

Original Research

# The usage pattern of patients' drug information leaflet for oral non-prescription drugs among university students in the United Arab Emirates: cross-sectional study

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## Abstract

**Background:** Very few extensive studies have measured the prevalence and usage pattern of drug information leaflet (DIL) for oral non-prescription drugs (ONPDs) or identified the associated risk factors for not reading DIL among university students in the UAE. **Objective:** The current study aimed to estimate the prevalence of the usage pattern of DIL for ONPDs, and delineate the associated risk factors for not reading the DIL among university students. **Methods:** A cross-sectional survey-based multistage sampling technique conducted among 2875 students at three major universities in UAE. The self-administered validated questionnaire was constructed and developed based on Andersen's behavioral model. Binomial logistic regression performed to ascertain the effects of 25 potential predictors on the likelihood that participants not reading (discarded) the DIL after reading them. The primary outcome measure was reading (discarding without reading) the DIL, and the associated behaviours. **Results:** 2875 university students were eligible to participate in the study, but only 2519 students agreed to participate, indicating an 88% of intent participation. However, only 2,355 (81.9%) students completed the questionnaire. 1348 respondents reported using NPD (response rate 46.9%) during the past three months before conducting the study, which comprised the sample analysis (1307 were excluded). More than three-quarters of them read the DIL (always or often) at the first use (1049 of 1348, 77.8%). Approximately a quarter of those who read the DIL reported that they discarded them after reading (24.1%). The survey has identified four risk factors for not reading the DIL: those who get the drug information from physicians or pharmacists had lower odds of discarding the DIL (odds ratio [OR] = 0.491, 95% confidence interval [CI]: 0.273-0.884, p value < 0.05). Medical students had lower odds of discarding the DIL (OR = 0.598, 95% CI: 0.412-0.868, p value < 0.05). Those participants who believe that NPDs are as effective as prescription drugs had lower odds of discarding the DIL (OR = 0.342, 95% CI: 0.123-0.948, p value < 0.05). Participants who use more than one NPD to treat a single symptom a day have higher odds of discarding the DIL (OR = 1.625, 95% CI: 1.122 -2.355, p value < 0.05). **Conclusion:** The prevalence of drug usage pattern in this population was 57.5% as 1348 subjects reported using NPD during the past 90 days before conducting the study. We have identified four risk factors for not reading the DIL, those who get the drug information from physicians or pharmacists, medical students, those respondents who believe that NPDs were as effective as prescription drugs, and respondents self-treating a single symptom with more than one NPD. It was evident from the findings that usage pattern of NPD for DIL varied among the students, with no specific pattern dominating.

**Keywords:** Drug Information Leaflet (DIL); Non-prescription drug (NPD); Oral Non-Prescription Drug (ONPD); risk factors; university student

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## BACKGROUND

Using oral non-prescription drug (ONPD) in self-medication practice falls under the broad umbrella of self-care. Self-care is essential and refers to the processes people manage to maintain health, improve their lifestyle, and deal with own illnesses. The appropriate use of ONPD in self-medication has multiple benefits for the patient, and the community. ONPD allow individuals to treat themselves without visiting a practitioner, saving time for the patient, and the healthcare provider. It also gives the patient fast and direct access to disease management, which can be particularly important in contraception.<sup>1</sup> The use of ONPD is also beneficial in terms of cost, particularly in countries that have a nationalized health service.<sup>1,2</sup>

Despite these benefits, ONPD users have potential risks, which could lead to significant health-related problems.<sup>1-3</sup> One example of such a risk is through a common pain medication, the analgesic paracetamol. It is helpful for the relief of pain and fever and is accessible in pharmacies and supermarkets in different forms and dosages.<sup>4</sup> In large doses, however,



paracetamol is incredibly toxic and poses a risk to the consumer when proper warnings are not followed.<sup>5</sup> The prevalence of self-medication using NPD is high amongst university students worldwide. Many studies on NPD, recording very low rate in Ethiopia (24.5%), average in Egypt (55%) and Nigeria (56.9%). While it was high in Slovenia (92.3%), Jordan (96.8%), Pakistan (95.5%), Palestine (98%), with the United Arab Emirates (UAE) being no exception to this trend (86%)<sup>6-8</sup> as NPDs are commonly used amongst students in higher education.<sup>9</sup>

The market for NPDs is also expected to grow in the UAE between 2023-2027,<sup>10</sup> with an expected overall pharmaceutical market to hit 4.7 billion in value by 2025.<sup>11</sup> For safe and effective use of NPDs, it is essential to read and understand the informational insert leaflet or drug fact label.<sup>12,13</sup> In a global review of consumer surveys regarding NPDs use, researchers found that many thoroughly read the drug fact labels or drug information leaflet (DIL) before taking NPDs for the first time.<sup>14</sup> However, a recent study showed that many people do not read the information leaflet.<sup>15</sup> Such practice may therefore result in an incautious use of NPDs. Subsequently, people who practice self-medication may be unaware of the adequate dosages, administration time, and active ingredients when taking a drug without reading the information leaflet. This can result in an inefficient and potentially health-hazardous treatment.

The emphasis is on the importance of accurate drug labelling and the clarity of the information presented in drug leaflets. Considering these recommendations, pharmaceutical companies have invested substantial funds in creating appropriate drug labels for facilitating consumer rational use.<sup>16</sup> In UAE, the Dubai Health Authority dictates that all DILs must use bilingual information in English and Arabic, and that consumers who purchase only a part of the original medication package must be given (free of charge) the DIL.<sup>17</sup> No extensive studies have measured the prevalence and usage pattern of DILs for ONPD or identified the associated risk factors for not reading the DIL among university students in the UAE. Therefore, the present study attempted to fill the gap in the literature. This survey study was crucial to gather specific information about the prevalence, and the risk factors for not reading the DIL among an educated segment of the society in the Emirates.

## OBJECTIVE

The present study aimed to estimate the prevalence of the usage patterns of DIL for ONPDs, and delineate the associated risk factors for not reading the DIL among university students.

## Ethics approval

Ethics approval obtained from University of Sharjah Ref. DFCM/08/01/14/739. All participants were 18 years of age or older. Participation was voluntary and anonymous. Prior to participation in the study, all potential participants informed of the aim of the study and of their right to refuse participation or withdraw from the study at any point without prejudice before completing the survey. Students informed that by completing the questionnaire they agreed to participate in the study.

## METHODS

A cross-sectional study conducted among the students at major universities in UAE, from January to April 2021. **Study population**

The specified precision method was used to determine the sample size.<sup>18</sup> The desired level of confidence was set at 95%, and the desired level of precision was set at 0.03 on either side, such that the estimated proportion of inappropriate use was within 3%. A multistage sampling technique used in the present study. In step 1, three universities out of six UAE universities offering medical and non-medical programs randomly selected. In step 2, three medical and non-medical colleges from each university selected by stratifying medical and non-medical colleges. Then, a random sampling used to select one from medical and two from non-medical colleges within each university. In step 3, a random sample from each program year selected using a simple random table [Table 1].

## Inclusion and exclusion criteria of the universities and students

A multistage sampling technique used to include universities in the UAE in this study. This previously described technique is a three-step cluster sample method [Figure 1]. The inclusion

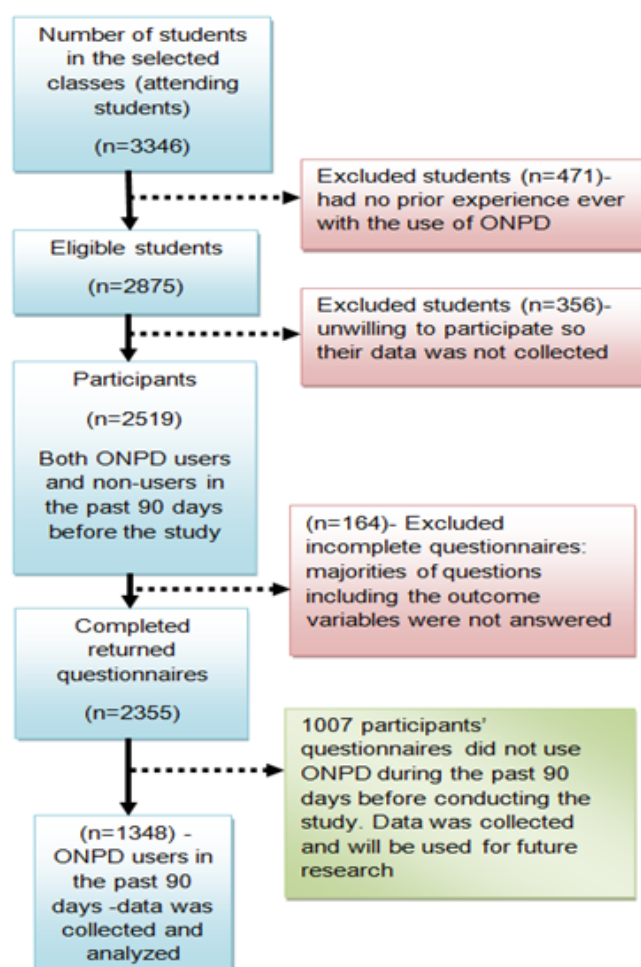


Figure 1. The survey flowchart



criteria of student participants included the following, students have been: undergraduate level, aged 18 years or older, enrolled in spring academic semester, met the English proficiency admission requirements established by the University, had prior experience with the self-use of NPDs, and had not previously taken the survey while attending other classes. All other students who did not meet the above-mentioned inclusion criteria excluded from participation in the study.

### Informed consent

Prior to participation in the study, all potential participants informed about the aim of the study and their right to refuse participation or withdraw from the study. The researchers provided a personal introduction and briefing of the study, informing the students of the nature of the study, the purpose of the study, and the expected time to complete the questionnaire. The consent of the students taken in advance of participating in the study.

### Data collection-questionnaire

#### The questionnaire instruments

The self-administered validated questionnaire used in this study was constructed, and tested for reliability (Cronbach Alfa 0.893.) based on Andersen's behavioral model.<sup>19</sup> The questionnaire comprised of three types of questions divided into three categories: predisposing, enabling, and need factors. Accordingly, the survey ended up with more than 20 explanatory variables. Independent variables were grouped into predisposing factors (three demographic characteristics, one social structural characteristic, and ten health belief characteristics), enabling factors (colleges, year of study, medication knowledge, source(s) of information on NPDs,<sup>20</sup> income, and employment) and need factors (self-care orientation and perceived health). Multiple drug use was assessed by counting the number of NPDs used to self-treat a single symptom.<sup>21</sup> Self-treating a single symptom with one NPD was considered monotherapy, using 2 to 4 NPDs to treat a single symptom was considered minor polypharmacy, and using five or more drugs to treat a single symptom was considered to be major polypharmacy.<sup>21</sup> Polypharmacy data were originally coded as mono = 1, minor polypharmacy = 2, and major polypharmacy = 3. The survey completed in a paper-and-pencil form [Appendix 1].

### Outcome measure

The primary outcome measure was reading (discarding without reading) the DIL, and the associated behaviours.

### Data analysis

The data analyzed using Statistical Package for the Social Sciences (SPSS, version 26, Chicago, IL, USA). Descriptive statistics used to describe the study variables using frequencies and percentages. Binomial logistic regression performed to ascertain the effects of 25 potential predictors on the likelihood that participants not reading (discarded) the DIL after reading them. Binary Logistic Regression (BLR) conducted to identify risk factors of discarding the DIL.

## RESULTS

2875 university students were eligible to participate in the study, but only 2519 students agreed to participate, indicating an 88% of intent participation. However, only 2,355 (81.9%) students completed the questionnaire and considered for data analysis. 1348 respondents reported using NPD (response rate 46.9%) during the past three months before conducting the study. More than three-quarters of respondents reported reading the DIL (always or often) at the first time of use (1049 of 1348, 77.8%). The mean age of the student sample was 20.9 ±0.05 years. The majority of the students were females [1797 (76.3%)], single [2151 (91.3%)], and not employed during the study period [2190, (93%)]. Students who participated in our study were mostly second [560, (23.8%)], and third years [713, (30.3%)] students. The prevalence of drug usage pattern in this population was 57.5% as 1348 subjects reported using NPD during the past 90 days before conducting the study [Table 1].

<b>Step 1</b>	Three universities, out of five UAE universities that offer medical and non-medical programs, were randomly selected
<b>Step 2</b>	a. Three medical and non-medical colleges from each university selected by stratifying on medical and non-medical colleges. b. A random sampling technique used to select one medical college and two non-medical colleges from within each university.
<b>Step 3</b>	A simple random sample of classes was selected from each randomly selected college

More than three-quarters of respondents reported reading the DIL (always or often) at the first time of use (1049 of 1348, 77.8%). About a quarter of those who read the DIL discarded them after reading (24.1%), and (38.7%) said they sometimes keep them even after use. Respondents further investigated to determine which section of the DIL they usually read. 43.6% of the respondents usually read only the drugs' indication (i.e., the use). Approximately one-third of the respondents (35.3%) usually read only about the adverse effect of the drugs, and another one-third (34.4%) reported reading only about the dosing instructions of the drugs. Only 27.3% of the respondents read everything in the DIL [Table 2].

Respondents further questioned to find out if the DIL were either easy to understand or helpful tool. The findings indicated that about (22.0% and 70.0%) of respondents believed that the information in the drug leaflets was very easy and understood, respectively. Moreover, (84.5%) reported that the information on the NPDs leaflet was helpful, while (14.2%) were not sure. More than one-third of the respondents (37.0%), reported keeping the DIL they received on the first time of use, and almost a third (32.3%) changed the way they use the drug because of reading the DIL. (31.3%) said that reading the drug leaflet did not change the way they used to take their medications [Table 3].

### Predictors of DIL

A binomial logistic regression performed to ascertain the effects of 25 potential predictors on the likelihood that participants discard the DIL after reading it. We have identified



Demographics	F, (%)
Age (years)	20.9 ±0.05
<b>Gender</b>	
Female	1797 (76)
Male	558 (24)
<b>Marital Status</b>	
Single	2151 (91.3)
Married	186 (7.9)
Divorced	18 (0.8)
<b>Ethnicity</b>	
UAE <sup>1</sup> National	1073 (45.5)
Arab	1068 (45.4)
Asian	86 (3.7)
Iranian	88 (3.7)
Others	40 (1.7)
<b>Universities</b>	
Sharjah university	681 (28.9)
UAE <sup>1</sup> university	837 (35.5)
Ajman university	837 (35.5)
<b>Student year of study</b>	
1 <sup>st</sup>	175 (7.4)
2 <sup>nd</sup>	560 (23.8)
3 <sup>rd</sup>	713 (30.3)
4 <sup>th</sup>	670 (28.5)
5 <sup>th</sup>	190 (8.2)
6 <sup>th</sup>	47 (2)
<b>Employment status</b>	
Yes	165 (7)
No	2190 (93)
Total	2355 (100)
<b>Self-care orientation</b>	
Low self-care	434 (32.3)
High self-care	914 (67.8)

Keys: F: frequency, %: percent; UAE: United Arab Emirates

Sections of the drug information leaflet (DIL)	F (%)
Indication	588 (43.6)
Adverse effects	476 (35.3)
Dosage	464 (34.4)
Contra-indications	375 (27.8)
Everything (all of the DIL)	368 (27.3)
Cautions	229 (17.0)
Drug-drug interaction	82 (6.1)

Keys: F: frequency, %: percent, DIL: drug information leaflet

four risk factors for not reading the DIL: those who get the drug information from physicians or pharmacists had lower odds of not reading (discarding) the DIL than those who did not (OR = 0.491, 95% CI: 0.273-0.884,  $p < 0.0001$ ). Medical students had a lower odd of discarding the DIL than non-medical students (OR = 0.598, 95% CI: 0.412-0.868,  $p$  value < 0.0001). Those respondents who believe that NPDs were as effective as prescription drugs had lower odds of discarding the DIL than those who did not (OR = 0.342, 95% CI: 0.123-0.948,  $p$  value < 0.0001). Respondents self-treating a single symptom with more

than one NPD had higher odds of discarding the information leaflets than those who did not (OR = 1.625, 95% CI: 1.122-2.355,  $p$  value < 0.0001) [Figure 2].

The chi-square test for independence, showed that there is a statistically significant association between age of the respondents, and incautious ONPD use ( $X^2(1) = 6.072$ ,  $p \leq 0.014$ ); and between gender and the incautious ONPD [ $X^2(1) = 45.783$ ,  $p \leq 0.001$ ]. Further association was evident for the expiry date checking behavior, and the incautious ONPD use [ $X^2(1) = 55.370$ ,  $p \leq 0.001$ ], the medical advice-seeking behavior of the participants, and their behavior of not reading the drug information-leaflets [ $X^2(1) = 40.342$ ,  $p \leq 0.001$ ], the trust in different health care professionals [ $X^2(1) = 1.243$ ,  $p = 0.537$ ]. Further association was evident for the professional sources of ONPD-information, and the incautious ONPD use [ $X^2(1) = 36.745$ ,  $p \leq 0.001$ ]; the informal source of drug information variable, and incautious ONPD use [ $X^2(1) = 20.058$ ,  $p \leq 0.001$ ]. Respondents who acquired ONPD information from reading medical books or the internet (14.8%) were less likely to be incautious users compared to those who did not (25.3%) and the association was statistically significant [ $X^2(1) = 18.199$ ,  $p \leq 0.001$ ]. Moreover, an association was evident between the polypharmacy behavior, and incautious ONPD use [ $X^2(1) = 10.769$ ,  $p \leq 0.001$ ]. Additionally, healthcare respondents had a lower proportion to be incautious users than non-healthcare, and the association was statistically significant [ $X^2(1) = 21.601$ ,  $p \leq 0.001$ ]. Moreover, there was enough evidence to suggest an association between incautious use and self-care orientation [ $X^2(1) = 5.513$ ,  $p \leq 0.05$ ] [Table 4 and Figure 3].

Multivariate analysis demonstrated that respondents age of 21 years and older have lower odds of being incautious ONPD user compared to those with lower age group (OR = 0.573, 95% CI: 0.384-0.855,  $p \leq 0.01$ ). Furthermore, females had 34% lower odds of being incautious ONPD user than males (OR = 0.344, 95% CI: 0.244-0.486,  $p \leq 0.001$ ). Similarly, expiration date checking behavior might be a protective factor against incautious use of ONPD (OR = 0.512, 95% CI: 0.373-0.702,  $p < 0.001$ ). Additionally, polypharmacy might be a risk factor of using ONPD incautiously (OR = 1.369; 95% CI: 1.006-1.862,  $p \leq 0.05$ ). Moderate levels of trust in the drug information provided by healthcare professionals were a significant protective factor against the incautious ONPD use (OR = 0.798, 95% CI: 0.540-0.967,  $p \leq 0.05$ ). The medical-advice seeking behavior was a significant predictor variable (OR = 2.287, 95% CI: 1.655-3.161,  $p < 0.001$ ). In addition, the odds of being incautious users were 2.3 times higher for those not getting o ONPD information from professional sources compared to those getting ONPD information from professional sources (OR = 2.399, 95% CI: 1.599-3.5598,  $p \leq 0.001$ ). Informal sources of ONPD information were associated with an increased likelihood of being incautious users (OR = 1.489, 95% CI: 1.095-2.026,  $p$ -value = 0.011).

Respondents that failed to get ONPD information from reading medical books or the internet had significantly (1.9 times higher odds) higher chances of being incautious ONPD users than users who did (OR = 1.914, 95% CI: 1.353-2.708,  $p \leq 0.001$ ). Moreover, being non-healthcare respondents might be a risk factor for incautious ONPD use (OR = 1.561, 95% CI: 1.103-





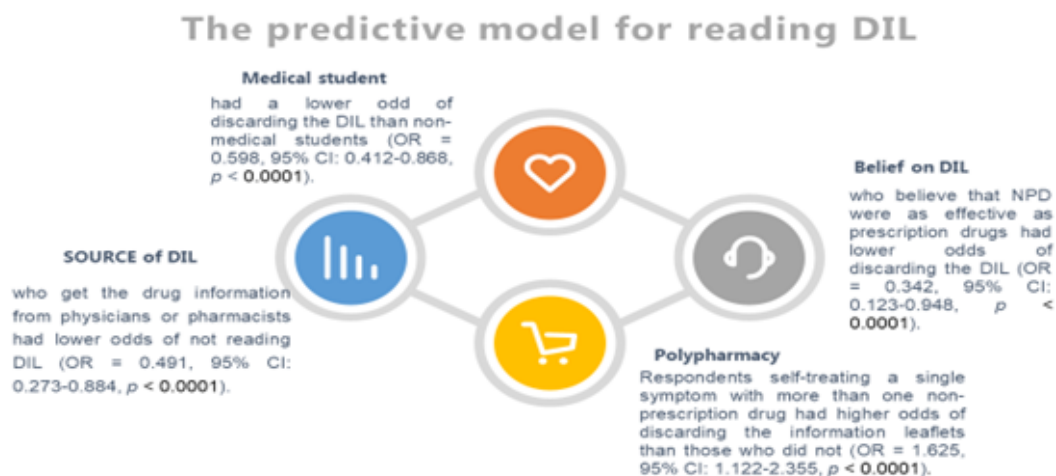


Figure 2. The binomial logistic regression predicted four risk factors for not reading the DIL

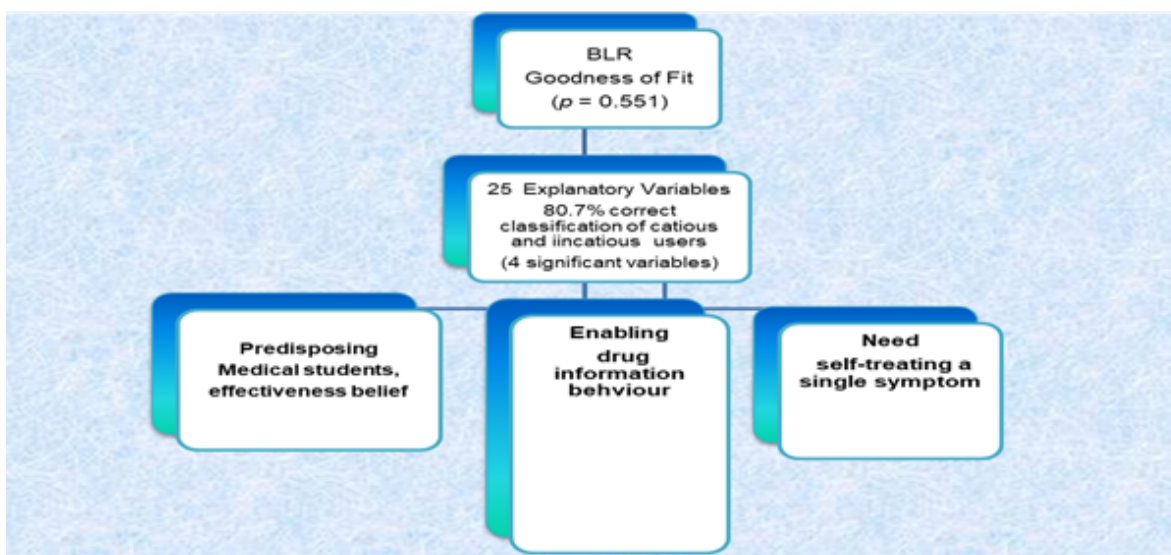


Figure 3. Associations with incautious ONPD use based on Andersen's Healthcare Utilisation Model

2.208,  $p \leq 0.05$ ). Additionally, a high level of self-care orientation might be a risk factor for the incautious ONPD use (OR = 0.696, 95% CI: 1.006-1.862,  $p \leq 0.05$ ) [Table 5].

## DISCUSSIONS

The present study estimated the prevalence of the usage pattern of DIL for ONPD, and the associated risk factors for not reading the DIL among university students. The prevalence of the usage pattern of DIL for ONPDs in the previous 90 days of conducting this study was 57.2%. We have produced a final model of four risk factors: those who get the drug information from physicians or pharmacists. Secondly, the medical students had lower odds of discarding the DIL than non-medical students. Thirdly, respondents who believe that ONPDs are as effective as prescription drugs had lower odds of discarding the DIL than those who did not, and finally respondents who use

more than one ONPD to treat a single symptom a day have higher odds of discarding the DIL than those who did not.

The prevalence of the usage pattern of DIL in our study is consistent with results retrieved by previous studies,<sup>8,9</sup> which found that over 50% of students were self-medicated with NPDs. Different prevalence rates have been registered in Iran (76.6%),<sup>22</sup> Palestine (60%)<sup>23</sup> India (78.6%), Egypt (62.9%), and Malaysia (80.9%).<sup>7</sup> Those differences explained by several factors uncovered in the literature.

More than three-quarters of respondents reported reading the DIL (always or often) at the first time of use (1049 of 1348, 77.8%) which is significantly high compared to one-third (38.8%) of the older outpatient group in Lebanon and almost two-third (68.71%) in India displayed any interest in reading it.<sup>24,25</sup> Although we could speculate that, the high percentage of responsible NPDs users attributed to the fact that the present

Table 4. The proportions of cautious and incautious ONPD users and the associated factors (n =1348)

Associated factor	Cautious users		Incautious users		p-value	df	χ <sup>2</sup>
	F	(%)	F	(%)			
<b>Age</b>							
8-20	425	74.6	145	25.4	0.014*	1	6.072
Age ≥21	624	80.2	154	19.8			
<b>Gender</b>							
Female	896	81.5	204	18.5	≤0.001*	1	45.783
Male	153	61.7	95	38.3			
<b>Expiry date checking behaviour</b>							
Check	200	62.7	119	37.3	≤0.001*	1	55.370
Do not check	849	82.5	180	17.5			
<b>Medical advice seeking behaviour</b>							
Ask for advice	839	81.9	186	18.1	≤0.001*	1	40.342
Don't ask	210	65.0	113	35.0			
<b>Trust in different health care professionals</b>							
Good	400	76.5	123	23.5	0.537	2	1.243
Moderate	418	79.3	109	20.7			
Poor	231	77.5	67	22.5			
<b>Professional source of ONPD</b>							
Yes	953	80.4	233	19.6	≤0.001*	1	36.745
No	96	59.3	66	40.7			
<b>Informal source</b>							
Yes	527	73.1	194	26.9	≤0.001*	1	20.058
No	522	83.3	105	16.7			
<b>Reading source</b>							
Yes	345	85.2	60	14.8	≤0.001*	1	18.199
No	704	74.7	239	25.3			
<b>Polypharmacy behaviour</b>							
Mono	714	80.5	173	19.5	≤0.001*	1	10.769
Poly	335	72.7	126	27.3			
<b>Healthcare participants</b>							
Healthcare participants	417	84.8	75	15.2	≤0.001*	1	21.601
Non-healthcare participants	632	73.8	224	26.2			
<b>Self-care orientation</b>							
Low	321	74.0	113	26.0	0.019*	1	5.513
High	728	79.6	186	20.4			

Keys: F: frequency, (%): Percent; Cont.: Continue; \* p value less than 0.05.

Table 5. Multivariate model for associations with incautious ONPD uses (n=1348)

Variables	Response	OR	95% CI	p-value
Age (ref-18-20 years)	≥ 21	0.573	0.384 - 0.855	0.006*
Gender (ref-male)	Female	0.344	.244 - .486	< 0.001*
Expiry date checking behaviour (ref-check)	Do not check	0.512	0.373 - 0.702	< 0.001*
Polypharmacy behaviour (ref-mono)	Poly	1.369	1.006 - 1.862	0.046*
Trust in health care professionals (ref-good)	Moderate	0.695	0.500 - 0.967	0.031*
	Poor	0.798	0.540 - 1.180	0.259
Medical advice seeking behaviour (ref-ask)	Do not seek medical advice	2.287	1.655 - 3.161	< 0.001*
Professional- source of ONPD information (ref-yes)	No	2.399	1.599 - 3.598	< 0.001*
Informal- source of ONPD information	Yes	1.489	1.095 - 2.026	0.011*
Reading medical books/ the internet- source of ONPD information (ref-yes)	Not reading	1.914	1.353 - 2.708	< 0.001*
Self-care orientation (ref-low)	High	0.696	0.513 - 0.946	0.020*
Medical versus non- medical (ref-healthcare) students	Non-Healthcare	1.561	1.103 - 2.208	0.012*

Keys: CI: confidence interval; OR: odds ratio; Ref: Reference; \* p value less than 0.05.



study only included university students, who may have high awareness about the importance of reading the DIL the first-time drug use, mixed results displaced refuting this conjecture. Previous studies conducted among university students reading the drug package insert before use was high in Iraq (84%), lower in 4 E.U. countries (50%) and significantly low (39.1%) in Poland yet 84% of participants mostly 30 years and above in Taiwan reported reading the DIL.<sup>15,26,27</sup> More robust and extended research needed to confirm this gap between the data where culture could be playing a role in this subject.

The effect of reading the DILs on the way participants use NPDs, observed as mixed with only 32.3% of the users reporting that reading the leaflet changed how they used NPDs. More than a third (36.3%) reported no effect, but the difference was statistically insignificant ( $p$ -value=0.173). This finding might not come as a surprise, given that 43.6% of users only read the indication for drug use and almost three-quarters (72.7%) of users do not read all the information in the drugs' leaflets, therefore, increasing the potential of missing essential leaflet information that might eventually influence their medication use behaviour. Similar results reported in a study conducted in Hungary among the general population, where 23% of Over the Counter (OTC)-drug users reported, greatly influenced by reading the DILs. In comparison, about 20% reported no influence.<sup>28</sup> The same was found in a study conducted in India but showed that less than half of patients (45.0%) changed their behaviour after reading the leaflet.<sup>25</sup> These findings raise the concern that many OTC drug users do not thoroughly read the DIL, resulting in a lack of information regarding safe and effective drug use.

The present study demonstrates the need to develop new and improved tools for providing drug information to the young generation. Pharmacists can play a valuable role in improving patient medical reading habits and being prompt. Moreover, media and the Internet can play a significant role in educational advertisements to raise consumers' awareness about the importance of reading the information in leaflets. Regulatory Instances should change DILs standards to new alternatives considering changes to the poorly presented adverse events that mostly lead to misjudgment and poor decisions on the medications used.<sup>29</sup> Furthermore, there is a need for greater involvement of all the responsible NPDs users that reported changeless behaviour toward NPDs usage after reading drug leaflets in any interventional program that fosters healthy use of drugs among students in the UAE.

About a quarter of those who read the DIL discard them after reading (24.1%). This finding indicates that about a quarter of participants are unaware of the necessity of DILs as a source of drug information. This finding is much lesser than that in the United States among public.<sup>30</sup> This indicates that the sample used in our study and the specific targets may have displayed lesser levels of awareness in contrast with samples used in another research. In the present study, 4 of the 25 potentially explanatory variables that entered the binary logistic regression model were identified as risk factors for discarding the DIL. Participants who got the drug information from physicians or pharmacists had lower odds of discarding the DIL than those who did not. The finding indicates that participants who usually

get information from professional sources of drug information are also keen to get it from the DIL and then keep the leaflets as a backup source of information if they need it again while using the drug. The finding enhances our understanding of the association between information-seeking behaviour and keeping the DIL. A study reported that information about the use of NPDs should be sought from pharmacists or other health professionals.<sup>2</sup> Medical students had a lower odd of discarding the DIL than non-medical students, and a lower probability. Our finding suggests that, medical students more aware of the importance of reading DIL and keeping them than non-medical students.

Concerning medical indications and type of drugs, medical students who practiced NPDs self-medication usage read the DILs more than non-medical. Possibly, the pharmaceutical knowledge and the easy accessibility of drugs indices, literature, and public health education have given them the confidence to make decisions of self-medication, increased their awareness toward making self-medication safe, and sound through DILs reading and keeping it as a recourse for later usage. Furthermore, this may have been reflected from, training, medical consultants or professors' guidance, and their colleague's advice at the university. The above positive findings well documented in literature.<sup>6,13,31-36</sup> Medical students might have a false sense of confidence because of pharmacology courses in their academic curriculum, so they might not be eager to read drug leaflets. This finding is consistent with other studies conducted in Saudi Arabia and India, elaborating that most medical students prefer not to read the DIL at all, consequently discarding the leaflet.<sup>6</sup> Hence, extended studies needed in that matter to have a better understanding of such behavior.

Those participants who believe that NPDs are as effective as prescription drugs had lower odds of discarding the DILs than those who did not. This finding might show that their belief about NPD's effectiveness in treating disease symptoms is as if drugs prescribed by physicians and might influence the behavior of keeping DIL. The present study is the first study that investigates the relationship between effectiveness belief and keeping the DIL; therefore, further studies are required to investigate this relation.

Moreover, participants who use more than one NPD to treat a single symptom a day have higher odds of discarding the DIL than those who did not. The reason behind such relation between using multiple drugs and discarding the drug leaflets could be correlated with another study conducted in Australia demonstrating that NPDs polypharmacy practice is likely to contribute patients to being non-adherent to medicine, which may explain the low interest in reading the DILs overall and discarding it.<sup>37</sup> Therefore, this relationship requires further in-depth investigation through a qualitative interview study.

The results of this study have several implications for pharmaceutical companies. The DIL might be an essential source of information; however, many university students do not read it or only read a single segment and discard it. Pharmaceutical companies should consider developing DILs that allow the conveyance of information that appeals to all



patient groups. The text complexity and language are the main factors for not reading the DIL.<sup>25</sup> From a medical student's perspective participating in another study, the layout of DILs and being in non-native languages can affect their reading rate.<sup>38</sup>

In contrast, other students reported that it is hard to understand the leaflet in general.<sup>25</sup> Therefore, to boost leaflet-reading rate in all majors, students may require some robust changes such as using a 5<sup>th</sup>-grade reading level writings or lower. Further, simplified user-friendly text, plain behavior-oriented language, usage of typographic cues to highlight information, pictograms, and visual aids with simplified text, establishing standardized format, and organization such as "Drug Facts" box, provide quantitative information to convey risks and benefits are some alternative ways to design the DIL.<sup>39</sup> However, university students tend to read the side effects section more. Thus, a proposition is to focus on this section's design.<sup>40-46</sup> However, since the younger generation is bent toward technology and mobile application, developing platforms that enable users to view the information structurally and are easily accessible and digitalizing DIL could reshape the student's behavior toward leaflet.<sup>47</sup>

In summary, more than three-quarters of the surveyed students said they usually read the DIL on first-time use, with around one-quarter of them read-only the whole leaflet: the other two quarters usually read only either the adverse events section or the dosing instructions. Reading the DIL caused patients to alter their treatment regimen. This could be because of the risk information that the drug leaflet conveyed to them and provoked a feeling of anxiety. On a different level, a perfect proportion of the students said that it was easy for them to understand the information presented in the DIL. It is always suggested that regulators and manufacturers consider all patient groups and emphasize what each piece of information presented in the leaflet can elicit in patients regarding perceived risks or benefits.

## CONCLUSION

The current cross-sectional study informs about the usage pattern of the patients' DIL for ONPDs among university students in the UAE. We report a sizable proportion of university

students that do not read and discard the DIL after drug use. The current study delineated the associated risk factors among university students. It was evident from the findings that usage pattern of DIL varied among the university students, with no specific pattern dominating. There is a great need to develop new and improved tools (e.g., digitalization) for providing DIL for the young generation for healthy, safe, and responsible DIL for ONPDs use. Our findings provide relevant insights for future research emphasis.

## ABBREVIATIONS

BLR	binary logistic regression
CI	confidence interval
DIL	drug information leaflet
NPDs	non-prescription drugs
ONPD	oral none-prescription drug
OR	odds ratio
OTC	Over the Counter
UAE	United Arab Emirates

## DATA SHARING STATEMENTS

Additional detailed information and raw data are available on reasonable request.

## CONFLICTS OF INTERESTS

The authors have no conflicts of interest associated with the material presented in this paper.

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