

## Factors influencing knowledge and practice of self-medication among college students of health and non-health professions

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### Abstract

**Background and objectives:** Self-medication is commonly practiced throughout the world. The aim of this study was to ascertain the use prevalence and knowledge of harmful effects of self-medication among college students of health professions and non-health professions.

**Methods:** A cross-sectional study was performed among 1,167 students from 12 faculties of a public university and two private universities in Kuwait. Data were collected using a self-administered pretested questionnaire containing 32 questions.

**Results:** Among the participants, 70.4% (822/1,167) used self-medication. The prevalence of self-medication was significantly higher among students of non-health professions compared with those of health professions (35.9% vs. 25.9%,  $p = 0.004$ , 95% CI, 6.28% to 13.73%, respectively). Pain killer medicines (52.9%), vitamins/minerals (13.1%), and antihistamines (9.0%) were the most commonly used non-prescription medications. Antibiotics and sleeping pills were used without a prescription in 2.9% and 2.1%, respectively. Older age, non-Kuwaiti national, and students of 5<sup>th</sup> to 7<sup>th</sup> year of study were significant predictors of self-medication. Knowledge scores of harmful effects of self-medication were about two-fold higher among females than their male counterparts. Similarly, students of higher years of study (5<sup>th</sup> to 7<sup>th</sup> year) had higher knowledge score compared with others.

**Conclusions:** The prevalence of self-medication was alarmingly high among young adults in Kuwait. People should be informed about adverse effects of self-medication through mass and social media campaign.

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### Introduction

Self-medication is an increasing public health problem worldwide [1]. Self-medication is the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms, as defined by the World Health Organization [2]. Self-medication is often due to the use of non-prescription medicines, commonly known as over-the-counter (OTC) medication. However, there are reports of indiscriminate use of prescription

medications including antibiotics [3]. Unfortunately, a vast number of users of self-medication take medications without being fully informed about the associated risks, contraindications and adverse effects. Moreover, indiscriminate use of non-prescription medicines can interfere with desired treatment and result in harmful side effects [4].

Self-medication is common in low and middle-income countries. In the developing countries, inadequacies in the healthcare delivery systems

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including inadequate doctor-patient ratio, high cost of prescription medicines, lack of education, unregulated distribution of medicines, untrained medicine sellers in the pharmacy, and patient attitudes towards government health facilities and physicians are some of the key drivers of self-medication [5,6]. In a systematic review of 34 studies in 31,340 participants in developing countries, the overall prevalence of antimicrobial self-medication was 38.8%, which varied widely from as low as 4.0% in Yemen to as high as 91.4% in Nigeria [5]. It was also common in using antibiotics in viral infections, especially in the Middle East [7] and in Asia [8]. As a result, antimicrobial-resistance is becoming more prevalent in areas with frequent non-prescription use [9].

Prevalence of non-prescription medication varies according to geographic location and the demographics of the population. Among 183 undergraduate medical students in Nigeria, 38.8% used self-medication in the preceding two months of the study [10]. In a cross-sectional study of 1,200 students randomly selected from nine public and private universities in Bangladesh, 54.5% used analgesic/antipyretic medicines, and 49.8% took antibiotics as self-medication [11]. In New Delhi, India, the prevalence of self-medication was very high (85.4%) among college students despite majority being aware of the harmful effects of it [12]. Even among the undergraduate medical students the prevalence of self-medication was 75.3% among males and 81.2% among females in India [13]. A similarly high prevalence (84.0%) of self-medication was observed among undergraduate nursing students in India [14]. In another study of the medicines dispensed in pharmacies in Bangalore, India, 66.7% (174/261) pharmacies dispensed antimicrobials without a valid prescription [15]. The prevalence of self-medication was 69.2% (465/672) in a cross-sectional study in Italy [16]. In a rural population in Greece, 44.6% used antibiotics without medical prescription at least once in their life time [17].

Among the Middle East countries, a study done among consumers visiting community pharmacies in Riyadh city, Saudi Arabia, 146 out of 285 consumers (51.2%) obtained medications without prescription [18]. In a study of pharmacists in the

United Arab Emirates, 144 out of 149 (96.6%) mentioned practice of self-medication. Antibiotics were used for self-medication by 69 (46.3%) pharmacists [19]. About 42% of medical and 48% of non-medical students in Iran reported self-medication with antibiotics [3].

The use of non-prescription medication is more common in females, younger individuals, or people who had a health problem in the past year [16]. However, younger aged users are more likely to abuse and develop dependence on non-prescription medication [20]. Many studies have revealed that lack of access to health care system, long delay of medical care, and the easy availability of OTC has contributed significantly to rising trends of self-medications [21]. It is also believed that self-medication trends are economically driven [22].

There are scarce of data on the use of non-prescription medication in Kuwait. One study conducted a decade ago showed a very high (92%) prevalence of self-medication among high school students in Kuwait [23]. The prevalence of self-medication was similarly high (97.8%) in undergraduate medical students [1].

In Kuwait, government-run health clinics and hospitals provide healthcare services at no out-of-pocket cost for Kuwaitis and at a minimum fee for non-Kuwaiti nationals. It is important to explore reasons for a high prevalence of self-medication despite government-run low-cost health services in Kuwait. The previous studies were conducted among secondary school students [23] and among undergraduate medical students in Kuwait [1]. In this study, we aimed to: 1) determine the prevalence of self-medication use among college students, 2) compare the practice of self-medication between students from health faculties and those with non-health faculties, 3) identify the reasons for using non-prescription medication and 4) demonstrate the predictors of knowledge and practice of self-medication. Our hypothesis was that students of health-profession background would be better equipped with knowledge about problems of indiscriminate use of medicines without a prescription, and would practice self-medication less often compared to students with non-health background.

## Methods

### *Population*

The population for this study represented university students, 16 years or older, of either gender, and of all nationalities in Kuwait. Visitors and staff of the universities were excluded. This cross-sectional study was conducted from October to November 2016. The participants were included in the study from 12 departments or faculties in Kuwait University, namely Science, Engineering, Medicine, Dentistry, Pharmacy, Allied Health, Islamic Law (Sharia), Art, Education, Law, Business, and Social Studies, and two private universities namely Gulf University for Science and Technology, and Australian College of Kuwait. The study population represented young adults in Kuwait because data were collected from the major public and private universities.

### *Ethics*

The ethical clearance for this study was obtained from the Human Ethics Committee of Health Sciences Center, Kuwait University. Then approval was taken from the dean of each faculty. A written informed consent was obtained from each participant before enrollment.

### *Sampling method*

Convenience sampling and a snow-ball technique were used to enroll participants on a first-come first-serve basis. Two teams, with 2-3 members in each group visited the campuses from 8 am to 12 pm, because most of the students were available during this time. A pretested questionnaire was used to collect data.

### *Questionnaire*

Participants completed an anonymous self-administered questionnaire, containing 32 questions, which took around 10 minutes to fill out. The questionnaire was broken down into 3 main segments, the first being demographic factors, and questions about smoking habit and any chronic medical conditions of the participants (12 questions). The questionnaire assessed age, gender, income, family education level, university, medical status, smoking status, and other potential variables that could influence non-prescription medication

usage across 12 questions. Non-prescription medication usage as well as self-medication habits were assessed in the following 19 questions. In this section, participants were first asked if they ever used any non-prescription medicine. If the answer was “yes”, they were asked about frequency of non-prescription medication, source of medicines, source of information about medicines, specific non-prescription medicines, reasons for self-medication, the participant’s experience of having any side-effects, dose changing habits, and attitude about self-treatment. Another section, which comprised of 10 questions on a 5-point Likert scale, included the participant’s general knowledge and awareness of problems which may arise because of self-medication. Questions on knowledge about adverse effects of self-medication were phrased either positively or negatively. Examples of knowledge questions are as follows: “Self-medication is safe”; “I can adjust the dose of the medicine to fit my schedule”; “Self-medication can delay correct diagnosis”; “Self-medication with antibiotics can lead to drug resistance”.

### *Sample size estimation*

The sample size was calculated using GPower version 3.1.10. Based on the previous studies, the prevalence of self-medication ranged from approximately 52% in Saudi Arabia [18], to 98% in Kuwait [1]. Using a conservative estimate of the prevalence of 55%, and with 95% confidence and 90% power, the estimated sample size was 1,055.

### *Statistical Analysis*

The data were entered using IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp.). Descriptive analyses were performed for the demographic variables, practice questions, and people with correct answers for the knowledge questions. Based on the scores of the knowledge questions, a total score was computed for each respondent. The major outcome variables such as prevalence of self-medication and knowledge scores were compared between students of health profession and non-medical profession, and by gender, nationality, educational status, and income. Health professions included medicine, dentistry, pharmacy, allied health, and nursing, whereas non-health professions included science and math,

engineering, Sharia (Islamic law), law, art, education, business and social science. Proportions of students of health and non-health professions who practiced self-medication were compared by Chi-Square test. 95% confidence intervals for difference between the two independent proportions were calculated according to methods described by Newcombe (1998) [24]. Knowledge scores were categorized into two: below the median and above and equal to the median scores. Univariate and multivariate logistic regression analyses were done to assess the predictors of knowledge and practice of self-medication. A *p*-value of 0.05 or less was considered statistically significant.

## Results

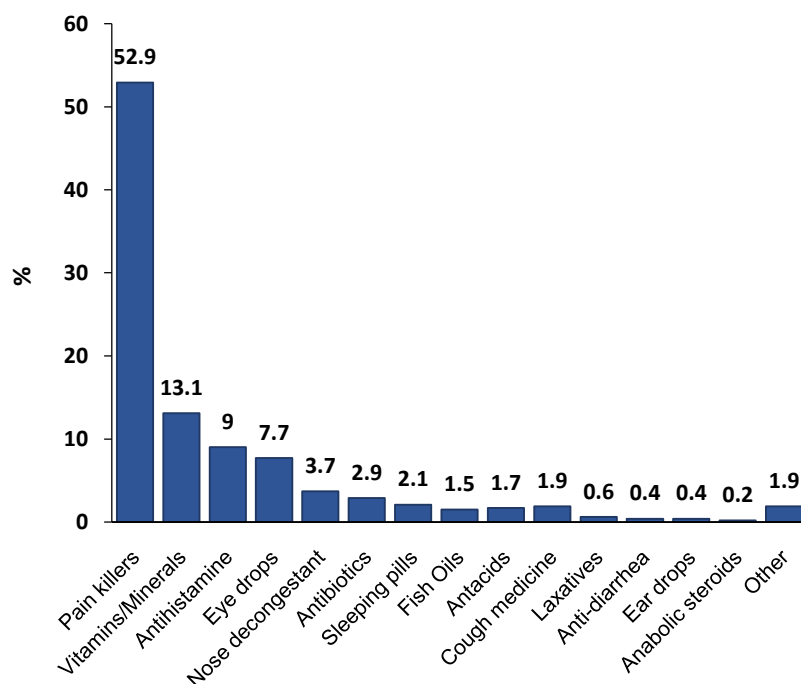
### *Sociodemographic characteristics*

A total of 1,266 eligible students were approached and 99 declined, giving a response rate of 92%. The data were analyzed for 1,167 participants, of whom 353 (30.2%) were male and 814 (69.8%) were female. The mean age of the participants was  $20.9 \pm 2.8$  years. Most of the respondents were of Kuwaiti nationality and were single. Majority of the participants (62%) had an average family income of >2,000 KD (or > \$6,600) per month (Table 1).

**Table-1:** *Socio-demographic characteristics of university students in Kuwait (n = 1,167)*

Variable	Number (%)
<b>Gender</b>	
Male	353 (30.2)
Female	814 (69.8)
<b>Nationality</b>	
Kuwaiti	995 (85.2)
Non-Kuwaiti	172 (14.8)
<b>Marital status</b>	
Single	1,038 (88.9)
Married	117 (10.1)
Divorced/widowed	12 (1.0)
<b>Smoking status</b>	134 (11.5)
<b>Father's education</b>	
High school	293 (25.1)
Undergraduate	121 (10.3)
Graduate	473 (40.5)
Post-graduate	280 (24.1)
<b>Mother's education</b>	
High school	266 (22.7)
Undergraduate	129 (11.1)
Graduate	574 (49.2)
Post-graduate	198 (17.0)
<b>Average family income (KD)<sup>a</sup></b>	
< 1000	118 (10.1)
1001-2000	327 (28.0)
2001-3000	288 (24.7)
> 3000	434 (37.2)

<sup>a</sup>1Kuwaiti Dinar (KD) = US\$ 3.3



**Fig-1.** *Most commonly used medicines for self-medication*

*Prevalence of self-medication*

Among the participants, 822 (70.4%) mentioned that they have ever practiced self-medication (Table 2). About 22% used self-medication once a month, about 11% used it once a year, and 10% used it as and when needed. The use prevalence rate of self-medication was significantly higher among students of non-health professions compared to those of health professions ( $n = 419$  (35.9%) vs.  $n = 302$  (25.9%),  $p = 0.004$ , 95% CI, 6.28% to 13.73%, respectively).

**Table-2:** Prevalence of self-medication practice by university students in Kuwait ( $n = 1,167$ )

Variable	Frequency (n)	Prevalence (%)	95% CI
<b>Self-Medication</b>			
Daily	94	8.1	6.6, 9.8
Once a week	78	6.7	5.4, 8.3
Twice a week	71	6.1	4.9, 7.6
Once a month	255	21.9	19.5, 24.4
Twice a month	83	7.1	5.7, 8.8
Once a year	126	10.8	9.1, 12.8
Other	115	9.9	8.2, 11.7
Ever	822	70.4	67.76, 72.99
<b>Academic Unit</b>			
Health Faculty <sup>a</sup>	302	25.9	23.5, 28.5
Non-Health Faculty <sup>b</sup>	419	35.9	33.2, 38.7

Note: <sup>a</sup>Health faculties include: Medicine, Dentistry, Pharmacy, Allied Health, and Nursing.

<sup>b</sup>Non-health faculties include: Science and Math, Engineering, Social Science, Sharia Law (Islamic Law), Art, Education, and Business;

a vs. b:  $p$ -value = 0.004; 95% CI = 6.28% to 13.73%.

*Medicines used for self-medication*

According to the data shown in Fig-1, the most frequently used non-prescription medication was pain killers (52.9%), followed by vitamins and minerals (13.1%), antihistamines (9.0%), eye drops (7.7%), and nose decongestants (3.7%). Antibiotics and sleeping pills were used without a prescription in 2.9% and 2.1% of cases, respectively.

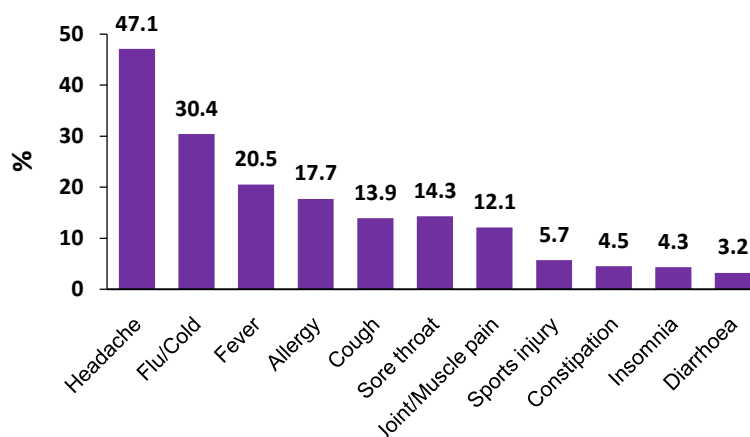
*Common health problems and reasons for self-medication*

The most common health problems for which students practiced self-medication were: headache (47.1%), flu/cold (30.4%), fever (20.5%), allergy (17.7%), cough (13.9%), sore throat (14.3%), and joint or muscle pain (12.1%). Detail is shown in Fig-2.

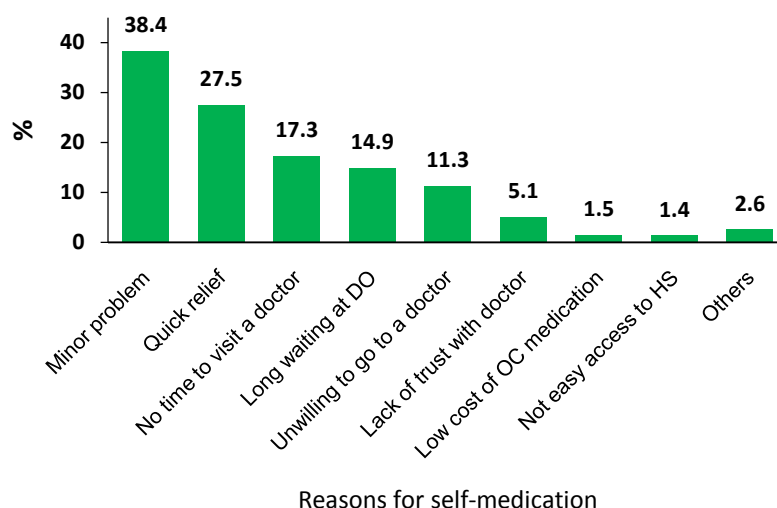
When they were asked what reasons made them prefer self-medication over visiting a doctor, the most common response was that the condition was a minor health problem (38.4%). The other reasons included: quick relief (27.5%), not having time to visit a doctor (17.3%), long waiting time at doctor's office (14.9%), did not want to go to a doctor (11.3%), lack of trust with doctor (5.1%), low cost of over-the-counter medicine (1.5%), and not easy availability of health services (1.4%) (Fig-3).

*Adverse effects experienced*

Of the users, 117 (14.2%) had experienced any adverse reactions while on self-medication. Of those who experienced adverse effects, 100% stopped taking the medication, 69.2% consulted a doctor, 34.2% consulted a family member or a



**Fig-2.** Common health problems for self-medication



**Fig-3.** Reasons for choosing self-medication over visiting a doctor.  
Note: DO- Doctor's office, OC- Over the counter, HS- Health service

friend, and 25.6% switched to another medication (Table 3).

**Table-3:** Adverse effects experienced and actions taken among those who used self-medication ( $n = 822$ )

Variables	Frequency (%)
Any adverse effects (yes)	117/822 (14.2)
Actions taken after having adverse effects ( $n=117$ )	
Stopped taking medication	117 (100)
Consulted a doctor	81 (69.2)
Consulted a family member or friend	40 (34.2)
Switched to another medication	30 (25.6)
Consulted pharmacy staff	28 (23.9)
Nothing	80 (68.3)
Other	4 (3.4)
Took more than recommended dose, even if by accident ( $n=822$ )	156 (18.9)
Purposely changed the dosage ( $n=822$ )	310 (37.7)
Reasons for changing the dosage ( $n= 822$ )	
Improving conditions	158 (19.2)
Worsening conditions	90 (10.9)
Less doses work better	38 (4.6)
More doses work better	69 (8.4)
Advice on changing the dose	41 (5.0)
To reduce adverse reactions	44 (5.3)
Others	25 (3.0)
Completed full dosage of medication ( $n = 822$ )	217 (30.0)

**Table-4:** Level of knowledge about adverse effects and sources of information about medication among those who used self-medication

Variable	Frequency (%)
Those who had score below the median of 29	624/1,167 (53.5)
Sources of information about the drug* ( $n=822$ )	
Checking the package insert	434 (52.7)
By consulting a pharmacist	239 (29.0)
By consulting FM or friends	218 (26.5)
From advertisements	22 (2.6)
From the internet	237 (28.8)
From previous experience	161 (19.5)
By guessing himself/herself	19 (2.3)
Others	9 (1.0)
Checked the expiry date of drug ( $n=822$ )	628 (76.4)
Feeling of having adequate knowledge to use or not to use self-medication ( $n=822$ )	442 (53.8)

Note: \*Multiple responses. FM: Family members

Importantly, about 19% of the participants self-reported that they had taken more than the recommended dose of medication, even if by accident. In addition, 310 (37.7%) deliberately changed the dosage of medication during the course of self-treatment. The reasons for changing the dose as reported by the participants were: improving conditions (19.2%), worsening



**Table-5:** Association of socio-demographic factors with use of self-medication

Risk Factors	Self-medication <i>n</i> (%)	Univariate Logistic Regression	
		Crude OR (95% CI)	<i>P</i> value
<b>Age groups</b>			
≤ 19	205 (55.4)	Reference	
20-21	216 (63.9)	1.43 (1.1-1.9)	0.022
> 22	279 (69.0)	1.80 (1.3-2.4)	< 0.001
<b>Gender</b>			
Male	215 (61)	Reference	
Female	509 (62.5)	1.038 (0.8-1.3)	0.777
<b>Nationality</b>			
Kuwaiti	603 (60.6)	Reference	
Non- Kuwaiti	120 (69.7)	1.458 (1.0-2.0)	0.035
<b>Academic year</b>			
1 <sup>st</sup> & 2 <sup>nd</sup>	258 (57.7)	Reference	
3 <sup>rd</sup> & 4 <sup>th</sup>	252 (62.2)	1.21 (0.9-1.6)	0.181
5 <sup>th</sup> to 7 <sup>th</sup>	187 (73.9)	2.1 (1.5-2.9)	< 0.001
<b>Mother's education</b>			
High school	163 (62.2)	Reference	
Undergraduate	75 (60)	0.79 (0.5-1.1)	0.182
Graduate	350 (61)	0.753 (0.4-1.2)	0.237
Post-graduate	128 (67)	0.827 (0.5-1.2)	0.343
<b>Father's education</b>			
High school	189 (65)	Reference	
Undergraduate	76 (64)	0.911 (0.5-1.4)	0.677
Graduate	276 (59)	0.955 (0.7-1.2)	0.768
Post-graduate	179 (65)	1.209 (0.8-1.7)	0.343
<b>Income (KD)</b>			
< 1000	75 (10.5)	Reference	
1001-2000	196 (27.5)	0.824 (0.5-1.2)	0.395
2001-3000	173 (24.2)	0.755(0.4-1.2)	0.238
> 3000	270 (37.8)	0.732 (0.4-1.1)	0.183

Note: In multivariate analysis, no variables were found significant for nonprescription medication, after controlling for age, nationality, year of study, father's education, mother's education, and income. Independent variables have missing values.

conditions (10.9%), less doses work better (4.6%) and more doses work better (8.4%), and advised to change the dose (5.0%). About 70% of those who practiced self-medication reported that they did not complete the full dosage of medications including antibiotics.

#### *Level of knowledge about the adverse effects of self-medication*

As mentioned in Table 4, out of a maximum possible score of 50, the mean ( $\pm$ SD) knowledge total score was 29 ( $\pm$ 4.8), with a range from 9 to

**Table-6:** Association of socio-demographic factors with knowledge scores

Variables	Knowledge score <sup>a</sup>		Univariate		Multivariate	
	< 29 <i>n</i> (%)	≥ 29 <i>n</i> (%)	Crude <i>OR</i> 95% <i>CI</i>	<i>P</i> value	Adjusted <i>OR</i> 95% <i>CI</i>	<i>P</i> value
<b>Age groups</b>						
< 19	200 (54.8)	165 (45.2)	Reference			
20-21	180 (53.6)	156 (46.4)	1.1(0.8,1.4)	0.745	0.82 (0.5, 1.2)	0.336
≥ 22	213 (52.9)	190 (47.1)	1.1(0.8,1.4)	0.590	0.65 (0.4, 1.0)	0.068
<b>Gender</b>						
Male	214 (62.4)	129 (37.6)	Reference			
Female	410 (50.8)	397 (49.2)	1.6(1.2,2.1)	< 0.001	1.87(1.4, 2.5)	< 0.001
<b>Nationality</b>						
Kuwaiti	526 (53.8)	452 (46.2)	1.1(0.8,1.6)	0.476	1.14 (0.79, 1.64)	0.481
Non- Kuwaiti	97 (56.7)	74 (43.3)	Reference			
<b>Academic year</b>						
1 <sup>st</sup> & 2 <sup>nd</sup>	261 (58.8)	183 (41.2)	Reference			
3 <sup>rd</sup> & 4 <sup>th</sup>	220 (54.6)	183 (45.4)	1.2(0.9,1.6)	0.219	1.45 (0.99, 2.1)	0.057
5 <sup>th</sup> to 7 <sup>th</sup>	108 (43.0)	143 (57.0)	1.9(1.4,2.6)	< 0.001	2.0 (1.5,2.8)	< 0.001
<b>Mother's education</b>						
High school	150 (57.9)	109 (42.1)	Reference			
Undergraduate	69 (55.6)	55 (44.4)	1.1(0.7,1.7)	0.674	1.08 (0.67, 1.74)	0.754
Graduate	295 (52.7)	265 (47.3)	1.2(0.9,1.7)	0.162	1.09 (0.78, 1.55)	0.609
Post-graduate	102 (52.8)	91 (47.2)	1.2(0.8,1.8)	0.284	1.03 (0.64, 1.67)	0.891
<b>Father's education</b>						
High school	159 (55.4)	128 (44.6)	Reference			
Undergraduate	68 (58.1)	49 (41.9)	0.9(0.6,1.4)	0.617	0.89 (0.55, 1.45)	0.641
Graduate	249 (53.7)	215 (46.3)	1.1(0.8,1.4)	0.642	0.99 (0.70, 1.41)	0.946
Post-graduate	144 (52.4)	131 (47.6)	1.1(0.8,1.6)	0.470	0.99 (0.64, 1.51)	0.951
<b>Income (KD)</b>						
< 1000	66 (61.1)	42 (38.9)	Reference			
1001-2000	83 (57.7)	134 (42.3)	1.1(0.8,1.5)	0.613	1.20 (0.74, 1.94)	0.466
2001-3000	38 (49.8)	139 (50.2)	0.8(0.6,1.1)	0.786	1.50 (0.91, 2.46)	0.111
> 3000	219 (51.8)	204 (48.2)	0.7(0.4,1.1)	0.083	1.34 (0.82, 2.18)	0.248

Note: <sup>a</sup>The median knowledge score was 29.

42. About 624 (53.5%) of them had scores below the median value of 29. Of the respondents, 434 (52.7%) looked for information about drugs by checking the package insert, while 29% consulted a pharmacist, and almost a similar percentage (28.8%) searched for the internet sources. Most of the respondents (76.4%) reported that they checked the expiry date of the taken medication. More than 50% of the respondents ( $n = 442$ ) felt that they have had adequate knowledge to use or not to use self-medication.

#### Association between demographic characteristics and use of self-medication

Univariate logistic regression was used to determine the association between demographic factors and the use of non-prescription medication. Estimates are presented as odds ratios (*OR*) with 95% confidence intervals (*CI*). According to Table-5, significantly more people of higher age group (20 and older) than those of  $\leq 19$  years, and more non-Kuwaiti students compared to Kuwaitis



used self-medication. Again, students of 5<sup>th</sup> to 7<sup>th</sup> year of schooling, representing a higher age group, used self-medication more often than the other groups ( $p < 0.001$ ). No significant association was observed between gender, parents' education, and family income. In multivariate analysis, no variables were found significant for self-medication, after controlling for age, nationality, year of study, father's education, mother's education, and income.

#### *Association between demographic characteristics and knowledge*

The knowledge scores of the participants were grouped into two: scores below the median value of 29 ( $n = 624$ ), and scores  $\geq 29$  ( $n = 526$ ). A logistic regression analysis was done with the knowledge scores as the dependent variable and the demographic factors as independent variables. Using both univariate and multivariate models, as shown in Table 6, two variables were found significant predictors of knowledge: females, who had a two-fold higher knowledge scores than their male counterparts; and higher academic years (5<sup>th</sup> to 7<sup>th</sup> year), meaning that students of higher academic years had a two-fold increase in knowledge scores than the junior students (1<sup>st</sup> and 2<sup>nd</sup> year).

#### **Discussion**

In this study, 822 (70.4%) of the study population used self-medication, and the prevalence was significantly higher among the students of non-health profession compared with those of health profession. This validates that our initial hypothesis was correct.

A previous study in Kuwait, which surveyed 1,110 high-school students, demonstrated a very high prevalence (92%) of using non-prescription medications [23]. They also found the rate increasing with age, which is consistent to our findings. Another study in Kuwait among undergraduate students, which surveyed 819 students from Kuwait University and Public Authority of Applied Education and Training Institute (PAAET), revealed that the prevalence of self-medication was as high as 98.8% among university students and 97.2% among PAAET students [1]. However, in the later study, there was

a trend of decreased use of non-prescription medicines with increasing age. The lower prevalence of self-medication in our study could be attributed to the different demographic characteristics of the sampled populations, and/or possibly a change in the trend of medication use among the population.

In our study, the most common medicine for self-medication was pain-killers, which is consistent with previous studies in the country [1, 23]. A study in Italy, which surveyed 989 parents of public school children, estimated that the prevalence (69.2%) with NSAIDs was the most used type of medication and higher among females and of lower age [16]. The results of this study matches our finding in terms of prevalence and most frequent types of medications used but differs by finding a significant association with gender. Such association of gender was, however, nullified in our study in the multivariate regression analysis.

Although Kuwait Ministry of Health offers a free health care delivery system for all Kuwaitis and a minor fee-for-service for non-Kuwaitis, the use of self-medication was similarly high among both the groups. Participants in our study reported that the reasons they preferred using self-medication over visiting a doctor included: the problems being minor (38.4%); wanting to get a quick relief (27.5%), lack of time to visit a doctor (17.3%), having long waiting time at the doctor's office (14.9%), lack of trust with the doctor (5.1%), and low cost of OTC medication (1.5%). Since Kuwait's health care delivery service is a three-tiered system, residents have to be referred from the primary health care (PHC) clinics to the secondary health care and to the tertiary health care consisting of specialized hospitals. The nature of such a health care system forces a large number of people being treated at the PHC, resulting in a long waiting time. However, lack of trust with doctors indicates the scope for improvement of the doctor-patient relationship. Furthermore, economic reasons for self-medication were less important in our sample as most participants reported a high family income, which reflects the general economy of the population. Conversely, a study in Bahrain among the first-year medical students showed that economic reasons (14.9%) justified self-medication more than getting it for a quick relief (11.9%) [25].

Although the prevalence of antibiotic use without a prescription among our participant is low (2.9%), it is worth mentioning. The low rate of self-medication of antibiotic among our participants may be explained by the ease of their getting it from primary care physicians. Compared to our data, most developing countries reported a higher prevalence of self-medication of antibiotics, probably because of negligible regulation on antibiotic prescription and easy access to non-prescription medications. For instance, a study in south India among medical students showed that the prevalence of antibiotics use was as high as 34% [26]. However, in Ethiopia the prevalence of self-medication of antibiotics (4.8%) among health-faculty students was similar to our study [27]. In addition, the frequency of sleep medications among participants in our sample was 2.1%, which was similar to that seen in Canadian high school students (1.8%) [28].

Our study showed that females had a higher knowledge score than males and that student of higher academic year groups scored higher knowledge than those of lower academic year groups. The higher perception of knowledge among females may be attributed to their cautious and vigilant nature compared to males, and the higher perception of knowledge among senior grades may be due to an increase in experiences with age. Another study in western Nepal among undergraduate medical students [29] has found a similar relationship between the year of study and knowledge.

Another interesting finding in our study was that although more than 50% of the respondents thought that they have had adequate knowledge, about 53.5% were found to have poor knowledge scores about the adverse effect of self-medication. This emphasizes the importance of improving the undergraduate curriculum in providing adequate health knowledge to the college students.

In addition to the limitations of cross-sectional studies in general, such as the inability to estimate incidences or to establish a causal association, our study is subjected to several inexactitudes. One of the universities, namely American University of the Middle East, declined to participate in our study, a large percentage of which included non-Kuwaitis. This might alter the findings of the

association of self-medication with nationality. However, a large sample size and a high response rate of 92% should reduce the effect of bias.

## Conclusions

One of the new findings in this study was that students of non-health educational background had a higher prevalence rate of non-prescription medication compared with students with health background. The high prevalence of self-medication in Kuwait necessitates regulatory interventions to organize the dispensing of nonprescription medications among the young and working ages of the Kuwaiti population. Failure to address this issue of indiscriminate use of nonprescription medication will result in the persistence of the problem or even its magnification as its primacy is not acknowledged by the public. The high chance that the irresponsible usage of self-medication among the young adults is because of inadequate knowledge, as found in our study, the appropriate primary goal would be educating the public about the risks of diffuse and inappropriate usage of self medication.

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## Contribution of Authors

AKM: Conception, project supervision, data interpretation, and critical revision of the manuscript; AI: Questionnaire designing, preparation of ethics portfolio, and data collection; YAI: Data collection and interpretation; MBB: Data cleaning, analysis, and interpretation; MFM: Data collection and entry, and Arabic translation of the questionnaire; SFM: Data collection, and referencing.

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