

Polypharmacy Behaviour among University Students in United Arab Emirates

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Received: 08 January 2018; Accepted: 30 January 2018

Citation: Khalid A Al-Kubaisi, Mark D SteCroix, Don Vinson, et al. Polypharmacy Behaviour among University Students in United Arab Emirates. J Med - Clin Res & Rev. 2018; 2(1): 1-5.

ABSTRACT

Objective: This study is designed to measure the prevalence of polypharmacy and identify factors associated with this behavior among university students in UAE.

Methods: A cross-sectional study. Participants were asked whether they used Oral Non-Prescription Drugs (ONPD) in the last 90 days before conducting the study and then to provide details regarding how many ONPD they usually take for self-treating a single illness a day.

Results: Out of 2355 participants, only 1348 were ONPD users in the past 90 day. More than one-third (461, 34.2%) of user participants were multi medications users and seven variables were identified as factors associated with polypharmacy: frequency of use (OR= 3.443, 95% CI: 1.899-5.905, $p < 0.001$), dose seeking- behaviour (OR= 1.919, 95% CI: 1.440-2.557, $p < 0.001$), effectiveness-belief (OR= 0.763, 95% CI: 0.591-0.986, $p = 0.038$), informal source (OR= 1.366, 95% CI: 1.058-1.764, $p = 0.017$), self-care orientation (OR=1.792, 95% CI: 1.363-2.356, $p < 0.001$), perceived-health (OR=1.546, 95% CI: 1.150-2.077, $p < 0.01$) and inappropriate drug use (OR = 1.633, 95% CI: 1.062-2.509, $p < 0.05$).

Conclusion: There is a need for an educational intervention to motivate students to self-use non-prescription drugs more wisely.

Practice Implications: Motivating factors that are significantly associated with polypharmacy behavior include frequency of use, dose seeking- behavior, effectiveness-belief, frequency of use, dose seeking- behavior, effectiveness-belief, self-care.

Keywords

Polypharmacy; University students, Behaviour, Sharjah, UAE.

Introduction

There is no consensual definition for polypharmacy, but it can be defined as a number of drugs that are being taken simultaneously at any given time to treat a single illness, whether the concurrent use

of drugs resulting from a doctor's prescription or self-medication with ONPD [1]. Several other definitions of polypharmacy have been proposed, including the use of multiple unnecessary medications than clinically indicated [2]. In addition, drug regimens that include more than one unnecessary drug owing to the failure to recognize that some drugs have the same active ingredient is also considered polypharmacy [3]. There are several concerns about polypharmacy as it has been associated with increased risk of drug–drug interactions, increased incidence of adverse drug events, reduced quality of life, lack of adherence to medication, hospital admission, drug-related mortality, drug-induced symptoms, food–drug interactions and unnecessary combinations of drugs [1,4]. Furthermore, polypharmacy behavior that includes antibiotics can lead to antibiotic resistance, drug-resistant infections, greater illness severity and prolonged recovery [5].

Earlier studies showed a high (77%) prevalence rates of polypharmacy in Palestinian students [6], but lower rates in male (14.8%) and female (22.7%) Portuguese population [1]. The prevalence of polypharmacy among students in UAE has never been measured in the previous published research. Drug-related problems have also been shown to be linearly related to the number of drugs taken by a patient [7]. Pinheiro concluded that there was a need to measure the prevalence and the determinants of different drug regimens (monopharmacy versus polypharmacy) to closely monitor the occurrence of adverse drug reactions and drug–drug interactions [1]. Such information can be used to design interventional programs to promote responsible, safe and effective drug use. For these reasons, the present study was undertaken to measure the prevalence of polypharmacy among university students in UAE.

Ethics Approval

The present study was conducted after the approval of the Institutional Ethics Committee in UAE and Gloucestershire University, UK.

Methods

A cross sectional study was conducted among the students of major universities in UAE from January to April, 2014. A multistage sampling technique was used in the present study. In step 1, out of five UAE universities that offer medical and non-medical programs, three universities were randomly selected. In step 2, three medical and non-medical colleges from each university were selected by stratifying on medical and non-medical colleges and then a simple random sampling technique was used to select one-college from medical and two colleges from non-medical disciplines within each university. In step 3, random sample from each year of program were selected using simple random table. Prior to participation in the study, all potential participants were informed about the aim of the study and their right to refuse participation or withdraw from the study. Students consent was taken before participating in the study.

Study population

Specified precision method was used to determine the sample size

for this study. 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% (for example, 47 to 53%). The following formula was applied [8]. $n = (Z^2 \times P(1 - P))/e^2$ where Z = value from standard normal distribution corresponding to the desired confidence level ($Z=1.96$ for 95% CI), P = expected true proportion, e = desired precision (half-desired CI width).

A sample size of at least 1,068 ONPD users was needed. Assuming that the prevalence of ONPD use was 37.7% among students [6] to acquire 1,068 ONPD users, a total number of 2,833 students would be required. In the present study, the questionnaire was distributed to 3,346 students and identified 2,875 eligible students, giving a response rate of 85.9%. A total of 471 students were excluded, as they have had no prior experience ever with the use of ONPD. Furthermore, 356 students were unwilling to participate in the study and only 2,519 students were identified as both ONPD user and non-user in the past 90 days before the study. Out of the 2,519 participants, 164 student's surveys were excluded due to incomplete status or the fact that most of outcomes variables were not answered. The completed surveys counted to 2,355 of which 1,007 respondents reported that they have not used ONPD during the past 90 days before conducting the study. The remaining 1,348 ONPD users in the past 90 days were collected and analyzed throughout the study period.

Questionnaire development

A self-administered questionnaire was used in this study. The questionnaire was constructed and developed based on Andersen behavioral model that guided the present study [9]. The questionnaire comprised three types of questions that were divided into three categories: predisposing factors, enabling factors and need factors, accordingly, the survey ended up with more than 25 explanatory variables. Independent variables were grouped into predisposing factors (three demographic characteristics, one social structural characteristic and fifteen health belief characteristics), enabling factors (colleges, year of study, medication knowledge, source(s) of ONPD – information [10] income and employment) and need factors (self-care orientation and perceived-health). The responses were completed in a paper-and-pencil survey instead of an online form. The researchers provided a personal introduction and briefing informing the participants of the nature and purpose of the study, and the expected time to complete the questionnaire. Appropriate drug used was assessed based on five assessment criterion namely self-diagnosis, self-selection of ONPD, dose, frequency of use and food-drug administration [11].

For the purpose of this study, polypharmacy was assessed by counting the number of ONPD used to self-treat a single symptom. This measurement was adopted and modified from a previously published instrument [1]. Self-treating a single symptom with one ONPD was considered to be monotherapy, while using 2 to 4 ONPD to treat a single symptom was considered to be minor polypharmacy, and using 5 or more drugs to treat a single symptom was considered to be major polypharmacy [1].

Validity and reliability

To ensure the face validity of the modified survey used for this particular study, the questionnaire was submitted to four faculty members and two physicians with an excellent experience in survey design study. Furthermore, five students from different colleges of pharmacy in UAE were also asked to read the survey and give their feedback. All of their views and comments were taken into consideration and then incorporated into the final version of the questionnaire.

Data analysis

The responses of participants were encoded, for their demographic details, reasons for self-medication, commonly used ONPD, their knowledge, attitudes, beliefs and behaviors towards self-medication practice of ONPD. The data was analyzed using Statistical Package for the Social Sciences (SPSS, version 20, Chicago, IL, USA). Descriptive statistics was used to describe the study variables using frequencies and percentages. Chi-square test was used to identify any significant difference among the participants' responses regarding certain statements in the questionnaire with a significant level of $p < 0.05$. Binary Logistic Regression (BLR) was conducted to identify risk factors of polypharmacy and to compute odds ratio using enter method. The VIF using Cox and Snell R^2 (0.107) was 1.11 and using Nagelkerke R^2 (0.147) was 1.17 which are both less than 10. This indicates that the inflation of the standard error caused by collinearity, if exists, is not a cause of concern and there is no collinearity problem. The Full BLR model resulted in 70.7% correct classification of polypharmacy and the mono-pharmacy users.

Results

Results Of the 2875 students eligible to participate, 2519 chose to participate, indicating an 88% response rate. Among the 2355 students participated in this study, the majority were females (1797; 76.3%), single (2151; 91.3%), and not employed during the study period (2190; 93%). The majority of the responders (2158; 91.6%) were in the age group of 18-23 years as shown in Table 1. Out of those who accepted to participate, 1348 subjects reported using ONPD during the past 90 days before conducting the study and were asked to complete the survey giving a drug use' prevalence of 57.5%. Our study demonstrated that more than one-third of participants (461, 34.2%) had used more than one drug (polypharmacy) for treating a single symptom in the 90 days before the study was conducted. The vast majority of the polypharmacy user reported using 2 to 4 drugs only for treating a single symptom a day (i.e. minor polypharmacy users). When the students were asked about the reasons for self-medication, the majority (1061, 78.7%) of respondents reported that management of minor illness was the main reason for using of ONPD. Saving time as a reason for using ONPD was reported by 733 (54.4%) of the respondents. Furthermore, previous experience was cited by 572 (42.4%) of the respondents and about a quarter (330, 24.5%) of the respondents reported emergency cases as common reasons for self-medication with ONPD. Since respondents could indicate more than one reason for ONPD use, the percentages sum is more than 100% as shown in Table 2.

Demographics		N	%	95% CI	
				Lower	Upper
Age	18-20	1033	43.8	41.9	45.9
	21-23	1125	47.8	45.7	49.8
	24-26	171	7.3	6.2	8.4
	27-29	12	0.5	0.3	0.8
	≥30	14	0.6	0.3	0.9
Gender	Female	1797	76	74.6	78.0
	Male	558	24	22.0	25.4
Marital Status	Single	2151	91.3	90.2	92.4
	Married	186	7.9	6.9	9.0
	Divorced	11	0.5	0.2	0.8
	Others	7	0.3	0.1	0.6
Ethnicity	UAE National	1073	45.5	43.5	47.6
	Arab	1068	45.4	43.4	47.4
	Asian	86	3.7	2.9	4.4
	Iranian	88	3.7	3.0	4.5
	Others	40	1.7	1.2	2.3
Universities	Sharjah university	681	28.9	27.0	30.8
	UAE university	837	35.5	33.6	37.5
	Ajman university	837	35.5	33.6	37.5
Year of study	1st year	175	7.4	6.4	8.5
	2nd year	560	23.8	22.1	25.5
	3rd year	713	30.3	28.5	32.2
	4th year	670	28.5	26.6	30.2
	5th year	190	8.1	7.0	9.2
	6th year	47	2	1.4	2.6
Employment status	Yes	165	7	5.9	8.1
	No	2190	93	91.9	94.1
	Total	2355	100		

Table 1: Demographic characteristics of the participants (n=2355).

Reason(s) for ONPD use	Number	Percentage
Minor illness	1061	78.7
Saving time	734	54.5
Previous experience	572	42.4
Emergency	330	24.5
Disease prevention	182	13.5
Saving money	177	13.1
As effective as prescription drugs	62	4.6

Table 2: Distribution of the most common reasons for self-treatment with ONPD (n=1348).

The most commonly self-used ONPD were analgesic/antipyretic (1144; 84.9%), pain reliever (NSAIDs, 1028; 76.3%) and those for cough and cold (562, 41.7%). Respondents could indicate more than one reason for ONPD use, so again percentages sum is more than 100% as shown in Figure 1 which shows the proportion of students who used these pharmacological classes over the study period.

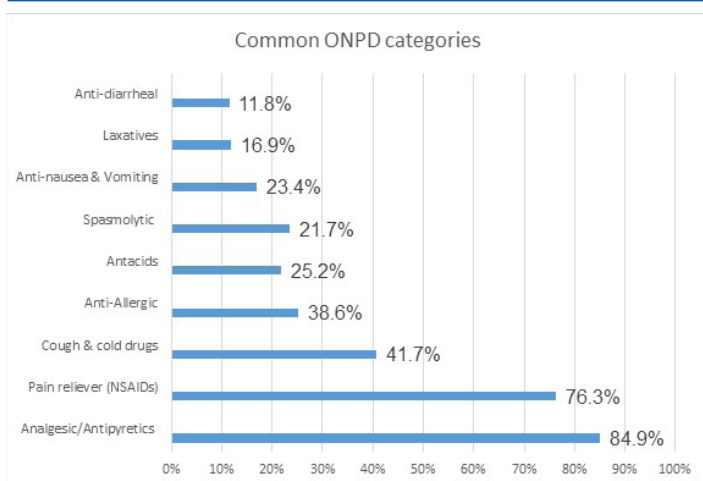


Figure 1: The most commonly used ONPD categories (n=1348).

BLR was conducted to assess the association of a number of factors on the likelihood that respondents would use more than one ONPD a day in self-medication practice and to estimate the individual probability of polypharmacy without prescription. A BLR was performed to ascertain the effects of 26 potential predictors on the likelihood that participants being polypharmacy users and identify seven significant variables (Table 3).

Variables	Response	Exp (B)	OR	95% CI		p-value
Effectiveness of OTCD belief (ref-effective)	Moderately	0.060	1.062	0.539	2.095	0.862
	Ineffective	-0.270	0.763	0.591	0.986	0.038
Frequency of use behavior (ref-yearly)	Monthly	0.378	1.459	0.925	2.301	0.104
	Weekly	0.498	1.645	0.996	2.717	0.052
	Daily	1.209	3.349	1.899	5.905	0.000
Taking more than the recommended dose behavior (ref-No)	Yes	0.652	1.919	1.440	2.557	0.000
Informal- source of OTCD information (ref-No)	Yes	0.312	1.366	1.058	1.764	0.017
Self-care orientation (ref-low)	High	0.583	1.792	1.363	2.356	0.000
Perceived-health (ref-very good)	Poor	-0.015	0.985	0.388	2.506	0.976
	Fair	0.382	1.465	1.005	2.135	0.047
	Good	0.435	1.546	1.150	2.077	0.004
Appropriateness of drug use (ref-appropriate drugs use)	Inappropriate drug use	0.490	1.633	1.062	2.509	0.025

Table 3: Logistic Regression model for associations with polypharmacy behavior.

The odds of being polypharmacy user in the response group who were daily drug users are 3.3 times higher than yearly users. Therefore, daily use of ONPD might be a risk factor for polypharmacy use (OR= 3.443, 95% CI: 1.899-5.905, p<0.001). Furthermore, taking more than the recommended dose behavior was a significant predictor. Participants who reported usual taking

of more than the recommended dose of ONPD had 1.9 times higher odds of polypharmacy use than those who did not (OR= 1.919, 95% CI: 1.440-2.557, p<0.001). Similarly, the odds of being polypharmacy user among participants who believed that ONPD are ineffective are 76% less than those who believed that ONPD are effective with the true population effect between 59% and 98% (OR= 0.763, 95% CI: 0.591-0.986, p=0.038). Therefore, the belief that ONPD is ineffective might be a protective factor against being polypharmacy user. Informal source of ONPD information was a significant variable. Participants who received their information about the use of ONPD from informal sources had 1.3 times higher odds of being polypharmacy users as compared to those who did not (OR= 1.366, 95% CI: 1.058-1.764, p=0.017). Therefore, informal- source of ONPD information might be a risk factor for polypharmacy use. High self-care orientation (treating more than five symptoms with ONPD) might be a risk factor for being polypharmacy user. The odds of being polypharmacy users among participants with high level of self-care orientation are 1.7 times higher than low level of self-care orientation with the true population effect between 13% and 23% (OR = 1.792, 95% CI: 1.363-2.356, p<0.001). Furthermore, participants perceived their current health as good had 1.5 times higher odds of being polypharmacy users as compared to those with very good-health status (OR = 1.546, 95% CI: 1.150-2.077, p<0.01). Similarly a fair-self-reported health status might be a risk factor for polypharmacy behavior (OR = 1.465, 95% CI: 1.005-2.135, p<0.05). Inappropriate drug users have 1.6 times higher odds of being polypharmacy users than appropriate counterparts (OR= 1.633, 95% CI: 1.062-2.509, p<0.05). Therefore, inappropriate drug use might also be a risk factor for polypharmacy use.

Discussion

Our study indicated that more than one-third (461, 34.2%) of participants had used more than one drug for treating a single symptom (polypharmacy) in the 90 days before the study was conducted. This prevalence of using multiple drugs by participants is considered high, placing participants at higher risk of developing adverse drug reactions, drug-drug interactions and food-drug interactions [1,2]. This might be explained in the light of other findings in our study. For example, the most commonly used ONPD in this study were paracetamol (84.9%) and non-steroidal anti-inflammatory drugs (NSAIDs) (76.3%), which were required for quick relief as one possible reason for using more than one drug for treating a single symptom. Second, the present study showed that previous experience was a common reason among participants for self-medication that sometimes requires the use of more than one non-prescription drug for treatment. It has been reported that some participants repeat the same drug regime for the same symptom [6].

Our finding that more than half the participants believed that ONPD are only moderately effective while only 3.3% of the participants believed that they are ineffective may point to the belief that using only one drug is not fully effective in treating the single symptom. This might be another reason why ONPD users have a tendency to use polypharmacy. This is consistent with the results of Chana

and Bradley who reported that drug consumers in Cameroon used multiple drugs for a fever because they did not have sufficient trust in the effectiveness of a single drug and used more than one drug, expecting that at least one of the drugs would work [10].

Of the 26 predictor variables only number 6 was statistically significant. The originality of our results lies in the fact that the vast majorities of these findings are, to the best of our knowledge, new and therefore cannot be compared with other reports in the literature.

Daily ONPD users (high-frequency users) had a higher probability of polypharmacy behavior than once-a-year ONPD users (low-frequency users). This result widens our knowledge about frequency of drug use and its potential relationship to irrational use of ONPD. This finding suggests that daily use of ONPD can increase the probability of daily use of multiple drugs for treating a single symptom. Importantly, it might be possible that such a trend indicates a stressful condition faced by those users. This may also suggest that stress experienced by students, because of preparing for exams has been suggested as a possible reason for taking more than the recommended doses of drugs [12]. This result supports previous findings that dose frequency of non-prescription drug use was the best predictor of self-reported emotional distress among American university students [13].

Using informal sources of drug information was a significant risk factor for polypharmacy as respondents who obtained their ONPD information from informal sources (family, friends and neighbors) had a higher probability of being polypharmacy users than those who did not. This might indicate that drug information from family, friends and neighbors cannot effectively replace reading drug leaflets or formal sources of drug information, such as doctors and pharmacists. Cusack and colleagues found that over-reliance on OTC drug information from sources like family and friends can cause serious health risks [14].

In the present study, ONPD users with high self-care orientation had a higher probability of polypharmacy behavior than ONPD users with low self-care orientation. This finding might be attributed to a false sense of confidence in taking care of one's own health, which may lead to using multiple and unnecessary drugs. These results are in agreement with previously reported findings that high self-care orientation is associated with a positive attitude towards drugs [15]. Our finding also confirms previous results of Sawalha who found that there is a positive correlation between the number of drugs taken by students (polypharmacy) and their self-care orientation [6]. We expected that participants with poor-self-reported health status are at high risk of using more than one ONPD for treating a single symptom daily. However, our results showed that participants perceived their current health as good or fair are at high risk of being polypharmacy users.

These findings might again reflect a false sense of confidence in students' health status, which might motivate them to be polypharmacy user. Students may think that they are healthy and

believe that using several ONPD a day might not have negative consequences on their health. The present study also demonstrated that inappropriate drug use was correlated with a higher likelihood of polypharmacy behavior. This may be explained by drug ineffectiveness when administered for the wrongly diagnosed condition or in the wrongly administered dosage. Experiencing side effects of using over-medication may lead students to use additional drugs and thus increase their chances of polypharmacy behavior. The findings related to the risks of polypharmacy behavior indicate that there is a substantial need for educating students in relation to responsible ONPDs use.

Conclusion

Polypharmacy behavior is high among university students in UAE. To promote healthy ONPD use in university students, awareness campaign is needed in all universities. Intervention strategies must focus on the potential dangers of polypharmacy behavior, particularly among students with a high self-care orientation. Further studies are also required to investigate additional explanatory variables.

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