 | 98.3 |
| | Married | 1 | 0.3 | 4 | 1.4 |
| | Divorced | 2 | 0.6 | 1 | 0.3 |
| **Place of residence of the family** | | | | | |
| | Urban | 288 | 88.3 | 271 | 91.9 |
| | Rural | 38 | 11.7 | 24 | 8.1 |
| **Family type** | | | | n = 294 | |
| | Nuclear family (mother, father, siblings) | 288 | 88.3 | 272 | 92.2 |

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| | | | | |
|---|---|---|---|---|
| Parents separated | 11 | 3.4 | 7 | 2.4 |
| Extended family (mother, father, siblings, grandmother/grandfather, or relatives) | 22 | 6.7 | 14 | 4.7 |
| Other | 5 | 1.5 | 1 | 0.3 |
| **Family income level** | | | | |
| Income less than expenses | 39 | 12.0 | 27 | 9.2 |
| Income equal to expenses | 188 | 57.7 | 179 | 60.7 |
| Income greater than expenses | 99 | 30.4 | 89 | 30.2 |
| **Working to cover expenses** | | | | |
| Yes | 9 | 2.8 | 24 | 8.1 |
| No | 317 | 97.2 | 271 | 91.8 |
| **Receiving a scholarship** | | | | |
| Yes | 83 | 25.5 | 162 | 54.9 |
| No | 243 | 75.5 | 133 | 45.1 |
| **Body image perception** | | | | |
| Underweight | 44 | 13.5 | 24 | 8.1 |
| Normal | 219 | 67.2 | 213 | 72.2 |
| Overweight | 62 | 19.0 | 51 | 17.3 |
| Obese | 1 | 0.3 | 7 | 2.4 |
| **Self-perceived health in the last 30 days** | | | **n = 294** | |
| Very good | 20 | 6.1 | 25 | 8.5 |
| Good | 119 | 36.5 | 108 | 36.6 |
| Moderate | 138 | 42.3 | 120 | 40.7 |
| Poor | 44 | 13.5 | 33 | 11.2 |
| Very poor | 5 | 1.5 | 9 | 3.1 |
| **Regular exercise (e.g., football, basketball, fitness)** | | | | |
| Yes | 139 | 42.6 | 114 | 48.8 |
| No | 187 | 57.4 | 151 | 51.2 |
| **Cigarette use status** | | | **n = 294** | |

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| | | | | |
|---|---|---|---|---|
| Never smoked | 228 | 69.9 | 182 | 61.7 |
| Used to smoke but quit | 17 | 5.2 | 26 | 8.8 |
| Smokes occasionally | 44 | 13.5 | 46 | 15.6 |
| Smokes at least 1 cigarette per day regularly | 37 | 11.3 | 41 | 13.9 |
| **Waterpipe (hookah) use status** | | | | |
| Never used | 223 | 68.4 | 176 | 59.5 |
| Tried once | 47 | 14.4 | 73 | 24.7 |
| Used to use but quit | 10 | 3.1 | 7 | 2.4 |
| Uses occasionally | 46 | 14.1 | 39 | 13.2 |
| Uses at least 1 time per day regularly | 0 | 0.0 | 0 | 0.0 |
| **E-cigarette use status** | | | | |
| Never used | 260 | 79.8 | 195 | 66.1 |
| Tried once | 44 | 13.5 | 63 | 21.4 |
| Used to use but quit | 4 | 1.2 | 20 | 6.8 |
| Uses occasionally | 16 | 4.9 | 16 | 5.4 |
| Uses at least 1 time per day regularly | 2 | 0.6 | 1 | 0.3 |
| **Other tobacco products (pipe, cigar, cigarillo) use status** | | | | |
| Never used | 259 | 79.4 | 214 | 72.5 |
| Tried once | 40 | 12.3 | 50 | 16.9 |
| Used to use but quit | 2 | 0.6 | 7 | 2.4 |
| Uses occasionally | 25 | 7.7 | 24 | 8.1 |
| Uses at least 1 time per day regularly | 0 | 0 | 0 | 0 |
| **Have you been exposed to peer pressure from friends to use tobacco products?** | | | | |
| Yes | 27 | 8.3 | 46 | 15.6 |
| No | 299 | 91.7 | 248 | 84.1 |
| **How do you evaluate your communication with your family?** | | | | |
| Good | 250 | 76.7 | 229 | 77.6 |
| Moderate–poor | 76 | 23.3 | 66 | 22.4 |

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| | | | | | |
|---|---|---|---|---|---|
| **How do you evaluate your communication with your friends?** | | | | **n = 293** | |
| Good | 243 | 74.5 | 223 | | 75.6 |
| Moderate–poor | 83 | 25.5 | 70 | | 23.7 |
| **Tobacco use among closest friends** | | | | **n = 294** | |
| None smoke / very few smoke | 213 | 65.4 | 153 | | 51.9 |
| About half smoke | 53 | 16.3 | 80 | | 27.1 |
| Most smoke / all smoke | 60 | 18.4 | 61 | | 20.7 |
| **Have you previously received information about the harms of tobacco products?** | | | | **n = 294** | |
| Yes | 317 | 97.2 | 280 | | 94.9 |
| No | 9 | 2.8 | 15 | | 5.1 |
| **Exposure to tobacco smoke** | | | | **n = 294** | |
| Never / very rarely | 75 | 23.0 | 47 | | 15.9 |
| Sometimes | 147 | 45.1 | 125 | | 42.4 |
| Often | 78 | 23.9 | 78 | | 26.4 |
| Always | 26 | 8.0 | 44 | | 14.9 |
| **Do you think physicians should set an example to society by not using tobacco products?** | | | | | |
| Yes | 233 | 71.5 | 234 | | 79.3 |
| No | 93 | 28.5 | 61 | | 20.7 |
| **Have you ever tried a tobacco product, even a single puff, at any time in your life?** | | | | **n = 293** | |
| Yes | 160 | 49.1 | 173 | | 58.6 |
| No | 166 | 50.9 | 120 | | 40.7 |
| **Initiation of regular tobacco use** | | **n = 61** | | **n = 54** | |
| Before medical school | 47 | 77.0 | 25 | | 55.5 |
| During medical school | 14 | 23.0 | 29 | | 54.5 |

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**Table 2.** Tobacco product use status of first-year and third-year students.

| Tobacco product use status | First year (n = 326) | First year | Third year (n = 295) | Third year |
|---|---|---|---|---|
| | n | % | n | % |
| **Overall tobacco product use** | | | | |
| Current user | 97 | 29.8 | 100 | 33.9 |
| Non-user | 229 | 70.2 | 195 | 66.1 |
| **Cigarette use** | | | | |
| Current user | 81 | 24.8 | 87 | 29.5 |
| Non-user | 245 | 75.2 | 208 | 70.5 |
| **E-cigarette use** | | | | |
| Current user | 18 | 5.5 | 17 | 5.8 |
| Non-user | 308 | 94.5 | 278 | 94.2 |
| **Waterpipe (hookah) use** | | | | |
| Current user | 46 | 14.1 | 39 | 13.2 |
| Non-user | 280 | 85.9 | 256 | 86.8 |
| **Other tobacco products (pipe, cigar, etc.)** | | | | |
| Current user | 25 | 7.7 | 24 | 8.1 |
| Non-user | 301 | 92.3 | 271 | 91.9 |
| | **n** | **Mean ± SD** | **n** | **Mean ± SD** |
| **Fagerström scale mean score** | 47 | 2.72 ± 0.36 | 43 | 3.79 ± 0.44 |

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**Table 3.** Intentions to quit using tobacco among third-year students who use tobacco products (n = 43).

| | | n | % |
|---|---|---|---|
| **Received information about tobacco cessation methods** | | **n = 55** | |
| | Yes | 46 | 83.6 |
| | No | 9 | 16.4 |
| **Previously considered quitting smoking** | | **n = 45** | |
| | Yes | 32 | 71.1 |
| | No | 13 | 28.9 |
| **Seriously considering quitting smoking within the next 6 months** | | **n = 45** | |
| | Yes | 25 | 55 |
| | No | 20 | 45 |
| **Seriously considering quitting smoking within the next 1 month** | | **n = 45** | |
| | Yes | 18 | 40 |
| | No | 27 | 60 |
| **Attempted to quit smoking within the last 6 months** | | **n = 45** | |
| | Yes | 20 | 44.4 |
| | No | 25 | 55.6 |

**Table 4.** Smoking status of third-year students and associated factors.

| **Variable** | | **Smoking status of the student** | | | |
|---|---|---|---|---|---|
| | | **Smokes** | **Does not smoke** | **Total** | **p-value** |
| **Sex** | | | | | |
| | Male | 51 (36.7%) | 88 (63.3%) | 139 (100%) | p = 0.015 |
| | Female | 36 (23.1%) | 120 (76.9%) | 156 (100%) | |

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| | | | | |
|---|---|---|---|---|
| **Place of family residence** | | | | |
| | Urban | 82 (30.3%) | 189 (69.7%) | 271 (100%) | p = 0.235 |
| | Rural | 5 (20.8%) | 19 (79.2%) | 24 (100%) | |
| **Working to cover expenses** | | | | |
| | Yes | 15 (62.5%) | 9 (37.5%) | 24 (100%) | p < 0.001 |
| | No | 72 (26.6%) | 199 (73.4%) | 271 (100%) | |
| **Regular exercise (e.g., football, basketball, fitness)** | | | | |
| | Yes | 50 (34.7%) | 94 (65.3%) | 144 (100.0%) | p = 0.057 |
| | No | 37 (24.5%) | 114 (75.5%) | 151 (100.0%) | |
| **Exposure to peer pressure to use tobacco** | | | | |
| | Yes | 24 (52.2%) | 22 (47.8%) | 46 (100%) | p < 0.001 |
| | No | 62 (25%) | 186 (75%) | 248 (100%) | |
| **Communication with family** | | | | |
| | Good | 57 (24.9%) | 172 (75.1%) | 229 (100%) | p = 0.001 |
| | Moderate–poor | 30 (29.5%) | 36 (70.5%) | 66 (100%) | |
| **Communication with friends** | | | | |
| | Good | 59 (26.5%) | 164 (73.5%) | 223 (100%) | p = 0.036 |
| | Moderate–poor | 28 (40%) | 42 (60%) | 70 (100%) | |
| **Tobacco use among closest friends** | | | | |
| | None / very few smoke | 17 (11%) | 136 (88.9%) | 153 (100%) | p < 0.001 |
| | Half / most / all smoke | 70 (49.6%) | 71 (50.4%) | 141 (100%) | |
| **Exposure to tobacco smoke** | | | | |
| | Never / very rarely | 6 (12.8%) | 41 (87.2%) | 47 (100%) | p < 0.001 |

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| | | | | |
|---|---|---|---|---|
| Sometimes / often / always | 81 (32.7%) | 166 (67.2%) | 247 (100%) | |
| **Believes that physicians should set an example by not using tobacco** | | | | |
| Yes | 57 (24.4%) | 177 (75.6%) | 234 (100%) | p < 0.001 |
| No | 30 (49.2%) | 31 (50.8%) | 61 (100%) | |
| **Ever tried a tobacco product (even a single puff)** | | | | |
| Yes | 83 (48%) | 90 (52%) | 173 (100%) | p < 0.001 |
| No | 4 (3.3%) | 116 (96.7%) | 120 (100%) | |

According to the logistic regression analysis, third-year students who were working to cover their expenses were 4.77 times more likely to smoke than those who were not working (95% confidence interval: 1.67–13.60). Students who were exposed to peer pressure were 2.5 times more likely to smoke compared to those who were not exposed (95% confidence interval: 1.17–5.44). Not believing that physicians should set an example to society increased the likelihood of smoking by 2.09 times compared to those who believed that physicians should set an example (95% confidence interval: 1.06–4.11). Students whose closest friends mostly smoked were 6.12 times more likely to smoke compared to those whose closest friends did not smoke (95% confidence interval: 2.99–12.50) (Table 5).

## Discussion

The results of this study reveal that the prevalence of tobacco product use increased as students progressed through the years of medical education. While the prevalence of tobacco product use was 29.8% in the first year, it had increased to 33.9% in the third year. Similarly, the prevalence of cigarette smoking also increased; it was 24.8% in the first year and rose to 29.5% in the third year. A study conducted among medical students at Balıkesir University also reported that the prevalence of cigarette smoking increased from the first year to the third year (13). In a study conducted in the Düzce University Faculty of Medicine, the prevalence of tobacco use was reported as 28.7%, while a study conducted at Gazi University found a smoking prevalence of 28.3% (18,19). In a study conducted among university students in Bosnia and Herzegovina, the prevalence of tobacco use was reported as 27% for first-year students, 38.5% for second-year students, 37.3% for third-year students, 31.3% for fourth-year students, and 31.6% for students in the fifth year and beyond (20). In a study conducted among multinational medical students in Hungary, the prevalence of cigarette smoking was found to be 21.5% among Hungarian students, 34.2% among German students, 13.0% among Norwegian students, and 29.5% among students from other countries (21).

Seventy percent of the students who used tobacco products in the present study reported having an intention to quit. In a similar study conducted in Düzce, 47% of smokers were considering quitting smoking (18). In a study conducted in the Bülent Ecevit University Faculty of Medicine, 51.9% of students reported considering quitting smoking (22). Although the majority of students who smoked were generally considering quitting, the proportion observed in the present study was higher compared to previous rates in the literature.

In our study, male students were found to smoke more frequently than female students. Consistent with our findings, studies conducted among medical students in Balıkesir, Düzce, Kayseri (Erciyes University), and Denizli (Pamukkale University) reported a higher prevalence of cigarette smoking among male students. Globally, tobacco use is more prevalent among men (3,13,18,23).

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**Table 5.** Factors affecting smoking among third-year students: logistic regression analysis.

| Variables factors (Reference group) | Affecting | Odds ratio | 95% confidence interval |
|---|---|---|---|
| **Sex** (Female) | Male | 0.86 | 0.45–1.63 |
| **Working to cover expenses** (No) | Yes | **4.77*** | 1.67–13.60 |
| **Communication with family** poor (Good) | Moderate– | 1.73 | 0.85–3.52 |
| **Communication with friends** poor (Good) | Moderate– | 1.13 | 0.55–2.33 |
| **Exposure to peer pressure** (No) | Yes | **2.5*** | 1.17–5.44 |
| **Exposure to tobacco smoke** exposure (No exposure) | Frequent | 1.71 | 0.56–5.18 |
| **Believes that physicians should set an example** No (Yes) | | **2.09*** | 1.06–4.11 |
| **Smoking status of closest friends** smoke (None smoke) | Most | **6.12**** | 2.99–12.50 |

*; $p < 0.05$, **; $p < 0.001$.

Students who worked to cover their expenses had a higher prevalence of cigarette smoking than those who did not work, being 4.8 times more likely to smoke. This finding suggests that socioeconomic disadvantage is an important factor associated with tobacco use among medical students. Financial difficulties may increase stress and anxiety levels, leading students to use tobacco products as a way of coping with these problems. Accordingly, low income levels, an important social determinant of health, may lead individuals to engage in risky behaviors such as tobacco use.

Exposure to peer pressure to use tobacco and having close friends who used tobacco products were also found to increase the prevalence of cigarette smoking. Students who were exposed to peer pressure were 2.5 times more likely to use tobacco products, while students whose closest friends mostly smoked were 6 times more likely to use tobacco products. Tobacco use by peers and insistence on tobacco use constitute important risk factors for trying tobacco products and developing tobacco dependence. Promoting tobacco-free campuses and peer education programs may be effective in reducing the risk. In a study conducted in Düzce, the rate of smoking initiation due to peer influence among fifth-year students was reported as 47.9% (18).

Among students who had tried any tobacco product at any time in their lives, the prevalence of cigarette smoking was 48%, whereas this prevalence was 3% among those who had never previously tried a tobacco product. In a study conducted in Bosnia and Herzegovina with 1200 university students from 16 faculties, 75% of the students reported having tried a tobacco product at least once (20). Trying a tobacco product increases the likelihood of becoming a tobacco user.

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In this study, the proportion of students who had tried e-cigarettes at least once increased from 13.5% to 21.4% from the first to third year, while the proportion of former users increased from 1.2% to 6.8%. Although the sale of e-cigarettes is prohibited in Türkiye, the increase in experimentation and use among students may suggest that access to these products has become easier. For waterpipe use, the proportion of current users remained similar between the first and third years (14.1% and 13.2%). However, the proportion of students who had never tried waterpipes decreased, while the proportion of those who had tried once increased. A similar pattern was observed for other tobacco products (pipe, cigar, cigarillo, etc.). The proportion of never-users decreased, whereas rates of experimentation and quitting increased. These findings suggest that during the course of medical education, students are exposed not only to cigarettes but also to alternative tobacco and nicotine products, and their tendency to experiment with these products increases over time. Misconceptions that e-cigarettes and waterpipes are less harmful than conventional cigarettes may encourage experimentation among young people. Although no clear increase was observed in current use, the increase in experimentation may create a risk for future regular use. Therefore, medical school curricula should include educational content that increases awareness of the health effects of e-cigarettes, waterpipes, and other alternative tobacco products in addition to conventional cigarette smoking.

Medical students will become members of a professional group responsible for conveying accurate messages to society regarding health promotion. In this study, students who did not believe that physicians should serve as role models for society were twice as likely to use tobacco products compared to those who believed that physicians should set an example. The belief that physicians should act as role models and do what is right may protect students from tobacco use.

## Conclusion

In this study, it was found that the prevalence of tobacco product use increased as medical students progressed through the academic years despite the inclusion of training on tobacco products and their harms through various educational activities within the curriculum of the first, second, and third years of medical school. To prevent the increase of tobacco use among medical students, adding "Tobacco Control Leadership" to the curriculum could help students move from merely learning facts to practicing active advocacy.

Given the increasing rate of experimentation with e-cigarettes, waterpipes, and other tobacco products, it is important to address misconceptions that these products are less harmful than conventional cigarettes.

Considering the association between socioeconomic disadvantage and tobacco use, interventions aimed at improving students' economic conditions and strengthening social support mechanisms, including the provision of scholarships, may contribute to reducing tobacco use among medical students.

The peer environment emerged in this study as an important determinant for both the initiation and continuation of tobacco use. Therefore, tobacco control programs targeting medical students should adopt approaches based on peer support. Furthermore, tobacco-free campuses that offer environments in which students are less likely to encounter tobacco products or be exposed to secondhand smoke should be promoted.

The frequent monitoring of faculty canteens and cafeterias, where students spend substantial amounts of time, and the enforcement of strict bans on smoking in these areas may deter students who smoke and help protect non-smoking students from passive exposure. Implementing strict supervision across all campus areas and imposing penalties for those who smoke near buildings or in enclosed spaces may also constitute deterrent measures.

By selecting specific peer groups, raising their awareness through peer education, and encouraging them to frequently discuss the harms of tobacco products within their social circles and inform their peers about available cessation support services, a healthier, tobacco-free peer environment may be fostered. Organizing awareness activities on key dates such as World No Tobacco Day on May 31, including setting up information stands and distributing brochures and posters, may increase students' awareness of the harms of smoking.

Policies should be developed not only to combat tobacco use but also to support and encourage students who do not use tobacco to remain tobacco-free. As many students

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are considering quitting tobacco use and have attempted to do so, more accessible support services should be provided, and counseling programs should be initiated within faculties to assist students in such cessation efforts.

## Limitations

The data of this study could not be matched at the individual level; therefore, changes in students' tobacco use behaviors over time could not be evaluated individually and the data were analyzed as two independent groups.

Although the findings of this study reveal important trends regarding tobacco use among medical students, the fact that the study was conducted at a single university limits the generalizability of the results to all medical students. As the data were collected on a voluntary basis, students with different tobacco use behaviors may have had varying likelihoods of participating in the study, potentially leading to selection bias.

In addition, since the data were based on self-reports, participants may have tended to provide socially desirable responses, potentially resulting in underreporting of tobacco use prevalence. Furthermore, some students did not respond to certain questionnaire items, which may have caused partial data loss in the analyses or a reduction in the number of variables included.

Although training on tobacco control and the health effects of tobacco and nicotine products is included in the medical school curriculum and is mandatory for all students, individual-level exposure to these educational activities was not assessed in the present study; therefore, their potential impact on tobacco use behaviors could not be evaluated.

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