ORIGINAL RESEARCH

Patterns of self-medication among medical and nonmedical University students in Jordan

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Background and objective: Self-medication practice involves consumption of medicines by one's own initiative or on the consultation of others without the guidance of a physician. Self-medication and use of over-the-counter drugs are prevalent worldwide public health concerns. University students of medical and nonmedical disciplines may have different levels of health education. This study evaluated the prevalence and patterns of self-medication and the attitudes toward this practice among medical and nonmedical university students in Jordan.

Methods: A descriptive cross-sectional study was conducted in 504 students (medical: 248 and nonmedical: 256). The students were invited to complete a questionnaire that included questions primarily related to patterns of physician visits, self-medication practice, symptoms provoking self-medication, and sources of advice.

Results: Self-medication was highly prevalent and comparable between medical and nonmedical students (~96%). Headache (81.9%), cold (58.3%), and flu (53%) were the frequent symptoms provoking self-medication among students. Self-medication for headache (86.7% vs 77.3%) and tooth pain (53.1% vs 27%) was significantly higher among medical vs nonmedical students, respectively. Self-treatment with painkillers (82.3% vs 73%) or antiallergy (11.3% vs 5.9%) drugs was significantly higher among medical students, while the use of anti-flu decongestants (47.6% vs 60.2%) was lower compared to nonmedical students, respectively. Nonmedical vs medical students were significantly more dependent on friends (14.8% vs 7.7%) and own experience (7.4% vs 2.4%) as a source of self-medication advice.

Conclusion: Self-medication is common among Jordanian university students of medical and nonmedical disciplines. This practice, if used irrationally, may constitute a health problem that needs awareness and interventions by health care regulators in Jordan. Future studies are warranted to examine the impact of self-medication on students' health.

Keywords: self-medication, students, medical, nonmedical, survey, Jordan

Introduction

The US Food And Drug Administration defines over-the-counter (OTC) drugs as "drugs that are safe and effective for use by the general public without seeking treatment by a health professional".[1] Self-medication is a global form of self-care practice and can be defined as "the taking of drugs, herbs or home remedies on one's own initiative, or on the advice of another person, without consulting a doctor".[2] Self-medication practice is highly prevalent in the developing countries and can be enhanced by the availability of medicines as OTC.[3]

Self-medication, when adopted correctly, can be more convenient, may relieve acute pain, and reduce treatment cost and physician interaction times.[4] However, it

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can jeopardize human well-being and result in severe health-related complications when implemented inappropriately, such as in cases of self-treatment with prescription-only drugs.[5] For instance, developing drug resistance is of great concern with the frequent and inappropriate use of antibiotics that could be available without a prescription. A survey conducted over Jordanian households reported that 39.5% of the participants had used antibiotics without prescription.[6] Other serious consequences that might be provoked with frequent use of OTC medications include inappropriate dosing, drug duplication, drug interaction, treatment failure, masking of health problems and symptoms, and delay in prescribing the appropriate treatment.[7]

A previous study showed that the reasons behind the prevalent use of OTC medications can include the following: the desire to save money, presence of minor health problems that do not need a visit to the physician, prior experience with drug efficacy, and the long waiting time at physician's clinic or hospitals.[8] The common sources of self-medications may include families, friends, pharmacists, newspapers, magazines, and Internet websites.[9]

College age group represents an integral part of the community. As medical students usually try to implement their knowledge into practice, self-medication has been frequently assessed among these individuals. The prevalence of self-medication among university students ranged from 38.5% in Ethiopia[10] to 98% in Palestine.[11] A meta-analysis of 27 studies of self-medication among physicians and medical students reported self-treatment prevalence of >50% in 76% of the studies.[12] In Jordan, studies conducted earlier on medication use were focused on medical students[13] or public,[9,14] with special attention to the consumption of antimicrobial drugs.[6,15,16] One study assessed the attitude and behavior of antibiotic use among medical and nonmedical university students and reported high consumption rates regardless of specialty.[17] As little data are available about self-medication practice among medical and nonmedical students, the goal of this study was to explore the prevalence, attitudes, determinants, and sources of self-medication among Jordanian medical and nonmedical students.

Methods

This was a descriptive cross-sectional study conducted among a convenient sample of students enrolled at medical and nonmedical schools of Jordan University of Science and Technology (JUST) located at the North of Jordan. The university students' population is about 21,000, of 60 nationalities, distributed at 12 medical and nonmedical schools. Medical

schools include pharmacy, medicine, nursing, dentistry, and applied medical sciences. Students of different academic levels (juniors and seniors) were targeted. The students were approached with the survey during their scheduled elective course classes, via taking 10 minutes out of the class time (at the end of the class). The study protocol and obtaining of informed verbal consent were approved by the institutional review board committee at King Abdullah University Hospital, JUST. An informed verbal consent was obtained from individuals after explaining the purpose of the study and that the involvement was voluntary. Students were also informed that their responses would be anonymous and confidential. Graduate students were not included in the study.

The survey included questions about respondents' sociodemographic, clinical information, education, history and pattern of physician visits, students' knowledge and beliefs of OTC medications and practice of the consumption of OTC and prescribed drugs (self-medication), reasons for the self-prescribed practice, sources of advice, and frequent symptoms prompting self-medication. The survey included primarily close-ended questions. Some of the questions may tolerate more than 1 answer (example: reasons for self-medication). Questions were related to the period of the previous 6 months. The questionnaire was also piloted on 50 students and tested among a group of students to receive feedback about understandability and clarity of the questions, and data of the pilot study were not included in the final analysis. The questionnaire was adjusted as per feedback from the piloted sample. The survey was developed after a comprehensive review of the related literature and consultation among the research team. It was face-validated via consultation with expert colleagues in the field and was also objectively validated for comprehensibility and clarity. Reliability was ensured via calculating Cronbach's α, which was >0.7 for all items of the questionnaire.

Descriptive statistics such as frequency (%), mean, and SD were used to present participants, characteristics as appropriate. The study questions and characteristics were compared between medical and nonmedical students using independent Student's t-test for continuous variables and χ^2 test for categorical data. The SPSS software (version 23) (IBM Corporation, Armonk, NY, USA) was used for data analysis at the level of significance of $P<0.05$.

Results
Demographics and clinical characteristics
This study was conducted in 504 students, of whom 248 were from medical and 256 were from nonmedical schools.

Slightly more than half (55.7%) of the respondents were female, and the mean age was 21.8±1.8 years for all participants (67.5% were ≥21 years old). The majority were nonsmokers (79.6%) and lived in the city (67.7%) in places close to hospitals (<25 minutes driving). When split by study year, the majority were in the third or fourth professional year of their academic study (68%). Most of the respondents had medical insurance (83.5%) and did not have chronic diseases (96%). The following sociodemographic and clinical characteristics were significantly different between medical and nonmedical students: gender, nationality, age, the area of living, smoking status, college year, monthly income, availability of transport, and medical history. For example, 69.8% of the medical students were female vs 42.2% of the nonmedical students, $P<0.001$. Additionally, only 11.1% of the medical students were smokers vs 25.8% of the nonmedical students, $P<0.001$. Other participant characteristics are listed in Table 1.

Patterns of medical visits
Regarding respondents' visits to physicians, 61.4% of the medical students reported that they had seen physicians at least 1 time in the past 6 months, which was comparable to that of the nonmedical students (68.6%), $P=0.154$. The major reasons for visiting physicians among participants were flu (41.5%), tooth pain (35.1%), and cold (26.4%). Nonmedical students had seen physicians for flu (48%) more than medical students (34.7%), $P=0.002$. Both groups of students reported that they highly adhered to doctor instructions. Data about students' medical visits are summarized in Table 2.

Patterns of self-medication
Significant differences in the knowledge of students about prescription-only or OTC medications were observed (Table 3). Higher percentages of medical students reported that antacids, expectorants, laxatives, antibiotics, and antidiarrhea medications are prescription-only drugs compared to nonmedical. The percentages ranged from 25.4% to 55.6% and 18% to 33.2% for medical and nonmedical students, respectively. Interestingly, a lower percentage of medical students (14.5%) believed that painkillers were prescription-only drugs compared to nonmedical students (22.7%), $P=0.019$.

Self-medication was reported by 96.8% of the participants, and this was not different between medical (97.2%) and nonmedical students (96.5%). The most predominant medicine classes that were self-used by all students in the past 6 months were painkillers (77.6%), anti-flu decongestants (54%), sore throat drugs (25.9%), cough suppressants (24%), or antibiotics

(21%). Self-medication was significantly higher in medical compared to nonmedical students with regard to the use of painkillers (82.3% vs 73%, $P=0.013$) and antiallergy drugs (11.3% vs 5.9%, $P=0.029$). However, the frequency of self-medication with anti-flu drugs was higher among nonmedical (60.2%) vs medical students (47.6%), $P=0.005$.

The most common indications for which students take medications on their own were headache (81.9%), cold (58.3%), flu (53%), and tooth pain (31%). Medical students showed self-medication practice for headaches and tooth pain significantly more often than nonmedical students (Table 3).

Other practices
The primary sources of advice for taking medications for all students were from physicians (55.8%), pharmacists (52.6%), Internet websites (44.2%), or family members (36.9%). A significantly higher frequency of nonmedical compared to medical students was dependent on friends (14.8% vs 7.7%, $P=0.011$) and own experience (7.4% vs 2.4%, $P=0.01$) as a source of medication use. A significantly higher proportion of medical students (57.1%) reported that they read medication instructions on the package insert (patient information leaflet) every time they bought a new pack of medication compared to nonmedical students (53.8%), $P=0.016$. The majority of participants (65.3%) reported that they stopped using the medicine and saw physicians whenever the drug had no effect. These data are listed in Table 4.

Discussion
This study evaluated patterns and attitudes of medical and nonmedical university students toward self-medication. The study revealed that self-medication practice is very common and comparable between medical and nonmedical students. Students primarily treat themselves to relieve pain and flu symptoms, and nonmedical students are self-treated with anti-flu drugs to a level higher than that of medical students. The study also showed that students are primarily dependent on physicians or pharmacists' advice for self-medication.

The prevalence of self-medication in our cohort sample was 96.8%. This is slightly higher than that reported among Jordanian medical and pharmacy students (78.5%),[13] comparable with health care and non-health care students of Slovenia (92.3%)[18] or Pakistan (95.5%),[19] and much higher than that documented among Saudi medical students (26%)[20] or Egyptian medical and nonmedical students (62.9%).[21] These differences in self-medication prevalence among students might be explained partially by the variable sample

Table 1 Demographics of study participants

Factor	Total sample (504), N (%)	Medical (248), N (%)	Nonmedical (256), N (%)	*P*-value
Gender				<0.001
Male	223 (44.3)	75 (30.2)	148 (57.8)	
Female	281 (55.7)	173 (69.8)	108 (42.2)	
Nationality				<0.001
Jordanian	433 (85.9)	191 (77.3)	242 (94.5)	
Non-Jordanian	71 (14.1)	56 (22.7)	14 (5.5)	
Age	21.8±1.82	20.77±1.66	21.57±1.88	<0.001
Missing	5 (1)			
Area of living				<0.001
City/urban	341 (67.7)	191 (77.3)	150 (60.7)	
Village/rural	153 (30.4)	56 (22.7)	97 (39.3)	
Missing	10 (1.9)			
Smoking status				<0.001
Smoker	91 (18.1)	27 (11.1)	64 (25.8)	
Nonsmoker	401 (79.6)	217 (88.9)	184 (74.2)	
Missing	12 (2.3)			
College year				<0.001
First	65 (12.9)	49 (20.5)	16 (6.3)	
Second	39 (7.7)	17 (7.1)	22 (8.7)	
Third	169 (33.5)	115 (48.1)	54 (21.3)	
Fourth	174 (34.5)	44 (18.4)	130 (51.4)	
Fifth or sixth	45 (8.9)	14 (5.9)	31 (12.3)	
Missing	12 (2.3)			
Monthly income (JDs)				<0.001
<400	117 (23.2)	41 (17)	76 (30.4)	
400–1,000	243 (48.2)	118 (49)	125 (50)	
>1,000	131 (26.0)	82 (34)	49 (19.6)	
Missing	13 (2.6)			
Insurance				0.072
Available	421 (83.5)	214 (87.3)	207 (81.5)	
Not available	78 (15.5)	31 (12.7)	47 (18.5)	
Missing	5 (1)			
Nearness to hospitals				0.376
5–25 minutes away	406 (80.6)	202 (82.8)	204 (80)	
25–60 minutes away	70 (13.9)	34 (13.9)	36 (14.1)	
>60 minutes away	23 (4.5)	8 (3.3)	15 (5.9)	
Missing	5 (1)			
Availability of public or private transport				
Available	479 (95)	243 (98.8)	236 (92.9)	0.001
Not available	21 (4.2)	3 (1.2)	18 (7.1)	
Missing	4 (0.8)			
Medical history				0.031
Yes	17 (3.4)	4 (1.6)	13 (5.1)	
No	484 (96)	243 (98.4)	241 (94.9)	
Missing	3 (0.6)			

size or the level of medical knowledge and the responsible self-medication between students.

Self-medication among students was also higher compared to the Jordanian public (42.5%).[9] This could be attributed to the higher level of medical and pharmaceutical knowledge about medications and their uses among university students; thus, it is likely that this knowledge is sufficient to practice self-treatment. The high level of self-medication observed among students of nonmedical disciplines indicates that students are becoming more familiar with medicines and their uses and that may be attributed partially to the large willingness to know and learn about medications from newspapers and Internet websites or even from the social networks. In fact, we showed that nonmedical students were more dependent on friends and own experience as a source of advice for self-medication, suggesting that they were

Table 2 Patterns of medical visits among students

Factor	Medical, N (%)	Nonmedical, N (%)	P-value
Number of physician's visits within the previous 6 months			0.154
More than once per month	16 (6.5)	23 (9.1)	
Once per month	35 (14.2)	49 (19.4)	
More than once	49 (19.9)	59 (23.3)	
Once	51 (20.7)	45 (17.8)	
None	95 (38.6)	77 (30.4)	
Reasons for physician's visits			
Headaches	44 (17.7)	49 (19.1)	0.686
Flu	86 (34.7)	123 (48)	**0.002**
Cold	66 (26.6)	67 (26.2)	0.911
Cough	25 (10.1)	22 (8.6)	0.566
Insomnia	11 (4.4)	10 (3.9)	0.766
Acne/skin disease	41 (16.5)	33 (12.9)	0.248
Tooth pain	90 (36.3)	87 (34)	0.588
Stomach pain/heartburn	23 (9.3)	25 (9.8)	0.851
Disorder of digestive system (diarrhea, vomiting, constipation)	21 (8.5)	15 (5.9)	0.256
Hemorrhoids	4 (1.9)	5 (2)	0.773
Infections	25 (10.1)	27 (10.5)	0.863
Allergy	40 (16.1)	32 (12.5)	0.244
Menstrual problems[a]	17 (9.8)	9 (8.3)	0.674
Others	31 (12.5)	35 (13.7)	0.697
After your office visit, do you follow your physician's instructions?			0.558
Yes	205 (88.7)	207 (87)	
No	26 (11.3)	31 (13)	

Notes: [a]Females only. Bold text indicates *P*<0.05 which is statistically significant.

more prone to accept recommendations from their friends compared to medical students. In Egypt, a study showed that neighbors and family, own decision, and Internet were frequent resources for self-medication among students.[21] Another study reported that friends and family, chemist, and Internet were the primary 3 resources of self-medication among undergraduate students of Nepal.[22] Other explanations for the high prevalence of self-medication in this study may include convenience, lack of time to seek physician appointment, and the fact that around 16% of the study cohort were not medically insured.

Consistent with a former study,[23] painkillers including analgesics/antipyretics were the most commonly used medications among students. For example, analgesics (55.4%) were the most frequently self-treated medications in a sample of 1,296 medical students in Serbia.[23] The nonsignificant difference in the prevalence of self-medication observed between medical and nonmedical students is in accordance with other investigations.[7,19] Nevertheless, medical and

nonmedical students showed significant differences in their practice of self-medication with some group of drugs. While medical students used painkillers and antiallergy drugs more than nonmedical students, they showed lower usage of anti-flu decongestants. Perhaps, the medical knowledge gained in college might act as a driving factor for medical students to make decisions of self-medication, even with drugs that might sometimes require a prescription such as antiallergy drugs. Additionally, medical students may feel that their scientific knowledge is solid and they may no longer need medical consultation.[13] The higher self-medication with anti-flu drugs in the nonmedical students might be related to their previous experience with the disease and such OTC medications. However, this frequent use of anti-flu decongestants may have not been effective as nonmedical students reported that they had commonly seen physicians for flu symptoms, and this was at a percentage higher than that of medical students. Although the use of antibiotics was not different between the student groups, its frequent use (21%) is of concern. As reported earlier, this inappropriate use of antibiotics may delay the prescribing of proper treatment and may increase the likelihood of bacterial resistance.[6,15]

In agreement with previous studies,[7,21] we found that headache, cold, and flu were the predominant health problems that provoked self-medication practice. For instance, a study conducted among 572 students in Pakistan found that students were primarily self-medicated for symptoms of headache (72.4%), flu (65.5%), and fever (55.2%).[7] Moreover, studies found that being a medical student was a significant risk factor for self-medication,[21,24] and this was reflected in this study as it showed that medical students self-treated for headaches and tooth pain significantly higher than nonmedical students.

The widespread use of self-medication, especially for prescription-only drugs such as antibiotics, is of concern.[6,25] Consistently, a study conducted among 731 Chinese students reported that 40.2% of the students self-treated with antibiotics purchased without a prescription from retail pharmacies and that they used this frequently for common colds.[26] The dispensing of antibiotics has to be restricted and regulated on different levels including legislations, physicians' prescribing, pharmacy dispensing, and awareness of the population. Thus, implementing legal regulations should be encouraged among community pharmacies, which have to adhere to laws and policies concerning good dispensing practice to limit the misuse and irrational use of medicine. As this study was not designed to assess the appropriateness of self-medication, future investigations are required to evaluate the positive and negative impacts of self-medication on students' health.

Table 3 Patterns of self-medication among students

Factor	Medical, N (%)	Nonmedical, N (%)	*P*-value
In your opinion, which of the following are prescription-only drugs?			
Pain killers	36 (14.5)	58 (22.7)	**0.019**
Cough suppressants	46 (18.5)	37 (14.5)	0.215
Antacids	47 (29.8)	53 (20.7)	**0.018**
Antiallergy	136 (54.8)	121 (47.5)	0.097
Anti-cold/flu	54 (21.8)	48 (18.8)	0.398
Expectorants	63 (25.4)	46 (18)	**0.043**
Laxatives	81 (32.7)	57 (22.3)	**0.009**
Skin treatment drug	160 (64.5)	151 (59)	0.202
Drugs used for sore throat	52 (21)	46 (18)	0.395
Antibiotic	138 (55.6)	85 (33.2)	<0.001
Antidiarrhea	89 (35.9)	63 (24.6)	**0.006**
Which of the following drugs have you taken without prescription for the last 6 months?			
Painkillers	204 (82.3)	187 (73)	**0.013**
Anti-cough drug	52 (21)	69 (27)	0.116
Antiacidity drug	34 (13.7)	38 (14.8)	0.716
Antiallergy drug	28 (11.3)	15 (5.9)	**0.029**
Anti-flu drug (decongestants)	118 (47.6)	154 (60.2)	**0.005**
Expectorants	16 (3.2)	15 (3.0)	0.782
Laxatives	8 (3.2)	5 (2)	0.368
Skin treatment drug	13 (5.2)	15 (5.9)	0.754
Sore throat drug	70 (28.2)	60 (23.4)	0.219
Antibiotic	54 (21.8)	52 (20.3)	0.687
Antidiarrhea	7 (2.8)	10 (3.9)	0.5
For which of the following indications have you taken medications without prescription for the last 6 months?			
Headaches	215 (86.7)	198 (77.3)	**0.006**
Flu	126 (50.0)	141 (55.1)	0.337
Cold	140 (56.5)	154 (60.4)	0.37
Cough	42 (16,9)	47 (18.4)	0.675
Insomnia	20 (8.1)	21 (8.2)	0.955
Acne/skin disease	21 (8.5)	21 (8.2)	0.914
Tooth pain	87 (53.1)	69 (27)	**0.048**
Stomach pain/heartburn	54 (21.8)	59 (23)	0.732
Disorder of digestive system (diarrhea, vomiting, constipation, etc)	25 (10.1)	25 (9.8)	0.906
Hemorrhoids	2 (0.8)	2 (0.8)	0.975
Infection	14 (5.6)	22 (8.6)	0.199
Allergy	26 (10.5)	25 (9.8)	0.778
Menstrual problems[a]	81 (46.8)	48 (44.4)	0.697

Notes: [a]Females only. Bold text indicates *P*<0.05 which is statistically significant.

Although self-medication practice was high among students, they showed some awareness about the use of medications. For instance, nearly half of our participants reported that they read medication instructions every time they bought a new pack of medicine, an attitude that was unsurprisingly more prevalent with medical students. In addition, students were willing to see physicians whenever the medicine is not working for them. Nevertheless, awareness and knowledge about self-medication and its good and bad consequences have to be enhanced among university students. Medication and health awareness campaigns and educational sessions in the university campus may be appropriate.

This study is the first to comprehensively compare the pattern of self-medication between medical and nonmedical students in Jordan. However, there are some limitations. The study was conducted at 1 large university in the North of Jordan although there are other universities that include medical and nonmedical disciplines in other parts of the country. The survey was self-reported, and this may have contributed to the inconsistent understanding of questions between students. A recall bias is possible as students were asked about their experience in the past 6 months. Although the sample size may be relatively small, it is convenient and the results can reflect the pattern of self-medication among

Table 4 Characteristics of medication use

Factor	Medical, N (%)	Nonmedical, N (%)	*P*-value
When taking medications, whose advice do you follow?			
Physician	148 (59.7)	133 (52)	0.081
Pharmacist	133 (53.6)	132 (51.8)	0.675
Other medical members (ie, nurses)	9 (3.6)	6 (2.3)	0.396
Family members	82 (33.1)	104 (40.6)	0.079
Friends	19 (7.7)	38 (14.8)	**0.011**
Advertisement on TV or newspaper	30 (12.1)	26 (10.2)	0.488
Own experience	6 (2.4)	19 (7.4)	**0.01**
Internet medical websites	114 (46)	109 (42.6)	0.444
When do you take these medications?			0.134
When there are symptoms	70 (29.7)	96 (38.7)	
When the symptoms are moderate and sustain for more than 3 days	97 (41.1)	96 (38.7)	
When the symptoms are increasing in severity	66 (28)	52 (21)	
Before symptoms to prevent against disease	3 (1.3)	4 (1.6)	
Others	8 (3.2)	5 (2)	
Do you read medication instructions sheet?			**0.016**
Yes, every time I buy a new pack	141 (57.1)	136 (53.8)	
Yes, when I buy a medication for the first time	82 (33.2)	69 (27.3)	
Yes, only when side effects appear	6 (2.4)	20 (4.7)	
No, I do not	14 (5.7)	34 (13.4)	
Others	4 (1.6)	2 (0.8)	
When a medication has no effect, what do you do?			0.133
Stop taking the medicine and see the physician	169 (68.7)	160 (64.5)	
Stop taking the medicine and consult the pharmacist	12 (4.9)	27 (10.9)	
I would increase the dose on my own	98 (7.7)	17 (6.9)	
I would decrease the dose on my own	40 (16.3)	35 (14.1)	
Others	6 (2.4)	9 (3.6)	

Note: Bold text indicates *P*<0.05 which is statistically significant.

university students. Also, there were multiple demographic factors that were significantly different between the 2 groups, which may have impacted the differences in students' patterns and practices with regard to self-medication.

Conclusion

Self-medication practice is high among medical and non-medical university students for OTC or prescription-only medications. Although the prevalence is similar among medical and nonmedical students, some differences with respect to medical indications and the type of drugs utilized were observed between students. Health professionals have to improve students' awareness about consumption of prescription-only drugs such as antibiotics and its health consequences. The dispensing of medicine has to be controlled by Jordanian health care authorities through developing effective preventative and interventional strategies; thus, an appropriate use of medications is achieved.

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Disclosure

The authors report no conflicts of interest in this work.

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