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Self-Medication and its Effective Factors in Islamic Republic of Iran: A Population based Study

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A B S T R A C T

Background: Self-medication is the use of drugs which have not been prescribed by health professionals. It is considered an important issue especially in developing countries because of side effects of irrational use of drugs and economic burden of disease. This study aim to analyze the prevalence of self-medication in Iran by provinces and socio economic and demographic factors that affect it.

Methods: Data of Iranian household income and expenditures survey (HEIS) in 2016 (source Iranian Statistical Center) was used in this study. Multilevel mixed effect regression was used to find relation between explanatory variables and self-medication ratio. STATA SE v 14 was used to perform the analysis.

Results: the results of this study showed that income (coefficient = - 0.00286) and socioeconomic status had negative significant relationship with self-medication ratio, while self-medication ratio was higher in some provinces like Ardebil, Sistan va Baluchistan and Ilam and it was lower in some provinces like Khuzestan and Kurdistan.

Conclusion: The prevalence of self-medication among Iranian people was relatively high and this ratio varies in provinces. In addition to promote population awareness about undesirable effects of the irrational drug consumption, developing strategies for drug consumption by improving prescribing pattern, OTC drugs and also increasing inspection of pharmacies is needed.

Keywords: Self-Medication, Drug Utilization, Income, Iran

Citation

Introduction

The World Health Organization (WHO) definition of self-medication is 'the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms' (1). In the other hand, Self-medication is the use of drugs which have not been prescribed by health professionals (2) and it is an important issue especially in developing countries where universal access to health care is not been achieved yet (3, 4).

In economically deprived communities, most common and preferred modes of illnesses are treated by self-medication (4-6). In Iran studies in a few provinces show that the prevalence of self-medication are very different and varies from 12 % to 90 %. Moreover, annually, each of Iranian had 339 drugs consumption (7-9). Studies shows the range of reported self-medication in the 70 included publications was 8.5-98.0 % (3, 10-12). Self-medication prevalence is 14 % in Saudi Arabia, 13 % in USA, 11 % in Australia and Germany, 9 % in Spain, UK, Sweden and 8 % in Switzerland, Mexico, and Italy(13). In Iran, Analgesics, eye drops, and antibiotics have the most shares of self-medicated drugs that are nearly same in world (7, 12-14).

Although entirely could not be say that Self-medication practices entirely harmful(11), Irrational use of drugs is a serious health problem in the countries. Unnecessary drug use is considerable from two aspects: first it causes a heavy burden to the economy especially in developing countries and second it's serious negative health effects(12, 15). Various studies reported that self-medication may lead to delay in health care seeking which results in financial loss due to delay in the diagnosis of disease and appropriate treatment(11). The use of non-prescribed medication could be happen because of re-submitting old prescriptions to purchase medicines, sharing medicines with relatives or members of one's social circle, difficulties in visiting a doctor, not having enough time, and low inspection by some pharmacies of legislation on requiring prescription of medical specialties and also patients' lack knowledge, pharmacists

overworked, and drugs are sold because of profit(2, 4). Studies show that feeling a minor illness (15 studies), health costs (9 studies), lack of enough time to visit a GP or specialists (11 studies), prior drug consumption experience (7 studies) and long waiting time to visit a qualified practitioner (5 studies) were most important reasons for self-medication (10).

Though a few and different studies have been conducted in different provinces of Iran separately (8-10, 16-19), there is no comprehensive, original and country level research about self-medication. Studies of such discipline will provide useful insight on the affecting factors which effect on self-medication and might help the policy makers to streamline the process of drug regulations, updating the list of essential medicines and over the counter drugs. Because of that, we aim to analyze the prevalence of self-medication in Iran and provinces and socio economic and demographic factors that effect on it.

Materials and Methods

The main aim of this study was to show expenditures and utilization due to self-medication and their effective factors in Iran. For this purpose data of national household income and expenditures survey (HIES) in 2016 was used. Data are available at Iranian Statistical Center (ISC) website and easily can be downloaded by everyone. The survey was implemented by ISC in 2016 in urban and rural areas of 31 provinces with a sample of 39,864 households. In addition to the question of the items of household expenditures and income, social characteristics of household members, occupation and household characteristics is also asked. The survey was done from May 2015 to April 2016, and its results was published in September of 2016.

The main aim of this survey is to analyze annual average of total expenditures, food (in 10 main traits), non-food (in 10 main traits) and household income, as well as estimating the annual variations of these averages in the urban and rural areas of the country as a whole, and the annual average of total expenditures, Non-residential and household

income at the level of urban areas of each province. Expenditures and income data were gathered at IR Rials currency, all of them were changed to US$ with exchange rate of 34200 IR Rials.

The HIES questionnaire is provided according to the Classification of Individual Consumption by Purpose (COICOP) standards. In the 2004 issue, new tables are presented based on this classification. Samples of the survey are gathered using three stage randomly sampling design. The 6th part of the survey was about health and medical services utilization and expenditures. Two of these questions were about utilization expenditures of drugs without prescribing of physicians which was used in this study.

Measures and analysis

Self-medication and medication with prescribing of physician was extracted from the survey in terms of expenditures and utilization in one month period. Self- medication utilization contained the number of times that each households bought drugs from drug stores without prescribing of physicians in one month period. Percentage of self-medication to overall drug utilization was calculated for each household. Situation of the country and each province about self-medication was calculated and at the end to show the relationship between social and economic factors and self-medication, regression models were estimated. The model had two levels: household level and provincial level, so mixed effect multilevel model estimator was estimated to show the relationship between the variables. The model is shown below:

$$y_i = \beta_1 + \beta_2 inc_i + \beta_3 inc_i^2 + \beta_4 ilit_i + \beta_5 uni_i + \beta_6 ses_i + \beta_7 urb_i + \beta_8 work_i + \beta_9 age5_i + \beta_{10} age65_i + \beta_{11} hhs_i + \beta_{12} male_i + \beta_{13} ins_i + \beta_{14} phy_i + \epsilon_i$$

Where, y_i is the outcome variable of study contain self-medication expenditures utilization ratio. Self-medication utilization ratio was calculated using this formula:

$$self\ medication\ ratio = \frac{number\ of\ drugs\ utilized\ without\ prescribing\ of\ physicians}{overall\ drug\ utilization}$$

Expenditures data were converted from Iranian Rials in to US dollars in 44350 exchange rate (dollar to rails) inc was yearly income of family (in US dollars) , inc^2 was second order of yearly income, lit was the number of illiterate persons in each family, uni was the number of persons with academic degree in each family, ses was wealth index of each family calculated from the household's ownership of assets, urb was living in urban or rural regions, $work$ was the number of persons who participate in labor market and earns money in each family, $age5$ is the number of persons less than 5 years old in the family, $age65$ was the number of persons more than 65 years old in the family and hhs was the household size , $male$ was number of males in each family and ins was coverage of household by one of health insurance plans. Instead of these household-level variables, a provincial level variable was added in the model too: phy was the number of physicians in 1000 population of each province.

Wealth index was calculated from household's ownership of selected assets. These variables contained: type of house ownership(rental, self-ownership,…), house area, number of rooms, accessibility to purified water, electricity, telephone, internet, bath, kitchen, air conditioner, package, radiant, sanitation, type of building structure (using wood, bricks, metal…) cars, bicycles, motorcycles, radio, television, freezers, refrigerators, computers, Owens, vacuum cleaners, Washing machine, sewing machine, fan, dishwashers. Principal component analysis (PCA) method was used to calculate wealth index from assets. After estimating the model, post estimation tests of LR and log likelihood ratio was calculated.

In addition, a fit plot was calculated to show the relationship between wealth index and self-medication ratio. The study was confirmed ethically in Research Deputy of Guilan University of Medical Sciences (GUMS), (ethics code: IR.GUMS.REC.1397.304).

Results

Table 1 shows descriptive statistics of study. As shown in the table 1, self-medication ratio was 0.279 in average, indicated that 27.9 % of drug utilizations were not been prescribed by physicians. In addition, household expended monthly 5.92 dollars for drugs in 2016. While they expended 0.843 dollars without prescribing of physicians. They utilized 0.178 unit (Unit: utilization of services) drugs without prescribing of physicians and 0.454 units with prescribing of them. Averagely, 0.50 person in the family had academic degree and 0.91 were illiterate. 0.314 persons were less than 5 years less in each family and 0.452 were more than 60 years old. Average household size was 3.553 and average yearly income was 3771.04 US dollars.

Table 2 shows self-medication utilization and expenditures and the self-medication ratio of each province of Iran. As shown in the table, self-medication ratio in Zanjan province was 0.094 (the lowest one) and was 0.56 in Ardebil province (the highest one). While people lived in Guilan province expended 2.33 dollars monthly, and without prescribing of physicians and those lived in Zanjan

had the lowest expenditures (0.160 dollars monthly). Self-medication utilization was lowest in Hormozgan province (0.101 units monthly) and was highest in Ardebil province (0.519 units monthly).

Table 2 as well as figure 1, shows self-medication expenditures, self-medication utilization and self-medication ratio in provinces of Iran.

Table 3 shows the results of Multilevel mixed effect regression for the relationship between social and economic variables and self-medication ratio. As shown in the table, household income has significant negative relationship with self-medication ratio (coefficient -0.0028), however second order of income did not have significant relationship with self-medication ratio. Wealth index was categorized in to 6 groups. As shown in the table, wealth had significant relationship with self-medication ratio, while the relationship was bigger in higher wealth status. Age5 had negative relationship with self-medication ratio while no significant relationship was found for age60. In addition, health insurance coverage of family had negative relationship with self-medication ratio (coefficient = 0-0.0217, P-value = 0.022).

Figure 2 shows fit plot between wealth index and self-medication ratio. As shown in the table, as moving from poor households to wealthy ones, self-medication ratio would decrease and after that it would increase again. The minimum self-medication ratio is for wealth quintiles of fourth and fifth.

Table 1. descriptive statistics

variable	mean	SD	minimum	Maximum
Self-medication ratio	0.279	0.419	0	1
overall drug expenditures	5.92743	20.38332	0	2705.75
self-medication expenditures	0.843111	4.294605	0	338.2187
self-medication utilization	0.178708	0.384158	0	2
with prescribing utilization	0.454596	0.575133	0	2
family characteristics				
Having academic degree	0.500288	0.815187	0	7
Illiterate	0.919022	0.91913	0	12
less than 5 years old	0.313899	0.571976	0	5
more than 60 years old	0.452813	0.701207	0	3
household size	3.553505	1.535334	1	20
yearly income	3771.048	3553.301	- 85991	131095.8

Table 2. Self-medication utilization and expenditures and the self-medication ratio of each province of Iran.

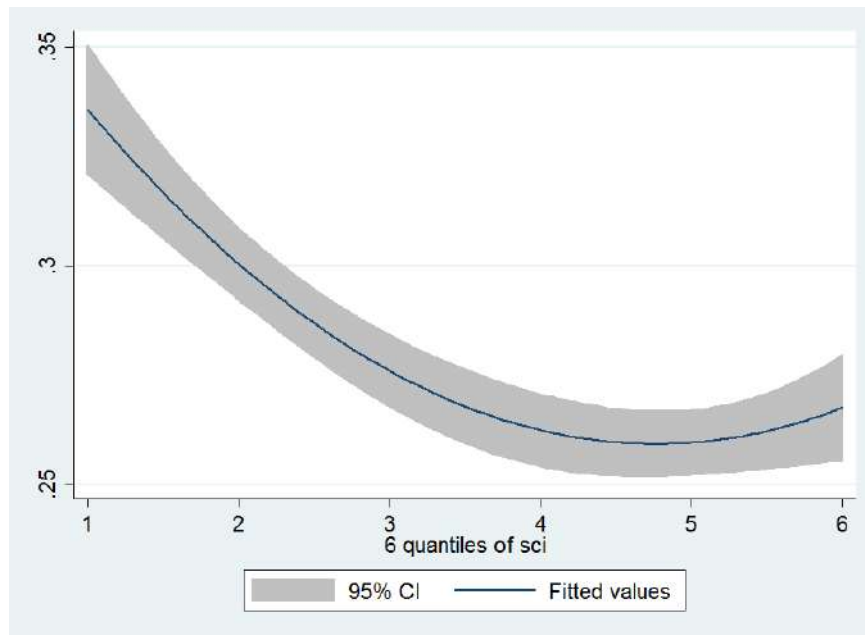| province	Self-medication ratio		Self-medication expenditures ($, per month)		Self-medication utilization (unit, per month)	
	mean	SD	mean	SD	mean	SD
Markazi	0.257528	0.016964	0.641932	0.074888	0.121901	0.008699
Guilan	0.393285	0.014472	2.333454	0.24551	0.351942	0.01359
Mazandaran	0.341897	0.016309	1.435083	0.133102	0.239837	0.01218
East Azerbayjan	0.354362	0.01366	1.208918	0.103919	0.337985	0.013175
West Azerbayjan	0.303333	0.021666	0.383332	0.06298	0.105223	0.008507
Kermanshah	0.138759	0.011705	0.586281	0.090733	0.096244	0.008253
Khoozestan	0.109219	0.011205	0.399245	0.065846	0.066667	0.006948
Fars	0.241865	0.013442	0.925301	0.236162	0.18099	0.00987
Kerman	0.320652	0.020982	0.814044	0.095019	0.114894	0.008496
Khorasan-Razavi	0.286039	0.014978	0.560028	0.066393	0.15942	0.008998
Isfahan	0.23818	0.013704	0.881779	0.10536	0.168776	0.009936
Sistan va Baloochestan	0.445652	0.022995	0.60906	0.089782	0.145139	0.009286
Kordestan	0.103687	0.014189	0.239988	0.056185	0.052743	0.007263
Hamedan	0.309278	0.01612	0.882372	0.112753	0.201713	0.011203
Chaharmahal va Bakhtiari	0.17239	0.011006	0.717864	0.078218	0.20217	0.012619
Lorestan	0.272506	0.021335	0.414008	0.05555	0.117318	0.009912
Ilam	0.41994	0.018531	0.843841	0.102447	0.287356	0.014012
Kohkilooye Va Biorahmad	0.433917	0.016485	0.699105	0.03532	0.323633	0.0139
Bushehr	0.25	0.018465	0.789177	0.11561	0.120748	0.009506
Zanjan	0.094321	0.01298	0.160944	0.044085	0.042757	0.005979
Semnan	0.176672	0.015669	0.723868	0.090992	0.104537	0.009613
Yazd	0.180882	0.013825	0.967443	0.154173	0.115806	0.008955
Hormozgan	0.2256	0.016423	0.703205	0.11495	0.101776	0.007905
Tehran	0.251955	0.011264	1.56042	0.146564	0.175248	0.008082
Ardebil	0.560834	0.015008	1.783511	0.160456	0.519928	0.015043
Qom	0.228202	0.01395	0.952779	0.097409	0.232759	0.013702
Qazvin	0.255385	0.016661	0.551222	0.066859	0.17345	0.011792
Golestan	0.322472	0.013137	0.890545	0.076167	0.296377	0.012297
North Khorasan	0.232206	0.016559	0.393605	0.065775	0.113019	0.008471
South Khorasan	0.395522	0.019386	0.352525	0.027214	0.185673	0.010517
Alborz	0.235429	0.016033	1.320952	0.163444	0.15233	0.010761
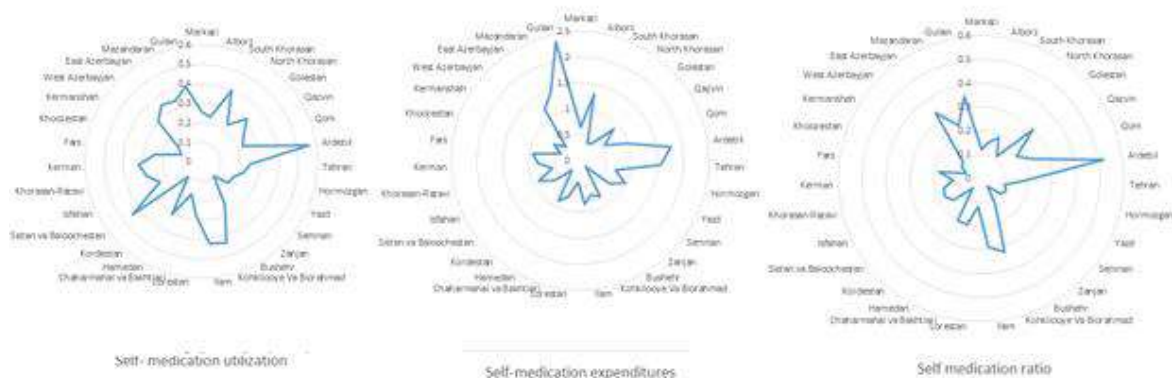
Figure 1. self-medication expenditures, self-medication utilization and self-medication ratio in provinces of Iran.

Table 3. The results of Multilevel mixed effect regression for the relationship between social and economic variables and self-medication ratio.

variable	coefficient	SE	P	lower limit	upper limit
inc(1000dollar)	- 0.00286**	0.00115	0.013*	- 0.00511	- 0.00062
inc2 (1000dollar)	0.0000149	0.0000172	0.388	- 1.89E-05	4.86E-05
Sci					
2	- 0.0253064**	0.0110466	0.022*	- 0.046957	- 0.00366
3	- 0.0455601**	0.0113462	0.000*	- 0.067798	- 0.02332
4	- 0.045456**	0.0116674	0.000*	- 0.068324	- 0.02259
5	- 0.0493421**	0.0120681	0.000*	- 0.072995	- 0.02569
6	- 0.0451974**	0.0130761	0.001*	- 0.070826	- 0.01957
Ilit	- 0.0077917*	0.0044995	0.083	- 0.016611	0.001027
Uni	0.0001963	0.0040207	0.961	- 0.007684	0.008077
Work	- 0.0029686	0.0033548	0.376	- 0.009544	0.003607
age5	- 0.0220929**	0.0065075	0.001	- 0.034847	- 0.00934
age60	- 0.0056408	0.0047035	0.230	- 0.01486	0.003578
Urb	- 0.0075438	0.0062333	0.226	- 0.019761	0.004673
Ins	- 0.0217896**	0.009537	0.022	- 0.040482	- 0.0031
Phy	- 0.1808787	0.1227465	0.141	- 0.421457	0.0597
Hhs	0.0021546	0.0026276	0.412	- 0.002995	0.007305
constant	0.4718615**	0.0791535	0.000*	0.3167235	0.627
province: Identity					
var(constant)	0.0100279**	0.0026123	0.017*	Log-likelihood	- 11107.216
var(Residual)	0.164476	0.0015918	0.168	LR test χ2	1156.15

** significant at 95% confidence interval ,   *significant at 90% confidence interval

Figure 2. Fit plot between wealth index and self-medication ratio

Discussion

The study showed self-medication ratio is about 30 % that considering to other countries with the range of 14 % to 8 % for self-medication, is high figure (13). Although another study showed 53 % overall prevalence of self-medication in Iran through meta-analysis(7), but we thought that the differences is related to the definition of self-medication. We consider all medicines that could be purchase from pharmacy, as medicine and we don't consider traditional herbal substances that have common use in Iran. Ultimately it could be

said, the prevalence of self-medication in Iran is high and its effecting factors should be studied and determined.

Statistics shows that outpatient expenditure of drugs and supplies in Iran is 17.9 % of total health expenditure(20). Although this expenditure proportion is smaller than the similar countries such as Turkey, Our results show that 14.2 % of total drug expenditure in Iran is related to self-medication and it can be guessed that self-medication causes a heavy burden to the economy. Also we found that households expend 2 % of yearly income for drugs as out of pocket that we thought it is un-unneglectable considering to insurance coverage ratio in Iran.

Self-medication ratio and utilization in Ardebil province is the highest and in Zanjan is the lowest. Expenditure of self-medication is again the lowest in Zanjan, but Guilan expend the highest costs on self-medication while its self-medication ratio was not as high as other provinces. So it could be indicated that people live in Guilan expend more expensive drugs through self-medication and utilize more drugs. In addition in a province like South Khorasan, self-medication ratio is very high, but their utilization and expenditures are low, indicated that in this province, people utilize less drugs than others.

The significant negative relationship of household income with self-medication ratio shows that financial protection, accessibility and affordability of service could effect on self-medication at first. However analysis of second order of income shows no significant relationship with self-medication ratio, which indicates that, this relationship is not continued in all level of income. There was significant relationship between self-medication ratios and wealth status. Other researches showed that proportion of self-medication increased considering with level of income because of increasing access to medicines(21, 22) that are in line with our findings. But we think in Iran people who has higher income, at first prefer to visit a doctor and after this stage, self-medication happens. In the other hand in people with lower level of income, self-medication is

common because of limitation in financial aspect of access to physician. The results show that institution of more stringent regulations on OTC drugs and also increasing inspection of pharmacies can control self-medication prevalence. Also changing referral system in Iran is fundamental strategy for overcoming self-medication. This strategy promote rational drug therapy by improving prescribing pattern and has positive effect on this issue which was happened in other countries and free access to medicines have a protective effect on self-medication(21-23).

There were negative relationship with between self-medication ratio and households which have age under 5 children, while no significant relationship was found with households which have elderly over age 60. Another study showed that Self-medication was also higher among the elderly in Iran, Which is not consistent with the results of the present study(7) . The low rate of self-medication in households with age under 5 children may be attributed to the high level of awareness in this group because of youth and literacy. Studies shows an inverse relationship between self-medication and level of awareness(7, 24).

Our findings showed health insurance coverage of family had negative relationship with self-medication ratio, that could indicate that financial protection and accessibility to health services reduces self-medication and Iranian prefer to visit a doctor at first. This negative relationship confirmed by results of several studies (10, 25, 26). Self-medication ratio is highly related to socioeconomic status. It is lower in middle class wealth groups and higher in lower and highest wealth groups.

Mild symptoms and self-diagnosis of disease, previous use of medication, and ease of access to non-prescribed medication were among the most important determinant factors of self-medication in earlier studies that we didn't study it in this research (7). Moreover, the most diseases related to self-medication are respiratory diseases, common cold and headache according to previous studies that we didn't study it because of data limitation (7). As the previous studies findings, In Iran, Analgesics, eye drops, and antibiotics have the most shares of self-

medicated drugs(7, 12-14), which implied that bacterial resistance development is another self-medication danger, in addition to economic burden and adverse drug reaction, which could be harmful for total population.

The study had some limitations. First we were not able to analyze data at individual level and we had to convert some individual level variables (like age and sex) to household level ones. Second, we did not have access to other variables which could be effective on self-medication.

Conclusion

The prevalence of self-medication among Iranian was relatively high. Self- medication was less in wealthier families and it was related to the household income. Given the high prevalence of self-medication, it seems necessary to implement financial protections to increase access of patients for physicians to avoid from self-medication and adverse drug reaction. Promote rational drug consumption strategies by improving prescribing pattern, implementation of family physician programs, more stringent regulations on OTC drugs and also increasing inspection of pharmacies can control self-medication prevalence and its huge economic burden.

Authors' contribution

Homaie Rad E designed the research; Ehsani-Chimeh E conducted the research, Davoudi-Kiakalayeh A, Yousefzadeh-Chabok SH revised the article and supervised the research. Homaie Rad E analyzed the data, Ehsani-Chimeh E wrote the article. All authors read and approved the final manuscript

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