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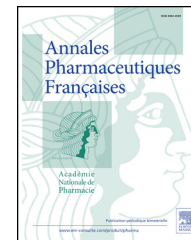


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ORIGINAL ARTICLE

Self-medication practice with analgesics (NSAIDs and acetaminophen), and antibiotics among nursing undergraduates in University College Farasan Campus, Jazan University, KSA

Pratique d'automédication avec analgésiques (AINS et acétaminophène) et antibiotiques chez les étudiants de premier cycle en sciences infirmières du University College Farasan Campus, Jazan University, KSA

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HIGHLIGHTS

- Unfortunately, with the COVID-19 pandemic, prescription only drugs are now increasingly being self-prescribed.
- Present study was therefore, conducted to generate data on self-medication practice of analgesic using non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen, and the antibiotics among nursing students of university college Farasan.
- A cross-sectional descriptive study was conducted among 177 study participants (average age 20 ± 3 years) using questionnaire. Data were collected, analyzed using Origin software (6.1, Illinois, USA). Significance was considered at $P < 0.05$.
- Results exhibited that self-medication practices of analgesics are high among nursing students (87%, $n = 154$) with NSAIDs and acetaminophen being the two most frequently consumed medicines whereas the antibiotics were the least used drugs.
- Results give rise to concern for general well-being of future nursing workforce. There is need to implement educational actions and awareness programmes to limit self-medication practices among educated youth of this beautiful Island.

KEYWORDS

Self-medication;
NSAIDs;

Summary

Objective. – Self-medication practices are widely practiced globally as major form of self-care for pain management. Unfortunately, with COVID-19 pandemic, prescription only drugs are now

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Analgesics;
Ibuprofen;
Acetaminophen;
Antibiotic;
Farasan Island;
Diclofenac

increasingly being self-prescribed. Present study was therefore, conducted to generate data on self-medication practice with analgesics using non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen, and the antibiotics among nursing students of University College Farasan Campus.

Materials and methods. – A cross-sectional descriptive study was conducted among 177 study participants (20 ± 3 years) between December 2019 to February 2020 using questionnaire. Data analyses were done using origin software (6.1, Illinois, USA). Significance was considered at $P < 0.05$. Study was conducted in Department of Nursing, University College Farasan Province, a premier educational institute of Farasan Island affiliated to Jazan university, KSA.

Results. – Self-medication practices were high among nursing students ($n = 154$ participants, 87%). Acetaminophen was highest used drug for analgesic purposes without prescriptions ($n = 101$ participants, 57%). Among NSAIDs, Ibuprofen was most preferred for various analgesic purposes ($n = 35$ participants, 20%) followed by diclofenac ($n = 9$ participants, 5%) and meloxicam ($n = 5$ participants, 3%). Azithromycine was the only antibiotic used by participants ($n = 4$ participant, 2%). Most common causes of self-medication were headache (45%), menstrual pain (23%) and fever (14%). Main reason for self-medications was lack of time to consult doctor (68%). Furthermore, self-medication was significantly associated with study year ($P < 0.003$).

Conclusion. – Results give rise to concern for general well-being of future nursing workforce. There is need to implement educational actions and awareness programmes to limit self-medication practices among educated youth of this beautiful Island.

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MOTS CLÉS

Automédication ;
AINS ;
Analgésiques ;
Ibuprofène ;
Acétaminophène ;
Antibiotique ;
Île Farasan ;
Diclofénac

Résumé

Objectif. – Les pratiques d'automédication sont largement pratiquées à l'échelle mondiale comme une forme majeure d'autosoins de la gestion de la douleur. Malheureusement, avec la pandémie de COVID-19, les médicaments sur ordonnance seulement sont maintenant de plus en plus autoprescrits. Cette étude a donc été menée pour générer des données sur la pratique de l'automédication avec des analgésiques utilisant des anti-inflammatoires non stéroïdiens (AINS) et de l'acétaminophène, et les antibiotiques chez les étudiants en soins infirmiers du « Farasan university college ».

Matériel et méthodes. – Une étude descriptive transversale a été menée auprès de 177 participants à l'étude (20 ± 3 ans) entre décembre 2019 et février 2020 à l'aide d'un questionnaire. Les analyses de données ont été effectuées à l'aide du logiciel Origin (6,1, Illinois, États-Unis). La signification a été considérée à $p < 0,05$. L'étude a été menée dans le Département des sciences infirmières du Collège Universitaire de la province de Farasan, un institut d'enseignement de premier plan de l'île de Farasan affilié à l'université de Jazan, KSA.

Résultats. – Les pratiques d'automédication étaient élevées chez les étudiants en sciences infirmières ($n = 154$ participants, 87 %). L'acétaminophène était le médicament le plus utilisé à des fins analgésiques sans ordonnance ($n = 101$ participants, 57 %). Parmi les AINS, l'ibuprofène était le plus préféré à des fins analgésiques variées ($n = 35$ participants, 20 %), suivi du diclofénac ($n = 9$ participants, 5 %) et du méloxicam ($n = 5$ participants, 3 %). L'azithromycine était le seul antibiotique utilisé par les participants ($n = 4$ participants, 2 %). Les causes les plus fréquentes d'automédication étaient les maux de tête (45 %), les douleurs menstruelles (23 %) et la fièvre (14 %). La principale raison de l'automédication était le manque de temps pour consulter un médecin (68 %). De plus, l'automédication était significativement associée à l'année de l'étude ($p < 0,003$).

Conclusion. – Les résultats suscitent des inquiétudes quant au bien-être général de la future main-d'œuvre infirmière. Il est nécessaire de mettre en œuvre des actions éducatives et des programmes de sensibilisation pour limiter les pratiques d'automédication chez les jeunes éduqués de cette belle île.

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Abbreviations

NSAIDs	non-steroidal anti-inflammatory drugs
SMP	self-medication practice
SM	self-medication
OTC	over the counter
ADRs	adverse drug reactions

Introduction

Drugs mostly used to self-medicate are the non-prescribed or over the counter (OTC) drugs. Self-medication practice (SMP) exposes patients to dangers such as overdose, adverse drug reaction, undesirable side effects, drug dependence, microbial resistance and various other health issues including the risk of masking evolutionary diseases, and increased costs for the health system [1].

Various motives of self-medication include familiarity with symptom or disease, the belief that one has enough knowledge to deal with disease, financial issues, time constraints to consult a doctor and non-serious attitude in dealing with their own health issues. Also, in the current COVID-19 crisis, self-medication practices are high and have become one of the most dangerous forms of disease prevention method due to fear of coming to hospitals where the risk of contracting is perceived to be high, social stigma of COVID-19 disease, travel restrictions and the requirements for physical distancing. There had been distressing news from different parts of the world that people have self-medicated themselves with the drugs that must be taken only under doctor's advice about doses and clinical conditions of the patient, this has even led to death in some areas of the world [2].

In view of epidemiological magnitude and serious negative impact of self-medication practices of analgesics, self-medication among students particularly in the area of healthcare is considered an important public health problem. Studies have shown that prevalence rates range from 38.0 to 97.8%, depending on students' country of origin, graduation course, or the reminiscent period of self-medication [3–11] (Table 7).

Analgesics such as various non-steroidal anti-inflammatory drugs (NSAID) and acetaminophen are the most frequently-used drug groups for self-medication practices [12,13]. NSAIDs are highly effective analgesics and are increasingly used for pain management [14,15]. The NSAIDs include commonly used drugs such as ibuprofen, diclofenac, aspirin and meloxicam are the centerpiece of pharmacotherapy for most rheumatological disorders, and are used in large numbers as analgesics, both as prescription drugs and over the counter purchases [16].

NSAIDs are generally well-tolerated by majorities which is fortunate as these drugs are often very helpful during pain and inflammation. Most side effects are minor and easily reversible by discontinuing the drug or by adding a drug to counter such effects and risks related to serious side effects are quite less. Although NSAIDs relieve pain, their irrational use may cause many prominent adverse drug reactions (ADRs) such as heartburn, upper gastrointestinal (GI) complications ranging from dyspeptic symptoms [17,18] to

life-threatening complicated stomach ulcers, gastroduodenal (GD) damage [19], tendency towards bleeding, hepatic and renal issues [20].

Continued use of NSAIDs for pain relief as monotherapy or in combination with other drugs over long periods of time are associated with the development of slowly progressive kidney disease [21–23]. Studies on animal models have shown that diphenylamine which is common in structure of NSAIDs, uncouples oxidative phosphorylation, decreases hepatic ATP content and induces hepatocyte injury [24,25].

Acetaminophen is another most widely used analgesic as first-line pharmacotherapy for combating pain disorders of different origin and pyrexia [26]. It is generally sold under various trade names. While acetaminophen is relatively non-toxic when administered in therapeutic doses [27], it is a dose-dependent fatal hepatotoxic agent that can cause acute hepatocellular injury leading to centrilobular necrosis [28]. Acetaminophen is known to cause hepatotoxicity when taken in a single or repeated high dose, or after chronic ingestion above therapeutic doses. In such cases toxic effects are developed through consumption of smaller amounts of acetaminophen but for a very prolonged period of time, usually for pain relief to treat toothache, chronic backache, or headache [29].

Acetaminophen hepatotoxicity is primarily related to N-acetyl-para-benzo-quinone imine (NAPQI), a reactive metabolite of acetaminophen formed by cytochrome P450 (CYP450) isoforms (CYP2E1 and CYP2A6) in liver microsomes [30]. The cellular damages caused by NAPQI are directly related to the dose of acetaminophen consumed. In case if acetaminophen is ingested at hepatotoxic doses, build-up of N-acetyl-para-benzo-quinone imine (NAPQI) at toxic concentrations takes place causing liver damage [31,32]. Hepatotoxicity from acetaminophen overdose, whether intentional or non-intentional, is the most common cause of drug-induced liver injury and is a global issue [33–35].

Of the most common used antimicrobial agents are antibiotics. The major problem of utilizing antibiotics without prescription is the emergence of antibiotics resistance [36].

Since self-medication practices are mostly prevalent among educated youth who very often suggest to the family and friends, study needs to be conducted on this issue among educated youth population, particularly those who are admitted to various academic institutions for the study of health and allied sciences. Studies on self-medication practices have been conducted in Saudi academia reporting varying prevalence of self-medication practices [37–42], however, there is an absolute lack of published data on self-medication practices with analgesics using NSAIDs and acetaminophen and the antibiotics among nursing undergraduates of university college Farasan Province, Farasan.

Farasan is a beautiful Island, located about 40 kilometers offshore from the city of Jazan. It is close to being registered under UNESCO's Man and Biosphere Program [43,44]. It has a vast educational institute, university college Farasan Province which is affiliated to Jazan university. Despite all its beauty and natural wealth, scientifically it has been less studied.

Since nursing students would become future nurses and may find themselves counseling patients on safe use of medicines, in this way these professionals play a

Table 1 Demographic characteristics of users and non-users of self-medication with analgesics as NSAIDs and acetaminophen, and the antibiotics among 177 study participants.*Caractéristiques démographiques des utilisateurs et non-utilisateurs d'automédication avec analgésiques comme AINS et acétaminophène, et des antibiotiques parmi 177 participants à l'étude.*

Demographic characteristics	Total number of participants (n = 177)	Self-medication practices in the past 3-months				P-value
		Users		Non-users		
		No.	%	No.	%	
Mean age (20 ± 3 year)						
≤20 year	88	65	37	23	13	<0.052
>20 year	89	89	50	–	–	<0.023
Siblings						
Between	177	149	84.2	25	14.1	<0.014
1–4						
>4						
Marital status						
Married		None				
Unmarried	177	154	87	23	13.0	<0.067
Residence						
Urban	177	106	60	18	10.2	<0.23
Rural		48	27	5	2.80	–
Accommodation						
Hostelers	43	96	55	9	5.00	<0.04
Day scholars	39	58	33	14	8.00	<0.42
Study year	2019–2020					
1st	21	10	06.5	11	7.1	<0.042
2nd	22	13	08.4	9	5.8	<0.013
3rd	23	20	12.9	3	1.9	<0.003
4th	35	35	22.7	0	–	<0.017
5th	28	28	18.2	0	–	<0.03
6th	22	22	14.3	0	–	<0.01
7th	19	19	12.3	0	–	<0.003
8th	07	07	04.6	–	–	<0.09

P < 0.05 is statistically significant.

significant role in patient care and safety especially regarding self-medication practices. Therefore, understanding the practice and self-beliefs related to self-medication mainly with commonly available and easy accessible analgesics as NSAIDs and acetaminophen, and the antibiotics is crucial.

The present study was therefore, conducted with a view to generate data on self-medication practices of analgesic using NSAIDs and acetaminophen among nursing undergraduates of university college Farasan Province. Data generated during this study would be of high significance to implement educational awareness programme and policies to limit this health negligence.

Materials and methods

Sample size

The study samples included 177 female nursing undergraduates with an average age of 20 ± 3 years from all sections

of nursing department, enrolled during academic year of 2019–2020 (December 2019 to February 2020), Semester-II and were willing to participate.

Inclusion criteria

The inclusion criteria for the study sample were full-time student status, enrolled with Jazan university during the academic year 2019/2020. Information on total strength of students in nursing department during 2019–2020, Semester-II was taken from the administrative in-charge responsible for this. The document pertaining to this has been provided as [Table 1](#).

Exclusion criteria

Students who have any type of medical conditions or requiring routine intake of prescribed medications were not deemed suitable.

Table 2 Drugs (^aICD names) used in self-medication and their^bATC code.
Médicaments (^anoms CIM) utilisés en automédication et leur^b code ATC.

^a Self-medicated drugs	^b ATC code
Acetaminophen	N02BE01
Ibuprofen	M01AE51
Diclofenac	M01AB05
Meloxicam	M01AC06
Aspirin	N02PA01
Azithromycin	S01AA26
Amoxicillin	J01CA04
Doxycycline	J01AA02
Metronidazole	J01XD01
Ampicillin	J01CR01

^a International Classification of Disease.
^b Anatomical therapeutic chemical.

Study design

A descriptive, cross-sectional questionnaire based study was conducted from end of December 2019 to the end of February 2020 at department of nursing, university college Farasan Province, Jazan university, Jazan, KSA. The researchers developed questionnaire in English with Arabic translation of each. The questionnaire was translated to Arabic language for simplification and was in English for its validation. Each completed questionnaire was considered as an informed consent for joining the study. The tool was developed based on a comprehensive review of the relevant literatures which are published in peer reviewed journals only [4,5,7,8,45]. The questionnaire was assessed for content reliability and validity and then was distributed among study participants after getting approval from the Head of Ethical Committee. The students were met in the selected classes for about 5–10 minutes to explain and discuss the contents of questionnaire for more clarification before they were asked to complete the questionnaire. For their convenience, students were allowed to take questionnaires to their homes and return to the researcher next day after completing it.

Every student was given the complete unconditional choice to participate without any incentives/bonus or penalty, and was assured that confidentiality of data throughout the study would be maintained and that the data would be used exclusively for research. The questionnaire contained two sections: section A was dedicated to the General Demographic Information and section B contained questions on Self-medication practice, reasons for self-medication, ailments that led to self-medication, types of drugs and source of the drugs. Self-medication practice was analyzed by asking if the participants have ever used analgesics as NSAIDs and acetaminophen (as per International Classification of Disease [ICD] with Anatomical Therapeutic Chemical classification [ATC] code of N02; analgesic with sub-category N02BE01, Table 2), and the antibiotics during past 1 to 3 months without any prescription. Any drug from sources other than from a doctor was classified as self-medication. Data collection took nearly two months.

Study area

The study was conducted in department of nursing, university college Farasan Province, Farasan, Jazan university, KSA. Farasan is famous for its coral reefs, pristine beaches, crystal clear waters and, rich land and underwater wildlife, and for its Parrot-fish locally called as ‘‘hareed’’ and is celebrated as Hareed festival every year and attracts tourists from all over the Kingdom and the foreigners as well. Farasan is miles away from the images of sand dunes one would think of when mentioning the typical landscape of the Kingdom of Saudi Arabia [43,44].

Ethical considerations

Ethical clearances were taken from the Ethics Committee of Farasan university college. Questionnaire was considered as the informed consent of the participants.

Statistical analysis

Data were collected in Microsoft Excel 2010 and analyzed using Origin software version 6.1. The data were presented as mean, standard deviation (SD), frequency and percentage. Comparative statistics was done using Chi² test and $P < 0.05$ was considered as significant level.

Results

The demographic characteristics of the respondents show that majority of the students (98% of the study participants) were between 20 ± 3 years and unmarried (Table 1). Self-medication practices of analgesics as NSAIDs and acetaminophen were significantly affected by the year of study as has been shown in Table 1. The students with higher study levels were more inclined towards self-medication with analgesic using NSAIDs and acetaminophen containing drugs compared to those of lower levels of the nursing programme ($P < 0.003$). Also, the participant who belonged to urban and those living in local apartments were more indulged in self-medication practices of NSAIDs and acetaminophen as analgesics ($P < 0.012$). The anatomical therapeutic chemical (ATC) codes and International Classification of Disease (ICD) of the drugs used in self-medication practices have been summarized in Table 2.

Causes of self-medication practice

The most common causes of self-medication of analgesics using NSAIDs and acetaminophen, and the antibiotics were headache (45%), menstrual pain (23%), fever (14%), cough/cold (7%), sore-throat (3%), hairfall (3%), body ache (3%), acidity and nausea (2%). Information pertaining to this section has been well presented in Table 3.

Major analgesics and antibiotics used during self-medication

Details pertaining to types of drugs and their intake frequencies and % are summarized in Table 4. In this study, 28% of the respondents ($n = 49$ participants) had used NSAIDs

Table 3 Causes of self-medication practice with analgesics using NSAIDs and acetaminophen, and the antibiotics.*Causes de la pratique d'automédication avec des analgésiques utilisant des AINS, de l'acétaminophène et des antibiotiques.*

Drug source	No.	%
Headache	69	39
Menstrual pain	35	20
Fever	22	12
Cough/cold	10	05
Sore-throat	5	03
Hairfall	5	03
Body ache	5	03
Acidity/nausea	3	02
Dental/ear pain	00	00
UTIs	00	00
Asthma	00	00
Diarrohea	00	00
Gastroenteritis	00	00
Appendicitis pain	00	00
Skin rashes	00	00
Total	154	87

P < 0.05 is statistically significant.**Table 4** Major analgesics and antibiotics used for self-medication practice.*Principaux analgésiques et antibiotiques utilisés pour la pratique de l'automédication.*

Self-medicated drugs	Frequencies	%	<i>P</i> -value
Acetaminophen	101	57	<0.009
Ibuprofen	35	20	<0.002
Diclofenac	09	05	<0.019
Meloxicam	05	03	<0.002
Aspirin	00	00	—
Azithromycin	04	02	<0.01
Amoxicillin	00	00	—
Doxyclyline	00	00	—
Ampicillin	00	00	—
Metronidazole	00	00	—
Total	154	87	

P < 0.05 is statistically significant.

as Ibuprofen (20%, *n* = 35 participants) and diclofenac (5%, *n* = 9 participants) for analgesic purposes without doctor's prescription. The NSAID Meloxicam is an anti-inflammatory non-steroidal drug normally used to get relief from muscular pain and 3% of the study participants (*n* = 5 participants) were using meloxicam as self-medication during muscular pain. Acetaminophen was the drug of choice as most of the respondents (57% of the study participants, *n* = 101 participants) have ticked acetaminophen as self-medication practice. Antibiotics were least used drugs as of the various mentioned antibiotics, azithromycin was the only used antibiotic (*n* = 4, participants, 2%). Results clearly indicate

that acetaminophen under different trade names was the highest used analgesic compared to analgesic NSAIDs without prescription.

Factors associated with self-medication practices with analgesics and antibiotics

Data analyses of questionnaires indicated that there were a number of reasons of self-medication with analgesics which are summarized in Table 5. The most common factors that led to self-medication among students were lack of time to visit a private clinic or Government hospitals due to their busy academic schedules (68%). Various other reasons of engaging in self-medication include knowledge about the disease/treatment (13%). Ten percent participants were of the opinion that they had experienced similar symptoms previously so they repeated the same medication and hence quick relief whereas 9% of respondents are of opinion that they are doing self-medication just for a trivial illness that does not need medical advice.

Sources of drugs for self-medications

Various sources from where the drugs were obtained are detailed in Table 6. The medications were bought from a nearby pharmacy by 139 users (78%) and 15 users (9%) obtained from department's clinic.

Side effects

Although, majority of the study participants had no side effects excepting, one student who reported burning sensation due to self-medication practices of acetaminophen.

Doses

Some participants had correct information about the maximum recommended doses of NSAIDs such as ibuprofen and diclofenac, and acetaminophen in 24 h however, number of such participants were quite less (*n* = 14, 8%). Majorities (*n* = 140 participants, 79%) were unaware about the doses.

Discussion

Data of present study showed that acetaminophen is the most common analgesic that is being used by the nursing undergraduates. Among non-steroidal anti-inflammatory drugs (NSAIDs), ibuprofen and diclofenac were the common drugs used by nursing students to manage different types of pain. Azithromycin was the only antibiotic used by the study participants to subside pain related to throat infections including sore throat and flu.

The findings of this study revealed that self-medication practice with analgesics was 87% among nursing undergraduate of Farasan university college. This prevalence is higher than that studies conducted on nursing and medical students in Jazan university 43% [4], 50% in King Saud university [46], different universities in Riyadh 80% for pharmacy, 71% for medicine, 61% for nursing and dentistry, 25% for applied medical sciences [7] and the

Table 5 Factors associated with self-medication practices with analgesic (NSAIDs and acetaminophen) and antibiotics. *Facteurs associés aux pratiques d'automédication avec analgésique (AINS et acétaminophène) et antibiotiques.*

Respondents	Frequency	Percentage (%)	P-value
Lack of time	105	59	<0.019
Knowledge of treatment options	20	11	<0.005
Experienced similar symptoms previously	15	9	<0.012
Condition does not merit seeing a physician	14	8	<0.07
No trust in doctor	00	00	–
Doctor is busy with many patients	00	00	–
Doctor's clinic far from home	00	00	–
Have medicines of family members	00	00	–
Total	154	87	

Table 6 Sources, frequencies and percentages of NSAIDs, acetaminophen, and antibiotics used in self-medication practices. *Sources, fréquences et pourcentages d'AINS, d'acétaminophène et d'antibiotiques utilisés dans les pratiques d'automédication.*

Drug source	No.	%	P-value
Pharmacy	139	78	<0.005
Family/friends	00	00	–
University clinic	15	09	<0.019
Old prescription	00	00	–
Medical representatives	00	00	–
Online shopping	00	00	–
Total	154	87	

Table 7 Self-medication practices among students in various other universities in KSA and outside KSA. *Pratiques d'automédication chez les étudiants de diverses autres universités de KSA et hors de KSA.*

Authors	Country	University	Percentage (%)
Present study	KSA	Department of nursing, Farasan university college	87
Saeed et al. 2015	KSA	Al-Qassim university	86.6
Dimabayao and Mohammad, 2016	KSA	Jazan university	43
Ünver et al. 2020	Turkey	Department of nursing, university of Turkey	61.8
AlBasheer et al. 2016	KSA	Jazan university	87
Alshahrani et al. 2019	KSA	King Khalid university	98.7
Essa et al. 2019	KSA	Universities in Riyadh	25–80
Williams and Crawford, 2016	Australia	University in Victoria	91.7
Gama and Secoli, 2017	Brazil	Public university in Amazonas	76
Malak and Abukamel, 2019	Jordan	Al-Zaytoonah university of Jordan	98.4
Gras et al. 2020	France	University of Picardy (Amiens, France)	95

studies conducted outside Saudi Arabia such as Brazilian nursing students 76% [9], university of Picardy 78% [11] and is lower than that reported for King Khalid university 98% [6] and Jordan university 98% [10]. The detailed comparison on this has also been provided as Table 7. The differences could be as a result of the discipline of the students surveyed and unavailability of other local clinics. It has also been seen that such students very frequently recommend non-prescription drugs to their friends as well. This study also revealed that the prevalence of self-medication increased with the increase

in study year as the students of level 2 were found to self-medicate comparatively less than those of the other higher levels [47].

Furthermore, antibiotics were the least used drugs for self-medication in present study compared to the high percentages recorded by various other studies conducted in KSA and other countries on use of antibiotics for self-medication [48–50].

This study was conducted to get insights into general attitudes and evaluate the prevalence of self-medication practices with analgesics using NSAIDs and acetaminophen,

and the antibiotics among nursing undergraduates and their knowledge regarding proper use and potential harmful side effects of self-medication practices with these drugs. Response rate was 100%. The high response rate achieved in this study may probably be due to the curiosity of students to participate, this was the great strength of the study.

Students had high positive attitudes towards self-medication and majorities of the participants were aware of the adverse effects as well. In this study, most of the respondents have been using acetaminophen as main analgesic followed by NSAIDs such as ibuprofen, diclofenac and meloxicam. The finding of this study are also in line with various other studies where the respondents have been reported to use analgesics as most commonly used self-medication drug [11]. The most cited reasons for use of analgesics remained headache followed by the menstrual pain, fever, migraine and, cold and cough. Very positive outcome of the study is that the antibiotics had been used at 2% that also for sore-throat (3 respondents). Urinary tract infections (UTIs) have not been responded by any participants as a reason for antibiotic. This clearly indicates that the students have a good knowledge and practice of personal hygiene.

Major reasons behind self-medication at student level includes time saving, underestimation of the necessity to take professional advice for minor ailments, anxiety related to hospital, previous successfulness with self-medication used for other medical conditions, effortlessly purchased over the counter (OTC) medicines, recommendations of family/friends and the pharmacists [51–53]. Significant numbers of the participants in this study have also suggested that their academic schedule parallels with the hospital hours and therefore they have no time to consult a physician or to take an appointment in hospital. Majorities of study participants responded that their illness condition was not serious enough to merit seeing a physician.

An encouraging finding from the study is that most of the study participants (89%) had knowledge about multiple uses of acetaminophen, stating that it is mostly used as analgesic and antipyretic as many of the questionnaire revealed that a single respondent has used the same in case of fever, dental pain, ear pain, menstrual pain, and even for headache.

According to the study conducted by Zardosht et al. [54], it was illustrated that the most common reason of using self-medication is student's knowledge of diseases and medications [54]. However, student's knowledge about potential drug interactions, adverse effects and complications may be questionable and may lead to unsatisfactory outcomes because of the lack of experience at this stage of students' lives [54].

Some of the participants of present study were using acetaminophen to treat hair fall, acidity and nausea and acetaminophen is not the correct choice for these ailments. This indicates that nursing students understand the disease well but treatment by self must be sincerely avoided because any inappropriate use of medicine may become drug abuse/misuse and may lead to various serious health issues. A published study by Alam et al. [55] has reported that pharmacy students are more aware than medical students

of the dangers of the self-treatment taking into account side effects and possible toxicity. Bahdailah [56] have also reported that primary knowledge in use of NSAIDs are inadequate in the Kingdom however, this study was conducted on educated youth the information provided by the participants on questionnaire indicate that most of the participants have the information regarding the side effects of NSAIDs and other analgesics but they have careless attitude towards their health which may be due to the various reasons cited by them as time constraints, do not consider their illness need doctor's advice and are far from family. Students were found to be casual in their attitude of taking analgesics either with NSAIDs or with acetaminophen as some had been reported that they take with coffee and empty stomach as well. These information are very important and may help in preventing the side effects mainly related to the gastrointestinal tract such as acidity and various kinds of bowel disorders.

Despite, generally being considered as safe drugs, NSAIDs are however associated with gastrointestinal problems such as ulcer development and cardiovascular side effects and there are published studies that have reported the risks of acute myocardial infarction associated with oral intakes of non-steroidal anti-inflammatory drugs [57].

Similarly, information regarding maximum recommended doses of acetaminophen in a day is crucial to prevent any fatal consequences as its prolonged use may cause hepatotoxicity and other complications, which the studied youth is unaware of. Its overdose is a leading cause of hepatotoxicity and contributes significantly to intensive care unit admissions as well as economic burden of hospitalization [58]. Acetaminophen has become the most significant cause of hepatotoxicity or acute liver failure (ALF)-a devastating disorder that is triggered by increase in plasma aminotransferase ALT/AST levels [59]. However, majority of study participants did not pay attention to this.

Other major side effects that may become apparent after regular and prolonged use of ibuprofen, diclofenac and acetaminophen are related with menstrual pain. Since it relieves pain, it gives a false courage to some teenagers and hence is drug of choice for menses pain. However, regular uses of these analgesics may cause irregular menstruation cycles as well and the real problem appear after marriage while trying to conceive. Results of this study point to a lack of awareness for maximum recommended dose/day and the major side effects of irrational use of analgesics.

The results clearly indicate that self-medication practices of analgesic with NSAIDs and acetaminophen are high among students and need attention by making policies to avoid any future health hazards. In view of these, there is a need to create awareness among the educated youth to ensure safe practices.

One of the major strengths of the study is that our study highlights an alarming situation in which the educated youth are involved in self-medication without having adequate knowledge about safe dosage and contraindications of analgesics as NSAIDs and acetaminophen. Also, the study represents a specific geographical location which has not been studied before on this issue. Data generated during this study would be highly beneficial to take clinical decision by health professionals and policy makers.

One of the limitations of this study was that the analyses were based on questionnaire with the possibility of over and under reporting based on their past three months experiences.

Conclusions

Health education on self-medication should be introduced at undergraduate level to create awareness among the students on the risks of self-medication practices of analgesics as NSAIDs and acetaminophen, and the adverse drug reactions (ADRs) associated with it. The study also indicates towards the need of counseling services at university clinics and trained pharmacist in the university clinic so that the students may become aware of the side effects of self-medication practices and to encourage them to visit the clinic anytime if they feel symptoms of any disease.

Periodical survey about self-medication practices is required to improve students' awareness, prevent health issues related to the ADRs of self-medication practices and prevent economic burden on healthcare system in Saudi Arabia.

Contribution of authors

Both the authors have participated in the research and/or article preparation. The first author has done literature search, data acquisition and calculations, and manuscript writing. Second author has done data analyses, statistical analyses and manuscript preparation. The design of the study, data interpretation has been done by second author. Second author has also participated in critically revising manuscript before final approval for submission.

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Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.pharma.2020.10.012>.

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