



Exploring Over-The-Counter Medication Use among College Students and the Role of Pharmacists

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ABSTRACT

Over-the-counter (OTC) medications are easily accessible and allow access to treatment options for people who do not or are too busy to receive care from physicians or other healthcare providers [1]. Consequently, OTC medications provide treatment to 60 million people in the U.S [1]. Besides convenience, OTC medications are also affordable treatment options [1]. Therefore, self-medication is a common practice, particularly with the use of OTC medications [2]. However, this practice puts people at risk of developing adverse events, side-effects, or adverse drug reactions (ADRs) [2]. Additionally, self-medication could lead to misusing or abusing OTC medications [2]. Previous studies have shown that a common misconception about OTC medications is that they are safe [3,4]. However, these medications are only safe when used as directed. This perception that OTC medications are safe is a problem because risks of self-medication include incorrect self-diagnosis, delays in seeking medical treatment, incorrect medication choice, masking of a severe disease, and the risk of dependence or abuse [5].

Keywords: Pharmacists, Self-medication, Pain relief.

INTRODUCTION

Self-medication starts at early age. Almost all school students have practiced self-medication by 16 years of age [6]. A study in one particular school for students in grades 7-12, found that 87% of students reported self-medication, 75% of which was for pain relief, and self-medication was increased with age where 95% of those aged 18 years or older reported self-medication [6]. In addition, younger individuals have been shown to misuse OTC medications [7]. Between 2004-2013, there were 390,560 poison center calls for intentional-suspected suicide with 80% among adolescents [7]. The two most common ingested medications were acetaminophen (11%) and ibuprofen (9%) [7]. Similar to adolescents, college students are frequent consumers of OTC medications [8].

Previous studies in different countries have reported high Self-medication rates among college students from 59% percent in the United Arab Emirates to 89% in Brazil [9-14]. Analgesics were shown to be the most common OTC medications used by college students [9-14,15]. Previous research has found common factors that influence self-medication among college students to be previous experience with the medication, minor illness, quick relief, easy accessibility, and urgency of the problem [6,9,12,16-24]. Studies have found that college students in the healthcare field report more self-medication than those in non-health related fields [10,16]. One study showed that pharmacy and medical students in particular report a high use of OTC medications with self-medication rates of 83% for pharmacy students and 74% for

medical students [16]. Another study reported a self-medication rate of 20% among pharmacy students and 49% for medical students [17]. Little is known about college students' perspectives regarding utilizing pharmacists to guide the selection and appropriate use of OTC medications.

OBJECTIVE

The purpose of this study was to identify how college students are using OTC medications, examine their perceptions on OTC medication safety, and understand how pharmacists can facilitate safe and appropriate use.

MATERIALS AND METHODS

Data collection

A survey was developed by the research team to identify college students' perceptions of OTC medication safety and understand how pharmacists can support the safe use of OTC medications among college students. The 32 survey items included questions regarding the frequency and types of OTC medications used, reading drug information and safety labels, information seeking behaviors, preferred method of learning about OTC medication safety, perceptions of pharmacist counseling, and demographics (age, sex, education level, and field of study). Survey questions included the following response options: multiple choice, Likert scale, yes/no, text entry, matrix table, and rank order. The survey was piloted by three pharmacy researchers to ensure content validity. Survey revisions were informed by the feedback. College students aged 18 years or older enrolled at a university in an urban city in Western Pennsylvania were invited to complete an

online Qualtrics survey displayed on the university's website between October-December 2017. A raffle system was used to incentivize student participation.

Data analysis

Out of 1007 survey respondents, 42 indicated no use of OTC medications in the past year and 71 did not answer demographics or other key items. These observations were dropped, leaving an analytic sample of 894 college students. Descriptive and exploratory statistical analyses were conducted to illustrate participants' demographic background and OTC medication-taking behaviors and perceptions, potential safety concerns, and information-seeking about OTC medications. We also focused on items illustrating the use of a pharmacist as a resource for OTC medication information.

In order to compare demographic information with reported frequency of OTC use, one-way ANOVAs were conducted for continuous demographic variables and chi-square tests were conducted for categorical demographic variables. Statistical analyses were performed using STATA (Version 15; STATA Corp., College Station, TX). Text survey data were analyzed using content analysis in Microsoft Excel.

RESULTS

The survey was made available to 28,642 undergraduate and graduate university students. Out of these students, 1007 participated in the survey with a response rate of 3.5%. As shown in Table 1 the majority of survey respondents were female (78%), non-Hispanic White (74%), and undergraduate students (69%).

Table 1: Characteristics of college OTC medication users

Characteristics of college OTC medication users						
	Overall (n =894)	Frequency of OTC Medication Use				p-value*
		Daily (n=179)	Weekly (n=277)	Monthly (n=294)	Less Than Monthly (n=143)	
Age, mean (sd)	22.85 (5.77)	23.78 (7.05)	23.16 (6.13)	22.00 (4.24)	22.85 (5.82)	0.46
Sex (<i>missing</i> =20)						<0.01
Male	192 (22.0)	38 (21.8)	50 (18.7)	53 (18.2)	51 (36.4)	
Female	681 (78.0)	136 (78.2)	218 (81.3)	238 (81.8)	89 (63.6)	
Race/Ethnicity (<i>missing</i> =30)						<0.01

Non-Hispanic White	641 (74.3)	138 (79.3)	224 (83.3)	210 (73.9)	69 (50.7)	
Non-Hispanic Black	35 (4.1)	6 (3.5)	8 (3.0)	11 (3.9)	10 (7.4)	
Asian	108 (12.5)	12 (6.9)	14 (5.2)	41 (14.4)	41 (30.2)	
Other**	79 (9.2)	18 (10.3)	23 (8.6)	22 (7.8)	16 (11.8)	
College Year						0.04
Freshman	118 (13.2)	28 (15.6)	34 (12.3)	35 (11.9)	21 (14.7)	
Sophomore	136 (15.2)	25 (14.0)	39 (14.1)	43 (14.6)	29 (20.3)	
Junior	151 (16.9)	22 (12.3)	49 (17.7)	65 (22.1)	15 (10.5)	
Senior	211 (23.6)	42 (23.5)	61 (22.0)	78 (26.5)	30 (21.0)	
Graduate/Professional Level	277 (31.0)	62 (34.6)	94 (33.9)	73 (24.8)	48 (33.6)	
Plan to Work in Healthcare						0.80
Yes	430 (48.2)	83 (46.4)	127 (45.9)	147 (50.0)	73 (51.1)	
Maybe	157 (17.6)	31 (17.3)	49 (17.7)	49 (16.7)	28 (19.6)	
No	306 (34.3)	65 (36.3)	101 (36.3)	98 (33.3)	42 (29.4)	
*p-value calculated using one-way ANOVA for continuous variables and chi-square for categorical variables						
** Other race/ethnicity category includes participants who indicated Other Race, Hispanic Ethnicity, American Indian/Alaska Native, Multiple Race, and Prefer Not to Answer						

Nearly half of the sample planned to work in healthcare (48%) and almost one third were graduate or professional level students (31%). The average age of the sample was about 23 years old. Of the 1000 survey respondents, 96% stated that they have used OTC medications within the past year. Out of the 894 college students included in the analytic sample, 179 (20%) used OTC medications daily, 277 (31%) weekly, 294 (33%) monthly, and 143 (16%) less than monthly. Sex ($p < 0.01$), race/ethnicity ($p < 0.01$), and college

year ($p = 0.04$) were found to be statistically associated with frequency of medication use at the $p < 0.05$ level, with women, non-Hispanic White, and graduate/professional level participants typically being more likely to report higher frequency of OTC medication use. As shown in Table 2, pain relievers (95%) were the most common OTC medications that participants reported using within the past year. More than half of participants reported using cold/sore throat/cough medications (78%), vitamins (66%), and allergy medications (60%).

Table 2: Types OTC medications used by college students

Types OTC medications used by college students	
Variables	Overall (n =894)
Type of OTC Medications Used	
Pain Relievers (e.g., Aspirin, Tylenol, etc.)	851 (95.3)
Cold/Sore Throat/Cough Medicines (e.g., decongestants, throat sprays, etc.)	697 (78.1)
Vitamins (e.g., Multivitamin, Vitamin C, etc.)	585 (65.5)
Allergy Medications (e.g., Antihistamines, Corticosteroids, etc.)	537 (60.1)
Antacids (e.g., Tums, Pepcid, etc.)	344 (38.5)
Upset Stomach/Anti-diarrheal Medications (e.g., Immodium, Pepto-Bismol, etc.)	265 (29.7)

Sleep Aids (e.g., Melatonin, ZzzQuil, etc.)	243 (27.2)
Herbal Supplements (e.g., Ginko Biloba, St. John's Wort, etc)	117 (13.1)
Other	28 (3.1)
Diet Pills (e.g., Caffeine, Hydroxycut, etc.)	16 (1.8)

Participants were asked about their agreement for several questions regarding OTC medication safety (Table 3).

Table 3: College students' OTC medication-taking behaviors and perception

College students' OTC medication-taking behaviors and perceptions					
OTC Medication-Taking Behaviors					
How often do you...	Always	Most of the Time	About Half of the Time	Not Usually	Never
...read directions if forgotten/haven't taken medication before?	497 (55.7)	9 (1.0)	264 (29.6)	60 (6.7)	63 (7.1)
...read warnings if forgotten/haven't taken medication before?	256 (28.7)	272 (30.5)	124 (13.9)	210 (23.5)	31 (3.5)
...take OTC medications as directed by the label?	439 (49.2)	388 (43.5)	52 (5.8)	11 (1.2)	3 (0.3)
OTC Medication-Taking Perceptions					
Indicate your agreement with the following statements: OTC medications are safe enough that...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
...you can take them without reading the label beforehand	16 (1.8)	99 (11.1)	107 (12.0)	486 (54.4)	185 (20.7)
...you can take them without regard to concurrent medications	9 (1.0)	45 (5.0)	51 (5.7)	416 (46.6)	372 (41.7)
...you can take a higher dose until the symptoms are relieved	14 (1.6)	112 (12.5)	123 (13.8)	369 (41.3)	275 (30.8)
...you can take the medication for a longer than recommended duration of time	14 (1.6)	101 (11.3)	151 (16.9)	392 (43.9)	235 (26.3)

The majority of participants reported always reading the directions if they have forgotten or have not taken that OTC medication before (56%). However, only about one in four participants reported reading warnings if they have forgotten or have not taken that OTC medication before (29%). Additionally, 22% of participants responded that OTC medications are safe as a reason for not reading the warnings before taking the medication. Nearly half of participants reported always taking OTC medications as directed by the

label (49%). The most common reason reported by participants for not reading the directions before taking OTC medications is that they have taken the medication before (73%). Very few participants perceived OTC medications as safe enough that they could take them without reading the label (13%), could take them without regard to concurrent medications (6%), could take a higher dose until the symptoms are relieved (14%), or could take the medications for a longer than recommended duration of time (13%). Potentially unsafe OTC medication use behaviors are shown in Table 4.

Table 4: Potentially unsafe OTC medication use

Potentially unsafe OTC medication use	
Item	Yes n (%)
Have you ever taken OTC medications and consumed alcohol around the same time?	403 (45.1)
Do you buy OTC medications over the internet?	92 (10.3)
Have you ever used any of the following OTC medications in a manner that is different from the stated label directions:	
Ibuprofen	302 (33.8)
Acetaminophen	124 (13.9)
Medication containing diphenhydramine	119 (13.3)
Medication containing pseudoephedrine	75 (8.4)
Medication containing dextromethorphan	63 (7.1)
Aspirin	52 (5.8)
Naproxen	52 (5.8)
Medication containing dimenhydrinate	26 (2.9)
Different medication	15 (1.7)
Never used OTC medications other than as directed by the label	452 (50.6)

OTC medications were taken around the same time alcohol was consumed by 45% of participants. A small minority of participants reported buying OTC medications over the internet (10%). Participants were asked to indicate if they had ever used OTC medications in a manner that is different from the label directions, and ibuprofen (34%), acetaminophen (14%), and medications containing diphenhydramine (13%) were the highest-proportion medications endorsed. Slightly over half of participants reported that they had never used OTC medications other than as directed by the label (51%). These findings show that potentially unsafe medication use is occurring among the college student participants.

The most commonly sought sources for information about OTC medications were the internet (72%), parents (54%), and doctors (31%). Pharmacists were reported by almost over a fourth of participants (26%), followed closely by friends (25%). Additionally, participants responded that they do not talk to their doctor often about taking OTC medications where 33% did not usually think to ask. Few participants reported not seeking OTC medication information beyond what is provided on the label (9%). When asked directly if they had ever spoken with a pharmacist about taking OTC

medications, 39% responded that they had. The main reason participants reported for not interacting with a pharmacist about OTC medications is that they did not feel the need to talk with them (73%). Participants most often reported long lines and perceiving the pharmacist as being busy as having an influence on whether or not they would approach the pharmacist with a question about OTC medications (71% and 69%, respectively). The sex and age of the pharmacist were reported as having an influence on less than 10% of participants. Participants typically responded as being comfortable with talking to their pharmacist about OTC medications, but 15% reported feeling slightly or extremely uncomfortable. Among these participants, reasons for being uncomfortable included feeling like they would be wasting the pharmacists' time, feeling dumb or judged, pharmacists not being approachable, and not knowing they could ask pharmacists about OTC medications.

DISCUSSION

Studying findings revealed a high self-medication rate of 96%, which is greater than rates in other studies [9-14]. Additionally, 33% of respondents reported using OTC medications monthly and 31% reported weekly use. Consistent with previous studies, pain relievers (95%) were the most common OTC medications used followed by cold/sore throat/cough medicines (78%) [9-

14,15]. Slightly over half of the respondents reported always reading the directions before taking OTC medications; however, 34% had used ibuprofen in a manner that is different from the label directions, a potential indication of misuse. Similar to prior studies, survey respondents not planning to work in the healthcare field reported more frequent OTC medication use than those planning to work in the healthcare field [10,16]. Of those who responded "Yes" to planning on working in the healthcare field, 81% reported taking OTC medications daily, weekly, or monthly as opposed to 84% of respondents who answered "No" to working in the healthcare field. Those planning on working in the healthcare field also reported to talk to their doctor more frequently about OTC medications (37%) than those who are not planning to work in healthcare (31%). This may be due to greater awareness of OTC medication safety among students conversant with the healthcare field than those who are not in the healthcare field [25].

Findings showed that gender was significantly associated with frequency of medication use where women were more likely to report higher frequency of OTC medication use. This is consistent with previous studies which also found that women are more likely to read drug information labels [14,26,27]. One particular study showed that female students were more knowledgeable about OTC medication safety [22]. Other studies found that female students used more painkillers compared to males and also experience more pain [26,28]. In addition, women have been shown to be more likely to use prescription and non-prescription analgesic medications concurrently [26]. This is potentially an unsafe medication-taking behavior that highlights the importance of pharmacists providing college students with information about safe and appropriate use of OTC medications. Despite the high OTC self-medication rate, most students reported not asking a doctor or pharmacist about taking OTC medications. Thirty-three percent of students responded that they usually do not think to ask their doctor about OTC medications and 61% reported not talking to a pharmacist.

This is concerning due to the high self-medication rate. However, 39% of students responded that they would like it if a pharmacist briefly talked to them about OTC medications and the majority would feel comfortable talking to a

pharmacist about OTC medications. Out of those who responded "other" for reasons they would feel uncomfortable talking to a pharmacist about OTC medications, 15% reported that they did not know they could talk to a pharmacist about these medications. Some participants thought that they could only talk to pharmacists about prescription medications or that they would be wasting the pharmacists' time. The misconception that students have about the role of pharmacists is consistent with previous studies [29,30]. The role of the pharmacist has drastically changed throughout the past decade yet the public is unaware of the medication counseling services that they can provide [29,30]. Pharmacists can play a valuable role in OTC medication safety for college students especially if they are not consulting a doctor [28]. Pharmacists can ensure that students understand how to properly take OTC medications and check for any drug interactions with other medications they are taking [31].

Limitations

These results cannot be generalizable to the entire student population of the urban university due to the low response rate. Additionally, most participants were female, White, and undergraduates which could create bias in the results.

CONCLUSION

The OTC self-medication rate among college students for the past year is alarmingly high at 96%. Gender, race/ethnicity, and college year were found to be statistically associated with frequency of medication use, with women, non-Hispanic White, and older college year participants typically being more likely to report higher frequency of OTC medication use. Pain relievers were the most commonly used OTC medication. Although slightly over half of participants reported always reading the directions before taking OTC medications, misuse was still occurring. Thirty-four percent of students reported not taking ibuprofen as directed by the label and other medications such as acetaminophen and medications containing diphenhydramine were listed as being misused. The high self-medication rate and reporting of misuse is especially concerning because the majority of students reported not talking to a doctor or pharmacist about taking OTC medications. However, almost half of participants reported feeling comfortable with talking to a

pharmacist about OTC medications. Therefore, attention is warranted to OTC medication use among college students and the role pharmacists need to play in OTC medication safety.

DECLARATION OF CONFLICTING INTERESTS

The authors declare that there is no conflict of interest.

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