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Hypochondriasis and self-medication among medical sciences students during the COVID-19 pandemic: A descriptive cross-sectional study in Northwestern Iran

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Abstract.
BACKGROUND: Increased fear and anxiety among the general public following the emergence of coronavirus 2019 (COVID-19) can lead to hypochondriasis as well as indiscriminate use of drugs, versus the disease.
OBJECTIVE: The present study was conducted to identify the frequency and causes of self-medication and hypochondriasis among students.
METHODS: This descriptive cross-sectional study was conducted among 241 students of different disciplines of Khalkhal University of Medical Sciences in northwestern Iran over a period of six months. SPSS 26 software, Chi-square and Fisher tests were used to analyze the data.
RESULTS: The rate of self-medication was calculated 51%. The highest rate of self-medication was in the form of tablets (75.6%) and capsules (28.5%) and the highest type of medication was herbal medicine (59.3%) and multivitamins and complementary drugs (54.5%). The most common cause of self-medication was previous use and the effectiveness of the drug in the past (79.7%). The mean score of hypochondriasis was calculated at 21.52 (11.02) and the majority of students (49.8%) were in the healthy group. There was a statistically significant association between hypochondriasis and self-medication ($p = 0.002$).
CONCLUSION: Based on the findings, more than half of the participants in the study had self-medication. About 20% of students also experienced mild to moderate hypochondriasis. Therefore, it is suggested that the necessary training and support be provided to deal with the side effects of these two phenomena.

Keywords: Coronavirus, drug prescription, feeling sick, side effects

1. Introduction

Self-medication is a form of self-management in which individuals, families, and communities take medications to treat and improve their health with-

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out consulting a physician [1]. The World Health Organization (WHO) defines self-medication as the acquisition and use of one or more industrial or herbal medicines without the use of a physician's opinion or diagnosis and without a prescription or medical supervision [2]. Indiscriminate drug usage causes disruption of the drug market, cost wastage, per capita increase in drug use [3], and the spread of factors such as bacterial resistance, lack of optimal treatment, drug poisoning and side effects [4]. According to studies, the prevalence of self-medication in different parts of the world varies depending on various cultural, political and economic factors and it has been reported between to be 32.5–81.5% [5]. For example, the prevalence of self-medication has been reported to be 21.5% in rural areas of Portugal [6], 14.9% in the adult population of Brazil [7], 11.9–50% in rural India [8], 62.7% in the adult population of Kuala Lumpur [9], and 42.5% in the general population of Oman [10]. One of the most important reasons for self-medication is the popular culture and public belief that they should be prescribed a lot of drug since people think that any doctor who prescribes more drugs is a better doctor [11]. In addition, many people take medication for prevention and treatment as well as self-enhancement [12]. This has caused half of the drugs used to be useless [12].

In Iran, the country's pharmaceutical system is facing with inappropriate and indiscriminate use of drugs and efforts have not been very successful to correct this trend [13]. The prevalence of self-medication has been reported to be 68% in the elderly population [14]. According to studies, indiscriminate drug use is very common among Iranian students, especially medical students [15–18]. In some studies, its prevalence has been reported to be above 50% [15, 16], and in some cases even above 80% [17, 18]. In a review study conducted in Iran, it was found that analgesics, eye drops and antibiotics included the highest indiscriminate drug use, respectively [19]. Factors such as keeping medicine at home, believing that self-medication is safe, not having enough time to see a doctor to solve the problem, delivery of medicine without a doctor's prescription by pharmacies, distrust of the quality of medicine and preferring foreign drugs to Iranian type was mentioned as important factors related to indiscriminate use of drugs [19].

Hypochondriasis is a type of mental disorder, the person is suspicious of the doctor's diagnosis and believes that he has a serious illness and seeks excessive medical care, despite having physical health and not observing the problem and disease in clinical and laboratory examinations [20]. Therefore, the person seeks excessive medical care or requests frequent changes of medical care and may even refuse medical care for fear of developing the disease [21]. Hypochondriasis can arise after a serious illness or the death of a relative, or because of a physical illness in a person who has recovered but left him/her in the same state of mind [21]. Another reason for this disorder is the patient's hypersensitivity to bodily sensations and his/her low tolerance threshold for pain and physical discomfort [22]. According to studies, the prevalence of this disorder is about 6% [23, 24]. The symptoms of hypochondriasis can start at any age; but this disorder is more reported in people aged 20–30 [25]. In the studies conducted by Ghasemnejad et al. and Ajezi, the prevalence of severe hypochondriasis was reported in one third of the studied Iranian students [26, 27].

The outbreak of coronavirus 2019 (COVID-19) posed new challenges in the field of healthcare worldwide [28]. One of these challenges was the lack of specific drugs at the beginning of the outbreak [29]. On the other hand, the spread of social media and sometimes the presentation of inaccurate information about drugs led to an increase in self-medication and home remedies without confirmation of sufficient safety and effectiveness [30, 31]. This is evidenced by the dramatic increase in internet searches for COVID-19 drugs, as well as the availability of online information on COVID-19 drugs by 2020 worldwide [32]. In some developing countries, including India, self-medication with hydrochloroquine and chloroquine has been observed against COVID-19 [33]. In the United Kingdom (UK), indiscriminate use by dexamethasone has been increased after researchers introduced dexamethasone as a life-giving drug against COVID-19 [34]. On the other hand, previous research on epidemics, such as the 2009 swine flu crisis, has shown that hypochondriasis is positively correlated with depression and anxiety [35]. People with hypochondriasis are more likely to experience psychological distress during an outbreak of an infectious disease because they interpret their symptoms of physical discomfort as signs of infection [36]. Almhdawi et al. reported that healthcare students had a relatively low level of Health-related Quality of life (HRQOL) during COVID-19 pandemic in Jordan [37]. Hence, it is expected that this vulnerability and fear factor could predict psychological pathology [37].

Considering the results of the afore-mentioned studies, it is very important to pay attention to the

side effects of self-medication and hypochondriasis. In addition, studies show that the incidence of self-medication and hypochondriasis among the young population, especially students, is high and it needs to be investigated. Meanwhile, students are of special importance due to their social position and they have more contact with community members in their future job positions as role models and examples of health behaviors for other people. On the other hand, the increase in fear and anxiety among the public following the prevalence of the emerging COVID-19 pandemic can aggravate the two disorders (self-medication and hypochondriasis) because a person may mistakenly consider themselves sick and this feeling makes them take medicine. It seems, in order to change the society's behavior, preliminary studies on the prevalence and influencing factors on health-related phenomena should be conducted to provide the basis for effective interventions. Therefore, collecting information about the causes and types of drugs taken for self-medication, as well as the prevalence of hypochondriasis disorder, can be helpful in dealing with these disorders because based on this information, the necessary training and awareness can be provided to the students. This study aims to identify the frequency and causes of self-medication and hypochondriasis among students of Khalkhal University of Medical Sciences.

2. Methods

2.1. Study design

This descriptive cross-sectional study was conducted between 11 July 2021 and 10 January 2022.

2.2. Sampling and data collection

The place of study was Khalkhal University of Medical Sciences (northwestern Iran). The study population included all 320 students of this faculty who were selected by the counting method. Dissatisfaction with participating in the study, having psychological and social problems, and partial completion of questionnaires were among the exclusion criteria. In order to collect data, after obtaining the necessary permits from university officials, an electronic version of the questionnaires was prepared and sent to students through the available virtual networks.

2.3. Study tools

Data collection tools included three questionnaires. The first questionnaire was demographic characteristics questionnaire that covered the following items: age, gender, housing, place of residence, field of study, marital status, academic year, economic status, parents' education level, history of self-infection, history of corona among relatives and family, fear of having COVID-19 and having an illness or health problem.

The second questionnaire include three parts. In the first part, the forms of drug use included five categories of Tablet, Vaccine, Capsule, Syrup, and Suppository. In the second part, the type of drug included six categories of Antihistamine, Soothing, Herbal Medicine, Multivitamins or other supplements, Antibiotics, Analgesic. The third section includes 13 items dealing with the causes of self-medication. The answers were yes and no. The frequency and percentage were calculated for each answer. It was possible to choose more than one answer.

The mentioned questionnaire was adapted from Tabiei et al.'s study [38] in Birjand. In this study, the validity of the content of the questionnaire was confirmed by the faculty members of Birjand University of Medical Sciences. In addition, its reliability was obtained to be 0.83 using Cronbach's alpha coefficient after a preliminary implementation on 30 students [38].

The third questionnaire was the standard hypochondriasis questionnaire. This questionnaire was designed and developed by Evans in 1980 [39] to identify hypochondriasis tendencies and includes 36 questions based on the Likert scale, with questions such as "How much do you think you are at risk of different disease compared to your age group?" It measures hypochondriasis. Based on the score obtained, individuals are divided into healthy (0–20), borderline (21–30), mild (31–40), moderate (41–60) and severe (above 60) groups [39]. The reliability and validity of the Persian version of this questionnaire was confirmed by Khani et al., and Cronbach's alpha coefficient has been reported to be 0.86 [40]. Cronbach's alpha coefficient of this questionnaire in the study of Talaei et al. was 0.89 [41]. In addition, the high correlation of this questionnaire with other hypochondriasis measurement tests such as the Minnesota Multidimensional Self-Illness Scale (MMPI) indicates its appropriate validity [41].

2.4. Statistical analysis

The collected data were analyzed using SPSS software version 26 and descriptive and inferential statistics. In order to report descriptive statistics mean, standard deviation, frequency and percentage were used. In the inferential part, Kolmogorov-Smirnov test was used to check the normality of the data. Chi-square and Fisher tests were used to determine the association between demographic characteristics of students, and hypochondriasis and self-medication. The association between hypochondriasis and self-medication was also investigated by Chi-square test. It should be noted that when the number of observations was less than 20 or if the number of observations was between 20 and 40 and the smallest expected frequency was less than 5, Fisher's exact test was used. Otherwise, if the maximum 20% of the expected frequencies were less than 5, the chi-square test was used.

3. Results

3.1. Participants

Out of 320 students, 241 participated in the study. The characteristic of the participants are presented in Table 1. The main participants were female (67.22%) and single (83.82%). The mean age of the participants was 24.29 (7.28) years old. The majority of samples were city dwellers (90.04%), and non-natives (72.2%). Nursing students (38.18%) were the largest number of participants in the study. About 65% of the participants were studying in the second and third year of university. In terms of economic status, most of the students were in average status (58.09%). In terms of parental education, most of the fathers had university education (34.44%) and most of the mothers with 9th grade literacy (31.53%). More than 60% of participants did not have COVID-19 by the time of the study. A disease or health-related problem was reported among 149 (61.83%) students. Having headaches (8.5%) was the most reported problem. Fifty-three (35.6%) students reported two or more problems or illnesses.

3.2. Self-medication, and its associated demographic characteristics

About half of the samples (51%) had a history of self-medication. According to Table 1, a statistically significant association was found between housing and self-medication ($X^2 = 5.03$, $p = 0.02$) and the academic year with self-medication ($X^2 = 10.59$, $p = 0.01$). Disease or problem related to breathing ($X^2 = 3.42$, $p = 0.06$), allergies ($X^2 = 4.04$, $p = 0.04$) and joint related problems ($X^2 = 6.41$, $p = 0.01$) were associated with self-medication. In addition, a statistically significant association was observed between self-infection of COVID-19 ($X^2 = 29.65$, $p < 0.001$), infection of family and relatives ($X^2 = 34.45$, $p < 0.001$) and fear of COVID-19 ($X^2 = 24.03$, $p < 0.001$), and self-medication. There was no statistically significant association between self-medication and the mean age (23.71(6.58)) of those who performed self-medication, and mean of those who (24.89(7.92)) did not experience self-medication ($t = -1.24$, $p = 0.21$).

3.3. Type and form of drug for self-medication

Table 2 shows the form and type of drugs used by students. The highest rate of self-medication was in the form of tablets (75.6%) and capsules (28.5%) and the lowest suppository (5.7%). The findings indicated 37 (30%) individuals with self-medication had taken two or more types of drugs. The most used drugs were herbal medicine (59.3%), multivitamins and supplements (54.5%), and the least analgesic (2.4%). Forty-seven (38.21%) participants had taken two or more of the two types of drugs mentioned.

3.4. Causes of self-medication

Table 3 shows the causes of self-medication among students. The most common cause of self-medication from the perspective of participants in the study was related to previous use and effectiveness of the drug in the past (79.7%), no major illness and no need to see a physician (60.2%), and the existence of a free drug market (37.4%), respectively. Lack of insurance was the least common cause of self-medication (11.4%).

3.5. Hypochondriasis score and association with self-medication

The mean score of hypochondriasis among students was 21.52 (11.02). According to Table 4, the highest number of individuals (49.8%) was in the healthy group based on the grouping related to the hypochondriasis. There was also a significant association between hypochondriasis and history of self-medication. As the hypochondriasis worsened, the rate of self-medication also increased (P-value = 0.002).

Table 1
Demographic characteristics of students (N = 241), and its association with self-medication

Variable		Frequency (percent)	Self-medication		X^2	*P*-value
			Yes	No		
Sex	Male	79 (32.78)	35 (44.3)	44 (55.7)	2.13*	0.14
	Female	163 (67.22)	88 (54.3)	74 (45.7)		
Marital status	Single	202 (83.82)	104 (51.5)	98 (48.5)	0.1*	0.75
	Married	39 (16.18)	19 (48.7)	20 (51.3)		
Place of residence	Urban	217 (90.04)	112 (51.6)	105 (48.4)	0.28*	0.59
	Rural	24 (9.96)	11 (45.8)	13 (54.2)		
Housing	Native	67 (27.8)	42 (62.7)	25 (37.3)	5.03*	0.02¶
	Non-native	174 (72.2)	81 (46.6)	93 (53.4)		
Field of study	Nursing	92 (38.18)	42 (45.7)	50 (54.3)	3.73*	0.44
	Midwifery	34 (14.11)	15 (44.1)	19 (55.9)		
	Environmental health	33 (13.70)	30 (58.8)	21 (41.2)		
	General hygiene	51 (21.17)	18 (54.5)	15 (45.5)		
	Nutrition science	31 (12.84)	18 (58.1)	13 (41.9)		
Academic year	First year	38 (15.77)	12 (31.6)	26 (68.4)	10.59*	0.01¶
	Second year	89 (36.93)	46 (51.7)	43 (48.3)		
	Third year	69 (28.63)	44 (63.8)	25 (36.2)		
	Fourth year	45 (18.67)	21 (46.7)	24 (53.3)		
Economic situation	Weak	13 (5.4)	7 (53.8)	6 (46.2)	0.31*	0.95
	Medium	140 (58.09)	68 (48.6)	72 (51.4)		
	Good	79 (32.78)	38 (48.1)	41 (51.9)		
	Excellent	9 (3.73)	4 (44.4)	5 (55.6)		
Father's education level	Illiterate	26 (10.79)	12 (44.4)	14 (53.8)	1.88*	0.59
	9th grade literacy	68 (28.21)	31 (45.6)	37 (54.4)		
	Diploma	64 (26.56)	36 (56.3)	28 (43.8)		
	University	83 (34.44)	44 (53)	39 (47)		
Mother's education level	Illiterate	45 (18.67)	18 (40)	27 (60)	4.57*	0.2
	9th grade literacy	76 (31.53)	45 (59.2)	31 (40.8)		
	Diploma	65 (26.97)	31 (47.7)	34 (52.3)		
	University	55 (22.83)	29 (52.7)	26 (47.3)		
Illness or health problem	Breathing	12 (3)	3 (25)	9 (75)	3.42*	0.06§
	Menstruation	22 (5.5)	10 (45.5)	12 (54.5)	0.3*	0.58
	Anemia	26 (6.5)	13 (50)	13 (50)	0.1*	0.91
	Allergies	25 (6.2)	8 (32)	17 (68)	4.04*	0.04¶
	Muscle	7 (1.7)	3 (42.9)	4 (57.1)	0.19**	0.71
	Skin	13 (3.2)	5 (38.5)	8 (61.5)	0.87*	0.35
	Headache	34 (8.5)	20 (58.8)	14 (41.2)	0.96*	0.32
	Joint-related problems	6 (1.5)	0	6 (100)	6.41**	0.01¶
	Nerves	17 (4.2)	8 (47.1)	9 (52.9)	0.11*	0.73
	Infection	5 (1.2)	3 (60)	2 (40)	0.16**	1
	Heart	10 (2.5)	4 (40)	6 (60)	0.5**	0.53
	Digestion	24 (6)	16 (66.7)	8 (33.3)	2.6*	0.1
History of COVID-19	Yes	90 (37.35)	59 (65.6)	31 (34.4)	29.65*	0.000∞
	No	151 (62.65)	64 (42.4)	87 (57.6)		
History of COVID-19 among relatives and family	Yes	178 (73.86)	108 (60.7)	70 (39.3)	34.45*	0.000∞
	No	63 (26.14)	15 (23.8)	48 (76.2)		
Fear of COVID-19	Yes	47 (19.5)	27 (57.4)	20 (42.6)	24.03*	0.000∞
	No	194 (80.5)	(49.5) 96	98 (50.5)		

*Pearson Chi-Square was applied. **Fisher's Exact Test was applied. ¶ *P*-Value < 0.05. § *P*-Value < 0.1. ∞ *P*-Value < 0.001.

3.6. Hypochondriasis, and its associated demographic characteristics

Based on the findings (Table 5), a statistically significant association was observed between hypochondriasis and father's education level ($X^2 = 15.8$, $p = 0.06$). In addition, there was a statistically significant association between self-infection with COVID-19 ($X^2 = 14.48$, $p = 0.01$), infection of family and relatives ($X^2 = 17.84$, $p = 0.004$) and fear of COVID-19 ($X^2 = 17.89$, $p = 0.004$) and hypochondriasis. Disease or problem with headaches ($X^2 = 11.77$, $p = 0.006$), nerves ($X^2 = 7.92$, $p = 0.03$), heart ($X^2 = 11.52$, $p = 0.005$) and gastrointestinal

Table 2
Type and form of drug (N = 123)

	Variable	Frequency (percent)
Drug form	Tablet	93 (75.6)
	Vaccine	18 (14.6)
	Capsule	35 (28.5)
	Syrup	29 (23.6)
	Suppository	7 (5.7)
Type of drug	Antihistamine	17 (13.8)
	Soothing	14 (11.4)
	Herbal medicine	73 (59.3)
	Multivitamins or other supplements	67 (54.5)
	Antibiotics	26 (21.1)
	Analgesic	3 (2.4)

ones ($X^2 = 7.13$, $p = 0.052$) was statistically associated to the hypochondriasis. No statistically significant association was found between the mean age of healthy 24.92 (8.03), borderline 23.96 (6.41), mild 22.34 (6.39), and moderate 24 (6.97) and hypochondriasis ($p = 0.52$).

4. Discussion

This study was performed to identify the frequency and causes of self-medication and hypochondriasis among students. The results confirmed the prevalence of self-medication among roughly 50% of the participants. Previous studies also showed a high prevalence of self-medication among Iranian students [15–18]. The total mean score of hypochondriasis among the participants also indicated that most of the individuals were in the borderline group of hypochondriasis and therefore being at risk. The temporary hypochondriasis is often seen among medical students. A bodily feeling, which was unimportant to a person in the past, is now mistakenly considered as a disease. Because the student now has a newly acquired cognitive body of information about pathology and clinical medicine [42].

Students, especially those of various medical sciences, seem to try self-medication or recommend medication based on what they know and have learned. A high proportion of self-medication was found among students according to results. Of course, this problem has also been reported in other parts of the world, including among Oman (78.5%) and Ethiopian (38.5%), Karachi (76%) and Kuwait (92%) students [43–46]. According to these finding, it can be stated that the rate of self-medication among students is high and it is necessary to give the necessary information to them through books, professors, media, internet and publishing related specialized articles. In addition, the findings indicated a high percentage of students in the basic sciences had self-medication, which is a very high rate considering the lack of direct contact of this group of students with the patient and the hospital and overall clinical work. This can be a sign of the influence and prescription of other classmates and friends, or lack of awareness of the side effects of drugs.

In this study, the highest rate of self-medication was in the form of tablets and capsules and the highest type of medication was herbal medicine, multivitamins, and supplements. The most common reason for self-medication was the previous use and effectiveness of the drug in the past. Similarly, Najafipour et al. in their study on medical students concluded that the most common form of medication usage was taking the tablets, and painkillers. They argued that previous experience of drug use, ignoring the disease's significance and self-diagnosis were the main causes of self-medication [17]. Khadem et al. in their study on medical students in Rafsanjan reported about 76.4% prevalence of self-medication, mostly in the form of tablets. In addition, analgesia was the most commonly used drug and the previous drug usage was the most important cause of self-medication [16]. A study by Alshogran et al. in Jordan showed that self-medication was very common among medical and non-medical students (96%). In their study, self-medication with analgesics and anti-allergy drugs was reported to be significantly higher among medical students. Non-medical students, in contrast to medical students, were significantly more dependent on friends as a source of self-medication counseling and personal experience [47].

There are several points to consider in results. First, unlike previous studies where painkillers were the most commonly used drugs, in this study herbal drugs and multivitamins were more common. Herbal medicine has been common in all parts of Iran for many years [48]. On the one hand, this may be influenced by the location of the study, where the use of herbal medicines is common. In addition, it may be related to the time of the study, which emphasized the effect of vitamins during the outbreak of Corona. Also, the use of herbal medicine became more common. Afshari and Jouki found out that diets containing vitamin A, C, D, E, and omega 3 could be used as promising options to prevent lung infection with COVID-19 [49]. The use of herbal medicine is

Table 3
Causes of self-medication among students (N = 123)

Cause	Frequency (percent)
I have used this medicine before and I got results, so I will use it again	98 (79.7)
I do not have a serious illness, so I do not need to see a doctor	74 (60.2)
I am able to diagnose the symptoms myself and seeing a doctor does not help me much	28 (22.8)
I took medicine / medicines and I still take it because I did not see any danger or side effects	37 (30.1)
I did not go to the doctor because of the ease of preparing the medicine without a prescription	41 (33.3)
Existence of free drug market in the country	46 (37.4)
I do not have enough time to see a doctor	32 (26)
In the past, I went to the doctor to find out if the pharmacy did not deliver the complete medicine prescribed by the doctor or similar	41 (33.3)
The doctors available to me are not able to treat me and do not have enough experience and knowledge in this field	26 (21.1)
I could not see a doctor because I could not afford the visit	16 (13)
I do not see a doctor because I am not insured	14 (11.4)
Restrictions on seeing a doctor (doctor not available)	17 (13.8)
Due to my deteriorating condition, I was not able to see a doctor due to illness	17 (13.8)
Other reasons mentioned by participants*	11 (8.9)

*Other reasons were mentioned: having more information than the doctor about the condition of the body, having a non-acute disease, trusting herbal medicine, less side effects of used drugs, prevention of disease exacerbation, negligence of doctors during visits, working in health system, and self-medication on the advice of parents.

Table 4
Grouping of hypochondriasis and association with self-medication (N = 241)

Hypochondriasis grouping	Frequency (percent)	Self-medication		X^2	*P*-value
		Yes	No		
Healthy (0–20)	120 (49.8)	47 (39.2)	73 (60.8)	15.009*	0.002^{∞}
Borderline (21–30)	76 (31.5)	45 (59.2)	31 (40.82)		
Mild (31–40)	32 (13.3)	21 (65.6)	11 (34.4)		
Medium (41–60)	13 (5.4)	10 (76.9)	3 (23.1)		

*Pearson Chi-Square was applied. $^{\infty}$*P*-Value < 0.01.

very common among the people of China to reduce visits to the hospital during the COVID-19 pandemic [50].

Another issue is keeping medicine at home in all countries of the world and it is not unique to Iran. Many researches in different provinces of Iran show the increase of drug resistance to all kinds of antibiotics, the lack of attention of doctors to drug interactions and the imposition of exorbitant costs on patients [51]. Soudi et al. in their study on 500 households found that 90% of them keep medicine at home. The most pharmaceutical forms were tablets, ampoules, capsules, and syrups, respectively [52]. Certainly, the accumulation of easily available drugs is the basis of self-medication, which, with its repetition, also leads to drug resistance. The results of a study showed that many students believe that drugs are not dangerous and they have obtained good results from self-medication. As a result, they take medicine without a doctor's prescription [53]. Therefore, correcting self-medication behavior requires information and necessary training. Salami et al. promoted self-medication behavior in medical students with the help of an educational intervention based on the health belief model [54]. The issue that should be considered in training is that using a certain drug in the past cannot be a strong reason to use it again because the conditions of the body change and the

Table 5
Association between demographic characteristics and hypochondriasis (N = 241)

Variable		Hypochondriasis				X^2	*P*-value
		Healthy	Border	Mild	Medium		
Sex	Male	75 (48.8)	50 (30.9)	25 (15.4)	8 (4.9)	2.09*	0.55
	Female	41 (51.9)	26 (32.9)	7 (8.9)	5 (6.3)		
Marital status	Single	32 (46.3)	20 (29.9)	11 (16.4)	5 (7.5)	1.74*	0.62
	Married	89 (51.1)	56 (32.2)	21 (12.1)	8 (4.6)		
Place of residence	Urban	106 (48.8)	69 (31.8)	30 (13.8)	12 (5.5)	1.003*	0.8
	Rural	14 (58.3)	7 (29.2)	2 (8.3)	1 (4.2)		
Housing	Native	44 (47.8)	31 (33.7)	13 (14.1)	4 (4.3)	4.51**	0.97
	Non-native	19 (55.9)	10 (29.4)	3 (8.8)	2 (5.9)		
Field of study	Nursing	25 (49)	14 (27.5)	9 (16.7)	3 (5.9)	2.9*	0.4
	Midwifery	17 (51.5)	12 (36.4)	3 (9.1)	1 (3)		
	Environmental health	15 (48.4)	9 (29)	4 (12.9)	3 (9.7)		
	General hygiene	96 (47.5)	66 (32.7)	29 (14.4)	11 (5.4)		
	Nutrition science	24 (61.5)	10 (25.6)	3 (7.7)	2 (5.1)		
Academic year	First year	19 (50)	12 (31.6)	6 (15.8)	1 (2.6)	6.7**	0.67
	Second year	24 (61.5)	10 (25.6)	3 (7.7)	2 (5.1)		
	Third year	96 (47.5)	66 (32.7)	29 (14.4)	11 (5.4)		
	Fourth year	24 (61.5)	10 (25.6)	3 (7.7)	2 (5.1)		
Economic situation	Weak	9 (69.2)	2 (15.4)	0	2 (15.4)	11.7**	0.17
	Medium	73 (52.1)	39 (27.9)	20 (14.3)	8 (5.7)		
	Good	34 (43)	32 (40.5)	11 (13.9)	2 (2.5)		
	Excellent	4 (44.4)	3 (33.3)	1 (11.1)	1 (11.1)		
Father's education level	Illiterate	16 (61.5)	7 (26.9)	3 (11.5)	0	15.8**	0.06§
	9th grade literacy	38 (55.9)	14 (20.6)	11 (16.2)	5 (7.4)		
	Diploma	26 (40.6)	31 (48.4)	14 (7.8)	2 (3.1)		
	University	40 (48.2)	24 (28.9)	13 (15.7)	6 (7.2)		
Mother's education level	Illiterate	27 (60)	12 (27.6)	5 (11.1)	1 (2.2)	12.65*	0.17
	9th grade literacy	43 (56.6)	21 (27.6)	7 (9.2)	5 (6.6)		
	Diploma	22 (33.8)	(41.5) 27	13 (20)	3 (4.6)		
	University	26 (50.9)	16 (29.1)	7 (12.7)	4 (7.3)		
Illness or health problem	Breathing	6 (50)	4 (33.3)	1 (8.3)	1 (8.3)	0.85**	0.65
	Menstruation	9 (40.9)	6 (27.3)	4 (18.2)	3 (13.6)	4.04**	0.23
	Anemia	9 (34.6)	8 (30.8)	6 (23.1)	3 (11.5)	5.7**	0.1
	Allergies	9 (36)	9 (536)	6 (24)	1 (4)	3.71**	0.26
	Muscle	4 (57.1)	1 (14.3)	1 (14.3)	1 (14.3)	2.52**	0.38
	Skin	7 (53.8)	3 (23.1)	2 (15.4)	(7.7) 1	1.1**	0.75
	Headache	13 (38.2)	8 (23.5)	7 (20.6)	6 (17.6)	11.77**	0.006∞
	Joint-related problems	2 (33.3)	(50) 3	1 (16.7)	0	1.51**	0.65
	Nerves	4 (23.5)	6 (35.3)	5 (29.4)	2 (11.8)	7.92**	0.03¶
	Infection	1 (20)	2 (40)	1 (20)	1 (20)	4.15**	0.17
	Heart	3 (30)	1 (10)	3 (30)	3 (30)	11.52**	0.005∞
	Digestion	11 (45.8)	4 (16.7)	6 (25)	3 (12.5)	7.13**	0.052§
History of COVID-19	Yes	47 (52.2)	24 (26.7)	15 (16.7)	4 (4.4)	14.48**	0.01¶
	No	71 (47.6)	52 (34.9)	17 (11.4)	9 (6.1)		
History of COVID-19 among relatives and family	Yes	87 (48.9)	58 (31.5)	24 (13.5)	11 (6.2)	17.84**	0.004∞
	No	31 (50.8)	20 (32.8)	8 (13.1)	2 (3.3)		
Fear of COVID-19	Yes	24 (51.1)	11 (23.4)	6 (12.8)	6 (12.8)	17.89**	0.004∞
	No	96 (64.4)	65 (43.6)	26 (17.4)	7 (4.6)		

*Pearson Chi-Square was applied. **Fisher's Exact Test was applied. ¶*P*-Value < 0.05. §*P*-Value < 0.1. ∞*P*-Value < 0.01.

same symptoms may be caused by a different disease or problem.

According to the findings, a statistically significant association was found between residence status, academic year, and self-medication. It seems that students at lower academic levels and students who lived far from their families did more self-medication. Respiratory allergies and joints disease or problems, were also associated with self-medication. In the study of Nahimana et al. on nursing students, self-medication was influenced by relatives' advice, low income, level of study and religion [55]. Mohammad et al. in their study stated that age, rural residence, female gender, inadequate access to health care, the presence

of chronic diseases and income (1000–2,000 pound) per month were strong predictors of self-medication [56]. In Gholipour et al.'s study on students of Tabriz University of Medical Sciences, in contrast to our results, a statistically significant association was found between gender and field of study and self-medication [57]. We found a statistically significant association between fear of COVID-19 and a history of infection in the individuals and their family and relatives and self-medication. According to the number of Google searches, the rate of self-medication has increased since the outbreak of the new pandemic [32]. In a multicenter study in Peru, Quispe-Cañari et al. reported self-medication with acetaminophen, ibuprofen, azithromycin, penicillin, antiretroviral drugs, and hydroxychloroquine during the COVID-19 pandemic [58]. Romano et al. reported that acetaminophen sales increased significantly during the COVID-19 pandemic [59]. Wegbom et al. showed that the prevalence of self-medication for the protection or treatment of COVID-19 in Nigeria was 41%. Fear of discrimination or stigma, fear of being quarantined, fear of contact with a suspicious infected person, and infection were important self-medication factors in their study [60].

In this study, most students were in the mild group in terms of hypochondriasis. However, the number of people in mild to moderate groups was about 20% of the participants. In addition, a statistically association was found between hypochondriasis and father's level of education and some problems and diseases related to heart, gastrointestinal nerves, headaches and hypochondriasis. Previous studies also confirmed the prevalence of hypochondriasis in the third decade of life and to an almost equal extent among men and women [25, 61, 62]. The study of Meng et al. showed a 28% prevalence of hypochondriasis among health students. This rate was higher in women than men, but it was not statistically significant [63]. Ahmed et al. reported a worrying rate of hypochondriasis among medical students. More than 60% of the participants were dissatisfied with their general health and more than two-thirds, most of whom were women, admitted that they were affected by unexplained pain in their body [64]. In the study by Talaei et al., the prevalence of borderline hypochondriasis symptoms was 36.8% and the prevalence of its disorder in the studied students was 16%. The disorder was significantly more common in girls. In addition, the association between hypochondriasis and different fields and levels of education was reported to be significant [41]. Akhavan et al. in their study on operating room staff found that as people got older, the prevalence of hypochondriasis increased [65]. It should be noted that the demographic variables studied in the studies are very diverse and this is the main reason for the difference between their results and the present study. On the other hand, in this research, age, levels and fields of study are largely similar.

In this study, a statistically significant association was found between hypochondriasis and self-infection of individuals and family and relatives with COVID-19 and fear of COVID-19. It is clear that the association between hypochondriasis and self-medication is two-way. The feeling of being sick increases the desire to take medicine, and on the other hand, excessive use of medicine and not getting results from it induces the feeling of being sick. In Okoi et al.'s study, 91% of respondents reported phobia and hypochondriasis. The phobia was mostly attributed to COVID-19 and the human immunodeficiency virus [66]. Mousavi et al. concluded that hypochondriasis can be predicted by variables of using protective equipment, experience of COVID-19 infection and awareness of this disease [67]. It is true that, as studies have emphasized, the fear of COVID-19 may increase hypochondriasis, but the psychological roots affecting this behavior should not be ignored. Scrignar recommended that panic disorder should be ruled out before diagnosing patients with hypochondriasis, because patients may have symptoms of panic disorders that can be similar to the fear and worries of hypochondriacs [68]. Sakai et al. confirmed a high prevalence of personality disorders among patients with hypochondriasis. The most common associated type of personality disorder with hypochondriasis was obsessive-compulsive personality disorder [69]. Hypochondriasis has long been recognized as an incurable problem, but later the beneficial effects of cognitive-behavioral therapies were identified [70]. A 5-year study in the UK found that cognitive-behavioral therapies significantly reduced stress and its symptoms among 444 patients with hypochondriasis [71]. In two studies, the effect of psychotherapy, cognitive therapy and paroxetine in reducing symptoms and treating symptoms of hypochondriasis has been confirmed [72, 73]. Hypochondriasis sometimes is related to problems and chronic pain, as was observed among study participants. The association between pain and hypochondriasis was confirmed in a review study, while pain treatment improved patients with hypochondriasis [74]. On the other hand, the fear of COVID-19 has been related to both phenom-

ena, so giving the necessary awareness in this case can also help and reduce fear and anxiety. Izzeddin Sarsak reported more than 30% of medical and rehabilitation sciences students experienced sleep and appetite distribution during the pandemic. Students with adequate knowledge about the COVID-19 pandemic reported a significant decrease in anxiety level [75].

4.1. Strengths and limitations

Self-medication and hypochondriasis may be increased with the spread of unknown diseases such as COVID-19. Therefore, studying these phenomena can help identify the causes to reduce them. Limitation of this study was due to that was small the sample size was small in number and it was done only in one medical university. We recommend further studies with larger sample size that include different medical universities from different regions of Iran.

5. Conclusion

According to the findings, more than half of the participants in the study had self-medication. Prevalence of indiscriminate drug use among the educated classes can cause indiscriminate drug use and self-medication to become normal behavior among people, because community choose educated people as role models. It is necessary to design programs at the university level by holding workshops and scientific discourses so that students can conclude that indiscriminately taking drugs can have irreparable side effects. Previous experience of drug use was the most important cause of self-medication. It seems necessary to control the sale of drugs in pharmacies, as well as the proper prescription of drugs by doctors. In addition, training provided by pharmacies and pharmacists can reduce the complications of indiscriminate drug use. About 20% of students also experienced mild to moderate hypochondriasis. Fear of COVID-19 infection and a history of the disease among individuals, family and relatives exacerbated both phenomena. Since the exact time for the end of the COVID-19 pandemic has not been determined, and self-medication and hypochondriasis may cause physical and psychological harm, especially for university students who are the human capital of a country, it is suggested that the necessary training and support be provided to deal with these two phenomena. Since chronic pains and mental disorders aggravate the symptoms of hypochondriasis and even self-medication, accurate identification of causes and symptoms can be helpful in planning for education, counseling and drug prescription. The association between hypochondriasis and self-medication is two-way. The feeling of being sick increases the desire to take medicine, and on the other hand, excessive use of medicine and not getting results from it induces the feeling of being sick. Therefore, effective measures in each case can improve the other case as well.

Ethical approval

Ethical permission was obtained from the Ethics Committee of Khalkhal University of Medical Science (IR.KHALUMS.REC.1400.004).

Informed consent

Informed consent was obtained from all participants prior to participation in the study.

Conflict of interest

None to report.

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