



Interaction between clinical medical students and the pharmaceutical industry: A crosssectional study

Klinik tıp öğrencileri ve ilaç endüstrisi arasındaki etkileşim: Kesitsel bir çalışma

● Ayşe Nilüfer Özaydın¹ ● Berk Bozdoğan² ● Anıl Çifter³
● Nergis Kıcı⁴ ● Senem Aslan⁵ ● Batuhan Erdir⁶

- ¹⁾ Marmara University, School of Medicine, Department of Public Health, Prof. MD, Istanbul / {ORCID: 0000-0002-2616-0710}
²⁾ Marmara University, School of Medicine, Medical Student, Istanbul / {ORCID: 0000-0001-6974-9333}
³⁾ Marmara University, School of Medicine, Medical Student, Istanbul / {ORCID: 0000-0001-8016-7342}
⁴⁾ Marmara University, School of Medicine, Medical Student, Istanbul / {ORCID: 0000-0002-4498-1491}
⁵⁾ Marmara University, School of Medicine, Medical Student, Istanbul / {ORCID: 0000-0002-5340-9112}
⁶⁾ Marmara University, School of Medicine, Medical Student, Istanbul / {ORCID: 0000-0002-8384-5249}

İletişim adresi:

Dr. Ayşe Nilüfer Özaydın

E-mail: nozaydin@gmail.com

Geliş tarihi: 18/07/2024

Kabul tarihi: 28/11/2024

Yayın tarihi: 30/12/2024

Ethics Committee Approval: The ethics permission has been duly received from the Ethics Committee for Clinical Studies Board of Marmara University (Protocol number: 09.2020.1066, date: 02.10.2020). The authors declare that there is no conflict of interests.

Alıntı Kodu: Nilüfer Özaydın A. ve Ark. Interaction between clinical medical students and the pharmaceutical industry: a crosssectional study. Jour Turk Fam Phy 2024; 15 (4): 133-145. Doi: 10.15511/tjfp.24.00433.

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Özet

Amaç: Bu çalışmanın amacı, klinik tıp öğrencileri ile ilaç endüstrisi arasındaki etkileşimi ve ilişkiyi araştırmaktır.

Yöntem: Kesitsel tipteki bu çalışma, Marmara Üniversitesi Tıp Fakültesinde öğrenim gören 5. ve 6. sınıf öğrencileriyle (2020-2021) yapılmıştır. Veriler çevrimiçi bir anket kullanılarak toplanmıştır. Her öğrenci için “Kuşkuculuk puanları” [0 (kuşkucu değil) - 1 (kuşkucu)] ve “uygunluk puanları” [0 (promosyonlar uygundur) - 1 (uygun değildir)] hesaplanmıştır.

Bulgular: Araştırmaya katılan 106 öğrencinin %91,5’i en az bir kez ilaç firması temsilcisi ile karşılaşırken, %55,6’sının ilk karşılaşmaları klinik öncesi dönemde olmuştur. En çok kabul edilen hediyeler eğitici olmayan hediyeler (%35,8) ve tanıtım broşürleridir (%34,0). Öğrencilerin ortanca kuşkuculuk puanı 0,5 ve ortalama uygunluk puanı 0,35±0,23’tür. Kadınların uygunluk puanları (0,39±0,21) erkeklerden (0,28±0,23) daha yüksek bulunmuştur. Katılımcıların %22’si hediye/sponsorlukların kendi reçete yazma kararlarını etkileyebileceğini belirtirken, %34’ü arkadaşlarının/meslektaşlarının kararlarının etkileneceğine inandığını beyan etmiştir.

Tartışma ve Sonuç: İlaç firmaları ile sıklıkla etkileşime giren klinik dönem tıp öğrencileri, firmaların pazarlama stratejilerine karşı kendi duyarlılıkları konusunda sınırlı bir farkındalığa sahiptir. Bu durum, geleceğin hekimlerini reçete yazma sırasında firmaların tanıtımlarından etkilenme olasılığını artırmaktadır. Bu nedenle, tıp öğrencilerinin duyarlılıklarını değerlendirmek amacıyla ulusal çapta çalışmalar yapılarak öğrencilerin durumları ve tıp öğrencileri ile ilaç endüstrisi ilişkisine yönelik ulusal ve uluslararası politikalar geliştirilmesi gerekliliği değerlendirilmelidir. Ayrıca tıp fakülteleri, farmasötik pazarlama stratejileri ve akılcı reçete yazmanın önemi konusunda farkındalığı artırmaya yönelik müdahalelerin uygulanmasında kritik bir rol oynamaktadır.

Anahtar kelimeler: İlaç endüstrisi, tıp öğrencileri, çıkar çatışması, promosyon

Summary

Aim: The aim of this study was to investigate the interaction and relationship between clinical medical students and the pharmaceutical industry.

Method: This cross-sectional study was conducted with 5th- and 6th-grade students studying at Marmara University Faculty of Medicine (2020-2021). The data were collected using an online questionnaire. “Scepticism scores” [0(not sceptical) - 1(sceptical)] and “appropriateness scores” [0(promotions are appropriate) - 1(inappropriate)] were calculated for each student.

Results: Of the 106 students, 91.5% of them encountered a pharmaceutical representative at least once, while 55.6% had their first encounter in the pre-clinical phase. The most commonly accepted gifts were non-educational gifts (35.8%) and promotional brochures (34.0%). Students’ median scepticism score was 0.5 and the mean appropriateness score was 0.35±0.23. Appropriateness scores of females (0.39±0.21) were found higher than male students’ (0.28±0.23). While 22% stated that the gifts/sponsorships may affect their own prescribing decisions, 34% believed that decisions of their friends/colleagues would be affected.

Discussion and conclusion: Medical students, who frequently interact with pharmaceutical companies, have limited awareness of their own susceptibility to marketing strategies. This situation makes future physicians more vulnerable/likely to be influenced during prescription. Therefore, nationwide studies regarding the susceptibility of the medical student should be conducted to assess the the situation and the need of national and international policies concerning the medical student-pharmaceutical industry relationship. It should be emphasized that medical schools are the crucial places to integrate such interventions to raise awareness about pharmaceutical marketing strategies and the significance of rational prescribing.

Keywords: Drug industry, medical students, conflict of interest, promotion

Alıntı Kodu: Nilüfer Özyayın A. ve Ark. Interaction between clinical medical students and the pharmaceutical industry: a crosssectional study. *Jour Turk Fam Phy* 2024; 15 (4): 133-145. Doi: 10.15511/tjtfp.24.00433.



Introduction

A medical doctor should be able to diagnose accurately and choose the appropriate treatment.⁽¹⁾ In this regard, evidence-based medicine has been developed as a process of systematically finding, appraising and using up-to-date research findings to create a basis for clinical decisions. This way it is aimed to encourage the use of the most suitable individualized treatment methods for the patients.⁽²⁾ There are two major groups that are affected by the process of deciding which method(s) to use; i. Patients, and ii. Pharmaceutical companies.

A great number of pharmaceutical companies and their considerable amount of investments give rise to an international competitive environment in the pharmaceutical market. As of 2020, the total global pharmaceutical market was valued at about 1.27 trillion USD.⁽³⁾ The Turkish pharmaceutical industry has an increasing trend and reached a sales volume of 40.7 billion TRY, ranking 18th in 2019 worldwide.^(4,5) Considering the size of the market and international competition, it is clear that influencing the decisions of medical practitioners, who will prescribe drugs, could be one of the marketing approaches.

The pharmaceutical companies have to constantly communicate and interact with the physicians under clinical practice conditions. In the United States of America, the pharmaceutical companies spend a budget of 12 to 18 billion USD per year just for promotions intended for the physicians.^(6,7) A considerable portion of this budget is comprised by approximately

60 million visits by the pharmaceutical sales representatives (PSR) to the doctors.⁽⁷⁾ It is observed that the drug/product promotions of the companies and the training and organization sponsorships they offer causes physicians to obtain biased information in favour of the sponsor's product and leads to changes in the prescribing behaviours of even the experienced doctors.⁽⁸⁻¹¹⁾

In order to prevent the professionals from deviating from the evidence-based medical practices, organizations such as American Medical Association and American Medical Student Association publish guidelines or recommendations on regulating the interactions between the drug companies and physicians as well as the drug companies and students on a regular basis.^(12,13) In Türkiye, the Ministry of Health published the "Regulation on the Promotional Activities of Medicinal Products for Human Use" in 2015, in order to set forth the rules that have to be followed during promotional activities.⁽¹⁴⁾

The pharmaceutical companies have started to include the medical students in their target groups for their promotional activities in order to make sure that their products are used more extensively and are known by larger groups of physicians. Accordingly, the interaction between the physician and the pharmaceutical company starts during the medical school years and continues on an extensive basis throughout the doctor's career.

A study conducted in Marmara and Ege Üniversitesi in Türkiye (2009) about the extent and contents

of the interaction between the medical students and the pharmaceutical companies has revealed that students in their preclinical years are in contact with the pharmaceutical industry, with 91% being in indirect contact and 64% in direct contact.⁽¹⁵⁾

Additionally, according to the results of nationwide studies examining the attitudes of medical students towards pharmaceutical companies throughout the world, students generally have a positive attitude similar to physicians.^(16,17) However, with the recent inclusion of courses on the relationship between the pharmaceutical industry and the doctors, it has been shown that the attitude of the students, who took the course, has changed negatively, and the students have started to approach gifts and information/promotions from the companies more sceptically.⁽¹⁷⁻²⁰⁾

The literature reveals few studies examining the current relationship between the pharmaceutical companies and medical students in Türkiye as well as worldwide; and it is seen that no general perspective can be provided for students in different universities.⁽²¹⁾

The aim of this study is to examine the relationship between 5th and 6th grade students studying at Marmara University of School of Medicine (MUSM) in the 2020-2021 academic year and the pharmaceutical industry.

Materials and Methods

The study was designed as a cross-sectional study. Permissions have been duly received from the Ethics

Committee for Clinical Studies Board of Marmara University (Protocol number: 09.2020.1066, date: 02.10.2020) and the Office of the Dean of the School of Medicine. Information regarding principles of the study was provided on first page of the online information form, and consents of the participants have been collected.

While the medical students in Türkiye represented the study universe, the cohort consisted of students enrolled in years 5 and 6 at the MUSM in the academic year 2020-2021 (N₅: 250, N₆: 200) the study cohort. The questionnaire was made available to the entire study cohort, and those participants who completed it were included in the study sample. Data were collected via Google Forms between October-December 2020 and reminder messages were sent regularly every two weeks.

Online questionnaire included 52 multiple choice and Likert scale questions. The first 20 questions were related to socio-demographic characteristics. Questions 21 to 52, on the other hand, are from the questionnaire, which was developed by Sierles et al. (2005) in the United States of America and was later translated into German by Lieband Koch (2013) and applied in Germany.^(18,22) The questionnaire was first translated from German to Turkish and after the pre-testing was given out to the participants. Permission was received from Dr. Cora Koch (Freiburg University, Germany) in order to use the questionnaire.

A “scepticism score” was calculated based on the responses to questions 42, 43, 44, 47, 48 and 50

$[(5-Q34)+(5-Q36)+Q35+Q39+Q40+Q42]/24 \times (4/3) - (1/3)$ [min: 0 (not sceptical at all), max: 1 (very sceptical approach)].

“Ethical appropriateness score (EAS)” was calculated based on the responses to questions 45 to 52 $[Q45+Q46+Q47+Q48+Q49+Q50+Q51+Q52]/40 \times 1.25-0.25$ [min: 0 (very little feeling of appropriateness), max: 1 (very strong feeling of appropriateness)].

Statistical analysis

The data were analysed using the program Statistical Package for the Social Sciences Statistics for Windows program, version 11.0 (SPSS, Chicago, IL, USA). Student’s t test, MannWhitney U test, Spearman correlation, Pearson Chi-Square and Fisher’s Exact test were used for analysis.

Odds ratios (OR) with 95% confidence intervals (CI) for the association between appropriateness score and each potential risk factor were estimated using multivariable logistic regression models. The goodness of fit for multiple logistic regression model was determined by the Hosmer- Lemeshow test. Sex, age, class, monthly income level, perceived health and acceptance of promotions were the variables considered in the model. The significance level was taken as 0.05 for all statistical tests.

Results

The research cohort consisted of 450 students and a total of 106 filled the questionnaire (response rate: 23.55% overall, 10.8% for 5th-year students, and 39.5% for 6th-year students). The mean age of the par-

ticipants was 23.56 ± 0.99 (median:26, range:22-29, n:106) and 61.3% of them were male. The socio-demographic characteristics of the participants by sex are given in **Table 1**.

Six of the medical students (5.7%) had taken part in training on the relationship between the physicians or medical students and the pharmaceutical industry before, whereas 94.3% had not. While 22.6% of the participants stated that they do not have knowledge about the positions that a physician can be employed in a drug company following graduation, only one student planned to have a career in a drug company after graduation.

A total of 91.5% of the participants encountered a PSR at least once throughout their medical education; and the first encounter of 60.8% of the students took place in the preclinical phase (Year 1: 19.6%, Year 2: 21.5%, and Year 3: 19.7%). And the places of first encounter were mainly the outpatient clinics (58.8%) and family health centres (28.9%), where they worked as interns. Of the participants 48.1% (n=51) expressed that they accepted at least one promotion offered by the companies.

The gifts, which the students reported to have accepted most frequently, were non-educational small gifts (pens, note holders etc.) by 35.8%, promotional brochures (34%), lunch invitations (27.4%), and drug/product samples (20.8%). Moreover, 5.7% of the participants had taken part in a sponsored workshop/seminary/congress attendance, 5.7% had participated in an event with registration fees covered by a drug company, 4.7% had attended in an event

Tablo 1: Participants' sociodemographic characteristics (n=106)

Sociodemographic Characteristic	Female		Male		Total		p
	n	%	n	%	n	%	
Age, years							
≤23	34	52.3	18	43.9	52	49.1	0.399
≥24	31	47.7	23	56.1	54	50.9	
School year							
5 th year	15	23.1	12	29.3	27	25.5	0.476
6 th year	50	76.9	29	70.7	79	74.5	
Income₺ (\$)*							
<8.086 (1083)	27	41.5	23	56.1	50	47.2	0.144
≥8.086 (1083)	38	58.5	18	43.9	56	52.8	
Hometown (Longest Place of Residence Until the Age of 12)							
Metropolitan City	46	70.8	25	61.0	71	67.0	0.296
City/ Town	19	29.2	16	39.0	35	33.0	
Education level of mothers							
High school or lower degrees	25	38.5	27	65.9	52	49.1	0.006
University or higher degrees	40	61.5	14	34.1	54	50.9	
Education level of fathers							
High school or lower degrees	13	20.0	15	36.6	28	26.4	0.059
University or higher degrees	52	80.0	26	63.4	78	73.6	
Self-evaluation on health status							
Healthy	57	87.7	34	82.9	91	85.8	0.493
Unhealthy	8	12.3	7	17.1	15	14.2	
Acceptance of promotion from pharmaceutical companies							
Accepted	31	47.7	20	48.8	51	48.1	0.913
Not accepted	34	52.3	21	51.2	55	51.9	
Total	65	100.0	41	100.0	106	100.0	

*It was changed from Turkish Liras to USD with indicative Exchange rates announced by the Central Bank of Türkiye. The Central Bank of Türkiye, 2020 September 15. Available from: URL: <https://www.tcmb.gov.tr/wps/wcm/connect/TR/TCMB+TR/Main+Menu/Istatistikler/Doviz+Kurlari/Gosterge+Niteligindeki+Merkez+Bankasi+Kurlarii/>

financed by a company and 0.9% had travelled to an event with transportation charges covered by a drug company. In addition, 7.5% of the students had attended at a sponsored dinner and 2.8% at a social event.

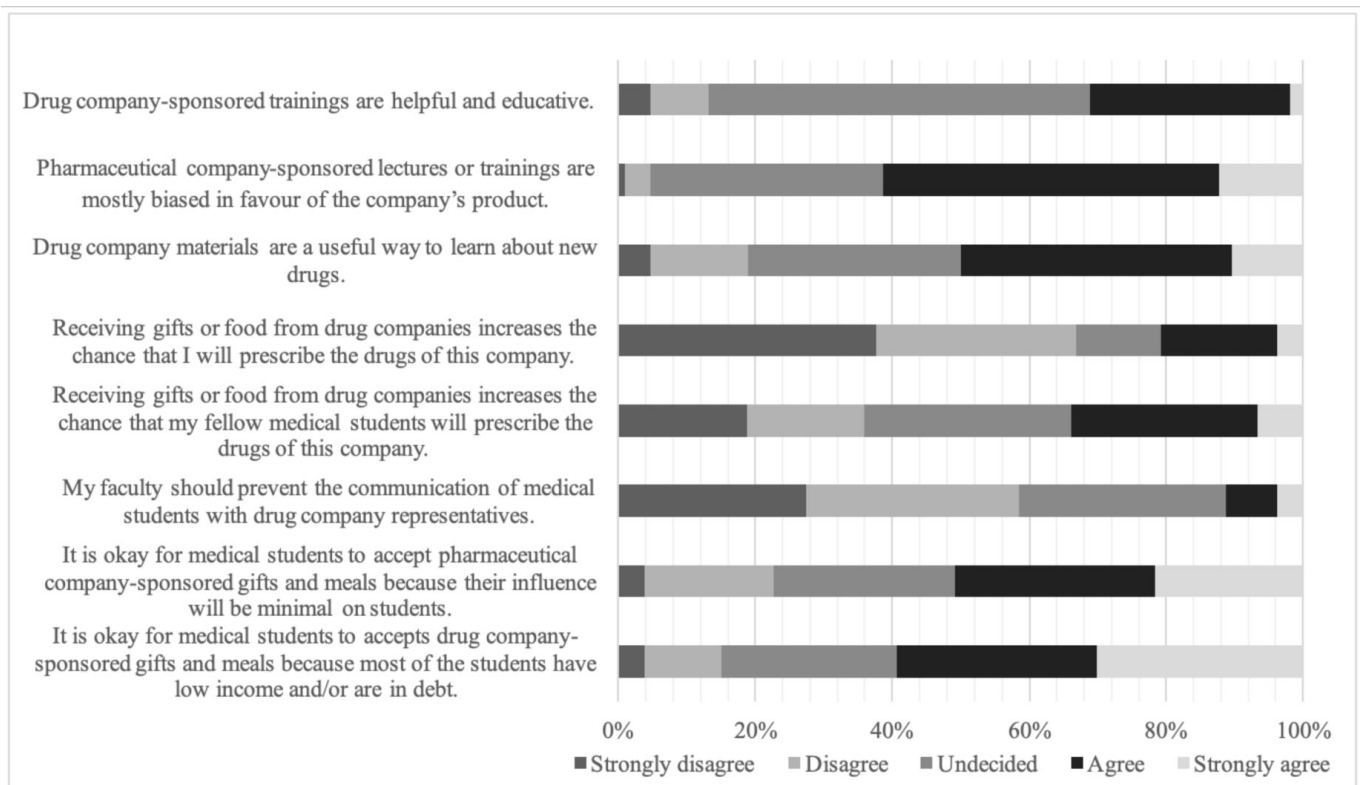
Findings regarding the attitude of the students towards interaction with pharmaceutical companies are given in Figure 1. While 22% of the students declared that the gifts and sponsorships offered by the pharmaceutical companies would have an impact on their decisions when prescribing drugs, 34% of them guessed that they would have an impact on the decisions of their peers/colleagues ($p < 0.001$). Also, it is seen that 14.2% of the participants thought that the

trainings organized by the pharmaceutical companies would be both informative and biased in favour of the pharmaceutical company in question.

Scepticism

“Median Scepticism score” was 0.50 for the participants (IQR:0.22). Both sexes had a neutral approach to the promotions (median_{female}: 0.50, median_{male}: 0.50, $p = 0.664$). There was no correlation between age and scepticism score ($r = -0.040$, $p = 0.687$); however, it is found that the scepticism score increased as the declared monthly household income decreases ($r = -0.246$, $p = 0.011$). Scepticism scores were found to be similar for the students, who accepted promotions from the drug companies (median: 0.50, IQR: 0.22),

Figure 1. Participants’ attitudes towards interaction with drug companies



and students, who did not accept promotions (median: 0.5, IQR: 0.22)($p=0.980$).

Ethical appropriateness

Average EAS was 0.35 ± 0.23 for the students (median: 0.34, range: 0.00-0.91), which means that the students assessed the promotions to be “ethically appropriate”. Male students had a higher tendency to consider the promotional gifts ethically appropriate ($EAS_{male}: 0.29 \pm 0.23$, $EAS_{female}: 0.39 \pm 0.22$, $p=0.021$).

Findings relating to the students’ assessments of the promotions offered by the pharmaceutical companies from the perspective of ethical appropriateness are given in **Table 2**. The gifts that were described as the most appropriate are books/textbooks by 89.7%, invitations to conferences/seminars by 77.4% and to lunches/dinners by 69.9%; while the ones that were accepted as the least appropriate are holidays by 50%; gifts worth 50TL and above by 43.9%; and drug/product samples by 36.4%.

EAS of the participants were found to be simi-

lar among age and monthly average income groups ($r=0.077$, $p=0.436$; $r=-0.165$, $p=0.093$, respectively). Students who accepted promotions from a drug company (0.35 ± 0.19) and did not accept (0.34 ± 0.26) had similar EAS ($t=-0.914$, $p=0.846$). No statistically significant correlation was found between scepticism and ethical appropriateness scores ($r=0.124$, $p=0.205$).

Ethical appropriateness score was divided into two groups, as below and above 0.34, being the median value, and it was accepted that the group with the score below 0.34 considered the gifts/sponsorships of the companies to be appropriate and the group with the score above 0.34 considers them to be inappropriate.

Being female was 7.52 times more likely to address have an impact on EAS (95% CI: 2.73 - 20.70) where as a monthly income below the poverty threshold were 3.77 times more likely to have an impact on EAS (95% CI: 1.44 - 9.85). The students that accepted gifts were 2.98 times more likely (95% CI:

Table 2: Factors influencing students’ opinions regarding the inappropriateness of the promotions

Predictor	Beta	Standard Error	p	OddsRatio	%95 CI
Sex (Female)	2.017	0.517	0.000	7.519	2.731-20.700
Class (5. year)	0.911	0.521	0.080	2.488	0.897-6.904
Monthlyincome [\leq 8.086 (\$1083)]*	1.328	0.490	0.007	3.773	1.445-9.849
Acceptance of the gift(s) (Accepted)	1.091	0.475	0.022	2.978	1.174-7.553

*It was changed from Turkish Liras to USD with indicative Exchange rates announced by the Central Bank of Türkiye. The Central Bank of Türkiye, 2020 September 15. Available from: URL: <https://www.tcmb.gov.tr/wps/wcm/connect/TR/TCMB+TR/Main+Menu/Istatistikler/Doviz+Kurlari/Gosterge+Niteligindeki+Merkez+Bankasi+Kurlari/>

1.17 - 7.55) to consider the gifts ethically inappropriate (Nagelkerke R² = 0.271, p<0.001) (**Table 2**).

Discussion

Our study aimed to evaluate the relationship between the students in their fifth and sixth years at Marmara University School of Medicine in academic year 2020-2021 and the pharmaceutical industry by means of an online questionnaire. This study is one of the few studies in Türkiye reflecting the views of medical students on their last to years regarding the pharmaceutical industry. By using the similar questionnaire, which was previously used by Sierles et al. (2005) in the USA and by Lieb and Koch (2013) in Germany, we were able to provide a contribution from a third country about to this topic.^(18,22) Consequently, this allowed us to compare our outcome directly with findings from these two countries.

Majority of the students declared that they had encountered at least one PSR. This indicates that the medical students at MUSM are in contact with the drug companies, which is similar to previous studies.^(15,18,21-23) One out of every two students accepted at least one gift offered by the pharmaceutical companies. Although the most frequently accepted gifts showed similarity to those in the studies conducted in Türkiye, Germany, the USA, and Baltic countries, it is found that there were relatively fewer students who accepted gifts in our study.^(18,21-23) This may have stemmed from the interruption of the face-to-face clinical training of students and reduced hospital visits by the PSRs due to COVID-19 pandemic, as well as a recall bias.

Our participants considered promotional gifts fundamentally somewhat more appropriate than German and American students. In our study female students were more likely not to consider the gifts as appropriate. A similar difference between sexes was also found in a study in Pakistan; however, there are also studies suggesting that the males and females have a similar attitude.^(19, 24, 25)

Congruent with previous studies, our participants consider accepting small gifts, free meals, and training materials offered by the pharmaceutical industry as ethically appropriate.^(17,22,23,26) When the promotions offered to the students were taken into account, it is possible that they were not perceived negatively as they were mostly small, inexpensive, and also contributed to their medical knowledge.

Moreover, while our participants' approach to promotions was similar to that of German students, they were more sceptical than the American students.^(18,22) Students' perspective on the pharmaceutical industry and their promotions/organizations has evolved over the past decade into a more sceptical manner, owing to restrictions imposed on the pharmaceutical companies on a national scale and the well-structured training programs created for the medical students.^(27, 28) Through the implementation of similar action programs, a sceptical approach could be achieved in Turkish medical students as well.

Despite the subject of prejudiced approach to trainings sponsored by the pharmaceutical companies has been highlighted in other studies, it is also noteworthy

thy that a considerable amount of the students had the opinion that such trainings were also beneficial.^(18,22) Similarly, in our study, while more than half of our students thought the sponsored trainings are generally distorted in favour of the company's product, two out of five considered such trainings to be educative and informative. Furthermore, our students believed that the materials provided by the companies are useful in learning about drugs on the market. Many studies worldwide have revealed this view to be more prevalent among the medical students at their clinical years (53-71%) as compared to preclinical students (29-62%).^(22,29-31)

A randomized controlled study by Grande et al. (2009) indicated that the medical students, who accepted promotions from the PSRs, even the small ones, tended to have a more positive attitude towards promotions and PSRs, as well as are deduced scepticism towards pharmaceutical companies.⁽³¹⁾ While similar results have been obtained in miscellaneous studies, it was also found that the students tended to believe they would not be influenced by such interactions.^(17,22,31-34)

In our study, approximately one third of the participants thought that the gifts/sponsorships offered by the firms would influence the decisions of their peers or colleagues when prescribing drugs, while on the contrary only one-fifth thought that their own decision-making process would be influenced. German and American students also consider their peers to be more susceptible to the promotions of the drug companies as compared to themselves.^(18,22)

This significant difference suggests that the students, who are frequently in contact with the pharmaceutical industry, have limited awareness about their own susceptibility to the strategies of the companies. A similar situation was observed in studies conducted with physicians. Fickweiler et al. (2017) emphasized in a systematic review, that the majority of the physicians thought the pharmaceutical companies would not be able to influence their decision-making, but their colleagues would be more susceptible in this context.⁽¹⁶⁾

Due to the COVID-19 pandemic, our research was conducted in electronic environment in an effort to reach all 5th and 6th year medical students. Although no sampling was selected and the study was made open to the entire study cohort, the participation rate was low and responses were received from the students who volunteered and/or who were especially interested in the topic.

During the data collection process, fifth year students were receiving only online education and were not continuing clinical rotations. Additionally, PSRs were also not allowed inside the hospitals. Correspondingly, the participants' responses were based on their experiences of the prior years, which may have resulted in recall bias.

Conclusion

As a result, in addition to maintaining frequent contact with the pharmaceutical companies, the clinical medical students that participated in our study also have limited awareness of their own suscepti-



lity towards the strategies of the drug companies. This may make future doctors more susceptible to being influenced in their prescription process, without even being aware.

Considering that a vast majority of our participants had no earlier training on the relationship between the physicians and the pharmaceutical companies and hence can easily be influenced by the companies, our study reveals the need to design interventions to improve awareness on rational prescription and drug marketing strategies. Therefore, we encourage researchers to conduct more comprehensive studies in this area to better understand the situation of medical students in Türkiye.

In case of need, we recommend developing comprehensive policies addressing the relationships between medical students and pharmaceutical companies, similar to those developed and implemented on an international scale. Additionally, we suggest integrating comprehensive relevant curricula into medical education, with the impacts of such courses on the attitudes of the students being demonstrated through pre-testing and post-testing.

Acknowledgements: We would like to thank Uz. Dr. Can Ilgın (MD, PhD) and all participant students.

Ethics Committee approval: The ethics permission has been duly received from the Ethics Committee for Clinical Studies Board of Marmara University (Protocol number: 09.2020.1066,date: 02.10.2020).

Conflict of interest: The authors declare that there is no conflict of interests.

Financial disclosure: The authors declare that this study did not receive any specific grant from funding agencies.

Author contributions: Concept: A. Nilüfer Özaydın, Berk Bozdoğan, Anıl Çifter, Nergis Kıcı; **Design:** Berk Bozdoğan, Anıl Çifter; **Supervision:** A. Nilüfer Özaydın; **Data collection and/or processing:** Berk Bozdoğan, Anıl Çifter, Nergis Kıcı, Senem Aslan, Batuhan Erdir; **Analysis and/or interpretation:** A. Nilüfer Özaydın, Berk Bozdoğan, Anıl Çifter; **Literature search; Writing:** A. Nilüfer Özaydın, Nergis Kıcı

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