

# Food & Health

Journal homepage: [fh.srbiau.ac.ir](http://fh.srbiau.ac.ir)

## Journal

### Self-medication practice, its causes and risk factors among people in Tehran, Iran: A descriptive-analytic study

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#### ARTICLE INFO

##### Original Article

##### Article history:

Received 02 September 2020

Revised 07 October 2020

Accepted 08 November 2020

Available online 20 December 2020

##### Keywords:

Self-medication  
Public health  
Chronic disease  
Analgesics

#### ABSTRACT

Self-medication practice, unfortunately, is a current issue in different countries. Patterns of self-medication vary among different populations and are influenced by different characteristics. So, this study was aimed at the prevalence of self-medication practice in Tehran. This descriptive-analytic study was performed from Oct 2019 to March 2020 by a researcher-designed questionnaire among people. The main determinants of the questionnaire included personal information, diet pattern, physical activity, smoking, alcohol consumption, and self-medication habits. Chi-square and Tukey's post hoc tests were used for statistical analysis of data. Eight hundred people participated in this study. The rate of self-medication was 78% among men and 88% among women. 35.75% of the participants had a chronic illness, and 90% of them had a history of self-medication. A significant correlation between gender and self-medication ( $p=0.45$ ,  $r=0.55$ ), also significant correlation between exercise and self-medication ( $p=0.206$ ,  $r=0.75$ ), alcohol consumption and self-medication ( $p=0.37$ ,  $r=0.19$ ) were not seen. Education and income levels, chronic diseases, history of drug allergies, smoking, and fast-food consumption seem to create self-medication behavior. Having an old doctor's prescription, saving time, as well as advising family members, were the most important reasons for self-medication. The most commonly used medications were analgesics, common cold medicines, and gastrointestinal drugs. Self-medication was mostly used to treat headaches, migraines, and common cold symptoms such as cough and muscle pain.

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#### 1. Introduction

Self-medication is the arbitrary treatment of disease and illness using medication. According to the World Health Organization (WHO), self-medication is defined as medication for illness, disease, and disorders diagnosed by oneself, or the intermittent or consecutive use of a medication prescribed for oneself (1). Studies have shown that there is no universal definition of self-medication, however, this can be seen as the selection and use of over-the-counter (OTC) medications, the re-use of previously prescribed medications without professional health care supervision, and the use of defined medications prescribed to treat symptoms or diseases which have diagnosed himself (2). Situations such as using

medications recommended by friends or family members, not following a treatment plan, or changing the dosage of medications prescribed can also be defined as self-medication (3). However, self-medication could benefit health care systems (such as better use of clinical skills and increase access to medication, but self-medication is associated with risks such as misdiagnosis, overdose, long-term drug use, and drug interactions (4). Self-medication can increase and expands antimicrobial resistance (AMR), which affects both human and animal health (5). Self-medication with antibiotics is one of the most common types of self-medication, an estimated 5% of over-the-counter antibiotics, which are used without a prescription in most parts of the world (6). Numerous studies have examined the prevalence and factors affecting self-

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medication, which show self-medication with OTC medication is a common problem worldwide and more so in developing countries (7, 8). Patterns of self-medication vary among different populations and are influenced by different characteristics such as age, sex, income and expenditure, level of education, medical knowledge, and intolerance to diseases (9, 10). Studies in Egypt and Iran show that self-medication is high among students (11, 12). Some studies in Rwanda have identified fever, colds, and coughs as the most important self-medication (13). However, other studies have identified fatigue, weakness, anxiety, and fever as the most common symptom of illnesses treated with self-medication, with the most important reasons being self-medication without harm, having a history of illness, and the availability of medications at home (14). A study in Spain reported that self-medication was closely associated with factors related to social cognitive demographics such as gender, level of education or age, and several health factors such as long-term physical illness (15). Self-medication in children was strongly associated with factors such as maternal literacy level, number of children, the order of birth, which did not correlate with maternal age, occupation, or subject matter. Antipyretics and analgesics were mostly used as monotherapy (16). Studies show that some parents consult a specialist when their children become ill and simply give antibiotics to their children, assuming they are aware of their misinformation about the effects of antibiotics (17, 18). The rate of self-medication was high in Sri Lankan athletes with allopathic and herbal medicines (19). Self-medication in athletes is also affected by the intensity of physical activity (20). In previous studies, generally referred to student self-medication, which limits the age range; also side effects and their frequencies have not been considered. In the present study, we tried to investigate the effect of chronic diseases, fast food consumption, smoking, and history of complications on self-medication, especially the relationship between the number of self-medication with chronic diseases and the effects of self-medication with antibiotics (21, 22). We also examined a wide range of people from different lifestyles, and drug allergies, the level of education of individuals, and the prevalence of drug forms. Due to the importance of the subject, this study aimed to determine the frequency of self-medication and its causes and affecting factors from Oct 2019 to March 2020 in Tehran.

## 2. Materials and methods

The present study was a descriptive-analytical cross-sectional study conducted from October 2019 to March 2020 on people (including students, ordinary people, business people, passers-by referring patients to clinics and hospitalized patients) in Tehran. This study was conducted by taking into account ethical considerations. The method of this study was that after the necessary coordination between the members of the research team and the design of the questionnaire, ordinary people entered the study with the condition of consent to participate in the project. A questionnaire designed by the researchers was used. All questionnaires were anonymous.

Participants were assured of confidentiality. Tehran was divided into eight geographical areas, and the questionnaires were filled in each area by the researchers. The questionnaire included 30 questions in the form of three axes of personal information (including age, sex, occupation, marital status, level of education and income and illness), diet pattern, physical activity, and smoking and alcohol (including fast food intake, type of food consumed, food allergies, duration of exercise, professional exercise and smoking and alcohol consumption). Self-medication habits (including illness, history of self-medication, cause of self-medication, type of self-medication, number of times self-medication, drug selection criteria the form of the drug used, the reason for choosing the drug, studying the drug prescription, history of drug side effects, action against the possible complication and the name of the drugs used) were used. Each numbered questionnaire and coded information were extracted. SPSS 23 software was used for statistical analysis. The significance level of the data was considered 5%.

## 3. Results

The results were as follows. Eight hundred twenty-three people were studied, and finally, 23 questionnaires were excluded from the study due to incompleteness and repetitive information. Of these 800 people, 632 (79%) individuals were self-employed, and 168 others (21%) (companion or parents) answered the questionnaire. The demographic information of the participants in the study is shown in Table 1. The average age of the participants in this study was  $62 \pm 39$ . The rate of self-medication was 78% ( $n = 275$ ) among men and 88% ( $n = 394$ ) among women (Table 2). 88 (11%) of the study population had a history of drug allergies. The most important drugs that cause allergies are penicillin (40%), aspirin (25%), corticosteroids (10%), anti-seizures (5%), and nonsteroidal anti-inflammatory drugs (20%). The most critical causes of self-medication were the old version (20.12%), time-saving (18.8%), and advice from other family members (14.62%), respectively. The types of medications used by participants are listed in Table 3. Among the analgesics, acetaminophen, ibuprofen (Advil) and aspirin were the most drugs used. Furthermore, gastrointestinal drugs including ranitidine, omeprazole, and ondansetron (Demitron) and common cold medicines were the most drugs used, respectively. Regarding the antibiotics, amoxicillin (38%), cephalexin (24%), azithromycin (22%), and cefixime (16%) had the highest use, respectively. It should be noted that most participants used more than one type of medication for self-medication. According to the results, the most common form of medicine used in self-medication was pills and capsules. According to Pearson correlation analysis, there was not a significant correlation between gender and self-medication ( $p=0.45$ ,  $r=0.55$ ), exercise and self-medication ( $p=0.206$ ,  $r=0.75$ ), alcohol consumption and self-medication ( $p=0.37$ ,  $r=0.19$ ). The most commonly used drugs form was tablets and capsules, followed by ampoules. Although tablets and capsules are highly available in pharmacies, and they are easy to use,

**Table 1.** Demographic information of the participants.

	Frequency (percentage)
<b>Gender</b>	
Man	352 (44 %)
Female	448(56%)
Total	800 (100%)
<b>Marital status</b>	
Single	496 (62 %)
Married	304(38%)
Total	800(100%)
<b>Education level</b>	
Illiterate	24 (3 %)
Secondary/High school	120 (15 %)
Diploma	160 (20 %)
College/University education	496 (62 %)
Total	800 (100 %)
<b>Income Level</b>	
No income	320 (40%)
Under 500 thousand tomans	64 (8%)
From 500 thousand to 1 million	80 (10%)
From 1 to 2 million tomans	96 (12%)
From 2 to 5 million tomans	184 (23%)
From 5 to 10 million tomans	40 (5%)
Above 10 million Tomans	16 (2%)
Total	800 (100%)
<b>Fast food consumption (in a month)</b>	
1 to 2 times	384 (48%)
3 to 5 times	248 (31%)
5 to 10 times	96 (12%)
More than ten times	32 (4%)
/do not consume	40 (5%)
Total	800 (100%)
<b>Exercise (per week)</b>	
> 150 minutes	176 (22%)
From 60 to 120 minutes	128 (16%)
From 30 to 60 minutes	96 (12%)
<60 minutes	112 (14%)
/ do not exercise	288 (36%)
Total	800 (100%)
<b>Self-medication with antibiotics</b>	
Yes	448 (56%)
No	352 (44%)
Total	800 (100%)
<b>Chronic disease</b>	
Yes	286 (35.75%)
No	514 (62.25%)
Total	800 (100%)

**Table 2.** Frequency distribution, by different causes of self-medication

Reason	Frequency	percentage
Having a previous prescription	161	20.12
Saving time	151	18.8
Advice from family members	117	14.62
The high price of physician's visit	88	10
Crowded medical centers	85	10.62
Lack of trust in doctors	58	7.25
Remote doctor or clinic	30	3.75
Nurse advice	24	3
Pharmacist recommendation	20	2.5
Other reasons	90	11.25
<b>Total</b>	<b>800</b>	<b>100</b>

injectable drugs often require special care and must be injected in medical centers under the supervision of a physician. It should also be noted that not all medications (in any form) used included over-the-counter medications (Fig. 1). However,

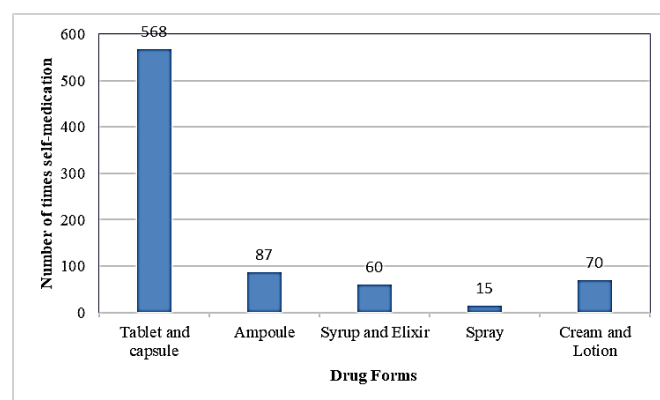
based on the Pearson correlation test, significant correlations were found between self-medication and various causes.

**Table 3.** Medications used in self-medication.

	Frequency	Relative frequency percentage
Common cold medicines*	764	95.5
Analgesics	750	93.75
Gastrointestinal medications**	634	79.25
Multivitamins and minerals	547	68.38
Antibiotics	463	57.88
Antihistamines	454	56.75
Antitussive drugs and expectorants	352	44
Anti-inflammatory drugs	119	14.88
Sedatives	96	12
Ophthalmology medications	38	4.75
Contraceptives	32	4

\* For example, Adult Cold or Cold Gel

\*\* Included ant-acid drugs, anti-emetic and anti-diarrhea drugs.

**Fig. 1.** Frequency of drug forms used for self-medication.

According to the results of this table, the amount of self-medication in those who have an income level of one to two million tomans and two to five million is more than others. Also, the rate of self-medication is higher in those who consume fast food, use some kind of tobacco, have drug allergies. Self-medication was significantly higher in people with university education (bachelor (45%) and master (38%) than other groups. A history of drug side effects (such as diarrhea, vomiting) is also a factor that was directly related to self-medication, so from 500 people (75%) of those who did not experience side effects self-medicated. In contrast, 120 (85%) of people who experienced drug side effects had self-medicated. It seems that chronic diseases (such as diabetes, hypertension) can provide the basis for self-medication so that 90% of people with chronic disease (286 people) had self-medication. The diseases/illnesses that caused people to self-medicate are listed in Fig. 2. It is worth mentioning that all participants mentioned more than 1 case. We found that the most common self-medicated diseases/illnesses were headache and migraine, muscle pain (myalgia), and cough, respectively. It is clear that, according to the results, the most common illness was cold and symptomatic treatment. However, due to over-the-counter drugs in most pharmacies in

Tehran, self-medication is also seen in chronic diseases such as hypertension, asthma and, diabetes. Regarding the relationship between the frequency of self-medication and related causes, based on the Pearson correlation coefficient, there was a direct relationship between education and the number of times of self-medication (Table 4). One-way analysis of variance (ANOVA) was used to compare the mean of the data and self-medication. The results are as follows: A significant difference was found between the different groups ( $p=0.00$ ). Tukey post hoc test was used to follow the difference in results. On average, self-medication in the income of groups between 1 to 2 million tomans per month and group 2 to 5 million per month compared to other groups is the highest. Also, a significant difference was found in self-medication between different educational groups ( $p=0.00$ ). So, in the diploma and undergraduate study groups, self-medication was significant, while at the higher education level, there was a significant difference not found ( $p=0.75$ ). On average, people who ate more fast food per month were more likely to self-medicate ( $p=0.029$ ). People who ate fast food 3 to 5 times and

5 to 10 meals were more likely to self-medicate. The history of drug allergy was significantly ( $p=0.04$ ) higher in subjects who self-medicated. Tobacco use (of any kind) also showed a significant relationship with self-medication ( $p=0.04$ ), a significant difference was found between chronic disease and self-medication ( $p=0.00$ ). Significant differences were also found between chronic disease and self-medication ( $p=0.00$ ). Also, the experience of drug allergy in individuals caused a significant difference ( $p=0.01$ ) in self-medication behavior. Besides, the results of Tukey's post hoc test on the frequency of self-medication showed that the frequency of self-medication ( $p=0.04$ ) in the non-income population ( $21.60\pm 0.58$ ), and income levels less than 3 million per month ( $13.60\pm 0.76$ ) was associated with the highest number of self-medication (respectively). The mean frequency of self-medication in people with chronic disease was significantly ( $p=0.00$ ) higher than people without chronic disease. Finally, on average, the number of self-medication in individuals with bachelor's, diploma, and pre-university education was higher than in other educational groups ( $p=0.00$ ).

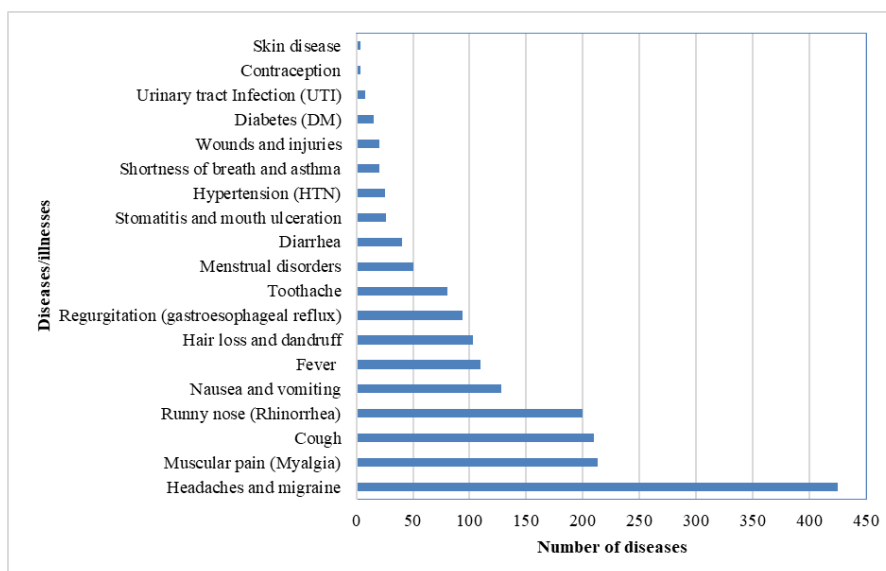


Fig. 2. Conditions treated by self-medication practice as stated by participants.

Table 4. Pearson correlation coefficient and self-medication-related causes.

Items	Chi-Square Tests	
	Value	Asymp. Sig. (2-sided)
Income and self-medication	7.895	0.048
Consumption of fast food and self-medication	4.740	0.029
Tobacco use and self-medication	11.130	0.004
Medication allergy and self-medication	8.372	0.004
Education and self-medication	31.305	0.000
Chronic disease and self-medication	40.980	0.000
History of drug side effects and self-medication	5.902	0.015
Frequency of self-medication and chronic illness	61.29	0.000
Frequency of self-medication and education	73.46	0.000
Frequency of self-medication and income	40.012	0.004

#### 4. Discussion

In this study, various sufficient causes of self-medication were investigated. In 2017, a study published in the American Journal of Infection Control stated that socioeconomic status, gender, and age are not related to self-medication, while in our study, social conditions such as tobacco use (income level) was examined, and it was found that these people had the highest rate of self-medication, but based on Pearson correlation coefficient analysis, no significant relationship was found between age and gender with self-medication. (23). In this study, it was found that there is a significant relationship between self-medication frequencies with education. In such a way that self-medication is more common among people with higher education (bachelor-master). By stating that there is a relationship between self-medication and age, gender, and education (24), several studies have shown

the relationship between low education and self-medication (25). The diploma was more pre-university degree than others; however, because the participants in this study did not have a specific age limit and there was no specific criterion for gender selection, it was concluded that there is no relationship between age and gender ( $p=0.45$ ). In another study by Jamhour, et al. (26) it was found that there is a relationship between self-medication and a person's level of education, which measures the level of education, especially about the use of antibiotics. This means that people with less knowledge about antibiotics stopped taking them at the wrong time. However, in this study, no correlation was found between economic and social status, gender, and age. Other relationships were also examined in this study. There is a relationship between the number of fast-food consumptions, drug allergies, and tobacco consumption with self-medication. People who consume more fast food (3-5 or 10-5 times a month) are more self-medicating. Previous studies have shown that self-medication is higher in middle and lower-income groups than in others (27-29). Low to moderate-income seems to be an influential factor in self-medication. Also, low-income individuals and families prefer to buy drugs and self-medicate based on their previous experience due to the high cost of medical counseling (30). There was a relationship between fast food consumption and its amount, drug sensitivity, smoking, as well as its amount and type with self-medication. So those people who eat more fast food (3-5 or 10-5 times a month) are more self-medicating. According to the results, it was found that most of the drug allergy for the participants in this study was penicillin, and there is a significant relationship between drug allergies and self-medication. Nevertheless, when it comes to smoking, other than alcohol and tobacco is associated with self-medication (25). In this study, no relationship was found between alcohol and self-medication ( $p>0.05$ ). Also, considering the study of exercising, the type of exercise, and its professionalism or not, no significant relationship was found with self-medication. According to several studies, such relationships were not found in other studies. It was shown that the main reasons for self-medication were having an old prescription, saving time, and recommending other family members. Other studies have also reported that people are more likely to quote from family members, friends, or other relatives, pharmacists, previous experiences with a similar disease, to alleviate the disease, to save money, to improve productivity. Patients' opinion that the value of a doctor's visit is not worthwhile due to the type of problem; they have turned to self-medication (31-34). The research was also consistent. In the elderly, other factors besides themselves include the family, the environment in which they live, the health care system from which they receive services and their health care providers, and the social environment (35). Numerous studies have shown that gastrointestinal diseases, fever, headache, respiratory diseases, colds, coughs, and cardiovascular diseases were the most common diseases that self-medicate (31, 34, 36) as well as people with due to these common diseases, medications such as analgesics, antibiotics, gastrointestinal drugs, and respiratory drugs are used in self-

medication (24, 31, 32). A study conducted in 2017 states that self-medication with antibiotics, followed by NSAIDs and cough and cold medicines, were the most common, while in our study, cold medicines were ranked at first and analgesics were ranked second, respectively. Gastrointestinal drugs with 634 cases were the most used drugs in our study (37). According to the results obtained in our study, the most commonly used drugs in self-medication were common cold medication, gastrointestinal drugs, and analgesics. Therefore, considering this issue, it is concluded that the general public is more inclined to self-medicate for such problems. A study on graduated students in Nigeria found that paracetamol is the most widely used drug in self-medication (24). Self-medication with analgesics is a stand method of treating toothache because most of these drugs are over-the-counter (OTC), easily accessible (4). OTC medications are used for allergies, chronic pain, migraines, vaginitis, gastrointestinal symptoms, or colds (33). However, proper self-medication with OTC medications can bring significant economic benefits to patients, employers, and systems. The findings suggest that a decision to adopt stricter regulations on OTC medications is needed to reduce the health risks associated with self-medication (34). The issue of self-medication and the associated antibiotic resistance is an increasingly crucial global problem (2). In a study, it was found that 12.1% of the total participants treated themselves with antibiotics, stating that the main reason for self-medication was not taking the disease seriously and feeling the need for a counselor (36). The most common antibiotic used for self-medication was amoxicillin capsules (36). According to the results of this study, 56% of participants treated themselves with antibiotics. Self-medication with antibiotics is a common practice among students and in developed and developing countries (26, 37-39). They were treated with it, and the antibiotics used revealed that all of these cases might be related to the lack of awareness about the need for rational use of antibiotics (36, 45). Various studies state that the incorrect use of antibiotics among individuals is due to a lack of awareness about the arbitrary use of antibiotics or insufficient information (40-42). However, one study states that despite sufficient knowledge about the side effects of antibiotic self-medication, self-medication with these drugs is common (43). In this regard, most studies of education and community awareness are considered essential and necessary for preventing self-medication with antibiotics (40, 44). Most studies have shown that self-medication and prescribing by a non-physician may be due to the high cost of antibiotics, the high cost of medical advice, and other economic factors (45, 46). Of course, even in rich countries where most medicines are free, and doctors' consultations are free, antibiotic self-medication is prevalent (44). Some people believe that antibiotics should be used to treat colds, but some knew that abusing antibiotics could lead to microbial resistance (26). One study found that people who self-medicated had a strong belief in the benefits of the drug and a weak belief in its disadvantages (4). However, some methods of self-medication are harmful and require immediate action (31). One study found that more respondents were

unaware of the side effects of self-medication. However, highly educated people were more aware of the side effects of self-medication (32), so targeted health education about the risks of self-medication should be considered (34). In one study, it was stated that almost half of the respondents chose self-medication. Only a small number met the doctor only if they felt sick because the illness is short-lived (less than seven days), participants tend to have self-medication (34), some of them also stated that their condition has not changed after self-medication (34). Finally, it should be noted that the training of general practitioners and health care providers on the types of diseases that are self-medicated and the drugs used should be done (31). There is also a need to inform the public and enforce drug distribution laws to prevent self-medication with antibiotics (26).

## 5. Conclusion

Various causes are involved in the development of self-medication behavior. Factors such as income level and education, chronic illness, history of side effects or drug allergies, smoking, and fast food seem to create self-medication behavior. It is worth noting that factors such as gender, exercise, and alcohol consumption do not have a significant effect on self-medication behavior. Having an old doctor's prescription, saving time, and advising other family members were the most important reasons for self-medication. The most commonly used medications were analgesics (acetaminophen), common cold medicines (adult colds), and gastrointestinal drugs (ranitidine). Pills and capsules were also the most commonly used form of medicine. Another vital point about self-medication is multidisciplinary, which is very useful in chronic disease, education level, and income level. Self-medication was mostly used to treat headaches and migraines and cold symptoms such as runny nose, cough, and muscle pain. Patients with chronic diseases were also among the groups who self-medicated, and this issue can hurt their underlying disease. It seems that culture building in schools, universities, and at the community level, can have a positive effect on preventing arbitrary consumption. Researchers are advised to examine self-medication and its related causes in different social groups separately.

## Limitations

There are several limitations to this study. Although self-reported data may contain a reminder bias, our findings were almost consistent with most other studies. Self-medication may vary from population to population, such as students. Given that only one province was surveyed, these results cannot be generalized to the whole country. Selection bias was also established by setting a 6-month limit for self-medication. The next step is to focus on self-medication among priority groups, such as the elderly, women, and children, and those with

chronic diseases, and such studies should be based on a large representative sample size.

## Acknowledgments

The authors are grateful to the investigators and study participants who contributed their precious time for data collection. The faculty members of the Islamic Azad University of Medical Sciences, especially Dr. Parcheh Bafieh and Dr. Seifi, who helped the researchers in designing and conducting this study, are highly appreciated.

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