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RESEARCH ARTICLE

Community pharmacy-based survey on pharmacists' knowledge, attitude, and performance regarding dietary supplements: Evidence from South of Iran

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ABSTRACT

Background: Pharmacists can help patients to make informed and safe choices of dietary supplements. **Aims and Objectives:** According to the importance of pharmacists' knowledge about dietary supplements and the effect of this knowledge on their attitude and performance, this study was conducted to determine the knowledge, attitude, and performance (KAP) of pharmacists toward these supplements. **Materials and Methods:** This cross-sectional study was conducted by a descriptive-analytical approach in Shiraz, the largest metropolis in south of Iran, in 2015. Data were collected using a questionnaire consisting 33 questions of KAP assessment that its validity and reliability were approved by a previous study. Data were analyzed using One-sample *t*-test, independent *t*-test, One-way analysis of variance, and Pearson correlation at the significance level of 0.05. **Results:** The results showed that the average of the attitude score had a significant difference between male and female pharmacists ($P < 0.05$) but there were no significant relationships between other demographic characteristics and the mean of KAP analysis. Other findings demonstrated a significant relationship between KAP of the pharmacists toward supplements. The relationship between knowledge and performance was stronger than the relationship between knowledge and attitude ($r = 0.47$). **Conclusions:** Our results implied that pharmacists with higher knowledge have a better attitude and performance toward the dietary supplements, so it is recommended to redesign the training courses for pharmacists at the top task of policymakers and administrators of health and pharmaceutical system of the country.

KEY WORDS: Community Pharmacy; Pharmacist; Dietary Supplement; Knowledge; Attitude; Performance

INTRODUCTION

Pharmaceuticals are considered as one of the most important and expensive technologies nowadays.[1] In many countries, per capita consumption of pharmaceuticals has increased during recent years. For example, evidence indicates the 33 million dollars of Iran's per capita in 2008 compared to the average of 100 dollars in many developed countries.[2] In the meantime, the use of dietary supplements in different societies has increased.[3]

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Dietary supplement is a term which covers various products ranging from vitamins, minerals, herbal compounds, and many high-energy compounds.[4] Evidence shows that in 2007, near to 68.9% of the Australians have used at least one of the 17 forms of Complementary Alternative Medicine which was not prescribed by a physician and these statistics were 71% in Canada in 2005.[5] The use of dietary supplements is also

considerable in Iran. In this regard, the study results showed that 41.9% of health centers visitors in west Tehran had used at least one type of dietary supplement.[6] Using these dietary supplements is related to demographic characteristics of people such as age, sex and also health behaviors and suffering chronic diseases.[7] It is also observed that the use of other dietary supplements is common in people who desire to lose weight and the number of their use will increase by weight gain and obesity.[8] In addition, the use of dietary supplements depends on different factors such as age, marital status, fear of osteoporosis, and using multivitamin supplements.[9] For example, different studies have shown that using dietary supplements such as calcium and iron is more common among married people.[10,11] Despite the above-mentioned widespread use of supplements, it is obvious that only a logical and optimal use of supplements can ensure appropriate treatment and improving patients health and consumers of these products and in the meantime, pharmacists would have an important role in the health and treatment cycle and are as one of the main and effective components in the cycle of prescription and using supplements for providing correct information regarding their appropriate use.[12] Pharmacists can help patients to make informed and safe choices of dietary supplements. In addition, since pharmacists are easily at patients' disposal, they can help patients in regards to buying dietary supplements or providing information based on the evidence regarding their interaction with conventional medicines.[13]

Fortunately, most consumers of dietary supplements know the role of pharmacists, effective in the recommendation for production of these supplements.[14] In this regard, the studies showed that consumers usually ask pharmacists about dietary supplements.[15] A recent survey of pharmacy customers in Australia showed 87% of consumers expected that pharmacists are able to answer about the effectiveness of dietary supplements and 92% of them expected to receive safe information about these products. Thus, most consumers of dietary supplements believe that the pharmacist should be able to recommend the most effective dietary supplements.[16]

It is while the conducted studies show that pharmacists' information about the supplements are not enough and even pharmacists know their knowledge insufficient in this regard for instance, the results of Clauson et al. showed that the majority of pharmacists' knowledge about dietary supplements is inadequate and pharmacists do not have enough self-confidence to answer patients' questions.[15] Some other, reasons for the inadequacy of information are noted like the incompetent training about supplements and lack of improving awareness of pharmacists in terms of the importance of counseling medication in courses of pharmacy schools or unavailability of approved resources.[17,18]

Although, the results of MehrAlian et al. showed that pharmacists with a higher knowledge level, had a more positive attitude and better performance toward the dietary supplements which further emphasizes the importance of improving knowledge of pharmacists regarding dietary supplements.[19]

Regarding to the importance of knowledge, attitude, and performance (KAP) improvement and the influence of them on behavior change, this study was conducted to determine the KAP of pharmacists about dietary supplements.

MATERIALS AND METHODS

This was a cross-sectional study conducted in 2015. The target population consisted of all pharmacies in Shiraz (n = 300). All pharmacies were enrolled by the census. In this study, after coordination and receiving the necessary legal permits, one of the researchers (MJ) visited pharmacies and after the explanation of the research goals and satisfying them, distributed the questionnaires between the pharmacists working in pharmacies and then collected them at the end of the same day. Verbal voluntary consent was achieved before starting data collection.

A questionnaire was applied as a data collecting tool to evaluate interactions between pharmacists and consumers of pharmaceutical supplements. The instruments validity and reliability were approved using the comments of experts and according to MehrAlian et al.,[19] respectively, with the calculation of Cronbach's alpha coefficient (for the aspects of KAP as 0.86, 0.61, and 0.81, respectively). This questionnaire included two parts, the first part collecting demographic information and the second part with 33 questions related to the knowledge (=7), attitude (=9), performance (=10), and scientific questions of pharmacists (=6). Grading the questions related to knowledge, attitude, and performance based on the Likert scale and scored, 1 for "strongly disagree" to score 5 for "strongly agree." Furthermore, for scoring the scientific questions (effects of zinc poisoning, the interference of glutamine and dietary supplements, the effect of raw egg on nutritional absorption, the forbidden use of HGH, the side effects of creatine and carnitine, and the relation between vitamins poisoning and osteoporosis), the scores "0" and "1" were considered for the wrong and correct questions, respectively, and to classify the scores related to the scientific questions, the participants who answered correctly to <30%, 30-40%, 40-60%, 60-70% and more than 70% of questions were classified as "very weak," "weak," "intermediate," "good," and "excellent," respectively.[19] The whole items of the questionnaire are presented in the Appendix Table 1. After collecting data and entering them to SPSS Version 20, interpretive and descriptive statistic was used to analyze data. Normality of variables was analyzed and accepted with the Kolmogorov-Smirnov test at first (knowledge P = 0.321, attitude P = 0.433, and performance P = 0.412). Then, data were analyzed using one-sample t-test,

independent *t*-test, one-way analysis of variance (ANOVA), and Pearson correlation at the significance level of 0.05.

RESULTS

Of 300 distributed questionnaires, 200 were gathered and analyzed (response rate=66.66%). Descriptive findings indicated that 61% of participants were men. Most of these people were 35-45 years old (51%) with the average of 38.02±7.60 years. In terms of education, the findings showed that the most participants (73.5%) were general pharmacists who finished pharmacy school in undergraduate level and do not have Ph.D. Furthermore, the findings from the ranking of the universities where participants educated showed that 52.5% of them were educated in type 1 universities inside the country (Shiraz, Tehran, Isfahan, Mashhad and Ahwaz University of Medical Sciences). This finding is important to compare the knowledge of pharmacists in typical universities that all are governmental, free and entrance exam base with Azad University that is payment based and no entrance exam in student absorption mechanism.

Finally, the findings showed that 47.5% of the participants had 10-20 years' work experiences and 80% of them were the technical managers of pharmacies (Table 1).

The results of t-test showed that the average of the attitude score had a significant difference in terms of gender ($P < 0.05$). In other words, female pharmacists' attitude toward dietary supplements was more positive than male. Meanwhile, the average of knowledge score, attitude, and performance of pharmacists in terms of the role of participants in pharmacy had no statistical difference. Furthermore, according to ANOVA, the average of knowledge score, attitude, and performance of pharmacists had no significant difference in terms of demographical variables such as age, education, rank of the university, and the work experiences so because of no significant relationship according to ANOVA, *post hoc* analysis did not apply (Table 2).

Table 1: Demographic and background characteristics of participants

Variables	Category	Frequency *n* (%)
Gender	Male	122 (61)
	Female	78 (39)
Age	<25	16 (8)
	25-35	48 (24)
	36-45	102 (51)
	>45	34 (17)
Education	Pharmacy student	28 (14)
	Pharm D	147 (73.5)
	PhD	25 (12.5)
University level	National type 1	105 (52.5)
	National type 2	34 (17)
	International	16 (8)
	Missing data	45 (22.5)
Experience (years)	<5	30 (15)
	5-10	30 (15)
	11-20	95 (47.5)
	> 20	45 (22.5)
Position	Technical manager	40 (20)
	Assistant	160 (80)

The results of Pearson correlation showed that there was a significant positive relationship between the variables of knowledge and attitude, knowledge and performance, attitude and performance with the higher amount of correlation coefficient between knowledge and performance (Table 3).

According to Table 3, pharmacists with more knowledge had more positive attitude and better performance toward dietary supplements. Furthermore, more positive attitude toward the dietary supplements leads to better performance in this regard.

In the section of scientific questions of pharmacists' knowledge about the dietary supplements including the effects of zinc poisoning, the interference between glutamine and dietary supplements, the effect of raw egg on nutritional absorption, the forbidden use of HGH, the side effects of creatine and carnitine, and the relation between vitamins poisoning and osteoporosis, only 1% of pharmacists were in the "very good" group and 49% were in "weak" and "very weak" groups (Table 4).

DISCUSSION

The results of this study showed that pharmacists' attitude toward the dietary supplements was positive. The results of Portyansky.[20] showed that most pharmacists had positive attitude toward the alternative medical products including dietary supplements. Furthermore, in Montbriand.[21] in Canada, it was determined that 63% of pharmacists had a positive attitude toward the alternative treatments. While the results of Dunn et al.[22] and Welna et al.[23] in the USA showed that about 50%of pharmacists believed that dietary supplements are not safe. The reasons of this difference in the results can be justified by difference in the studied community and their cultural and social contexts. While, in Iranian health system, prescribing pharmaceuticals and also many of dietary supplements are physicians and pharmacists do not have an important role in prescription process and are more passively executing orders and delivery of prescribed drugs to the patients.

Other results showed that the averages of knowledge and performance scores of pharmacists had no significant difference in terms of gender, but the attitude score had a

Table 2: Participants knowledge, attitude, and performance according to their demographic characters

Variables	Mean±SD		
	Knowledge	Attitude	Practice
Gender			
Male	3.38±0.48	3.63±0.35	3.55±0.43
Female	3.32±0.54	3.47±0.57	3.44±0.50
Statistics	t=0.869, *P*=0.386, df=193	t=2.280, *P*=0.024, df=191	t=1.597, *P*=0.112, df=190
Age			
<25	3.33±0.42	3.56±0.30	3.48±0.33
25-35	3.48±0.44	3.50±0.44	3.51±0.39
36-45	3.31±0.42	3.59±0.42	3.49±0.43
>45	3.23±0.81	3.39±0.78	3.45±0.74
Statistics	f=1.794, *P*=0.150, df=194	f=1.409, *P*=0.242, df=192	f=1.965, *P*=0.947, df=191
Educational level			
Pharmacy student	3.32±0.39	3.57±0.32	3.48±0.35
Pharm D	3.36±0.52	3.53±0.52	3.49±0.51
PhD	3.28±0.61	3.52±0.56	3.50±0.41
Statistics	f=0.243, *P*=0.785, df=172	f=0.096, *P*=0.908, df=194	f=0.014, *P*=0.986, df=167
University level			
National type 1	3.36±0.48	3.58±0.48	3.51±0.51
National type 2	3.46±0.0.37	3.56±0.43	3.57±0.36
International	3.43±0.34	3.70±0.30	3.50±0.45
Statistics	f=0.700, *P*=0.498	f=0.612, *P*=0.544	f=0.243, *P*=0.785
Experience (years)			
<5	3.37±0.48	3.44±0.0.48	3.51±0.41
5-10	3.55±0.40	3.55±0.34	3.52±0.45
11-20	3.30±0.51	3.57±0.49	3.50±0.50
>20	3.27±0.59	3.49±0.61	3.43±0.50
Statistics	f=2.190, *P*=0.091, df=194	f=0.676, *P*=0.56, df=192	f=0.294, *P*=0.830, df=191
Position			
Technical manager	3.39±0.36	3.50±0.36	3.44±0.41
Assistant	3.33±0.55	3.54±0.53	3.50±0.49
Statistics	t=0.679, *P*=0.498	t = −0.438, *P*=0.662	t = −0.672, *P*=0.502

Table 3: Correlation matrix of pharmacists knowledge, attitude, and performance

Variables			
Knowledge	1.000		
Attitude	0.399**	1.000	
Performance	0.462**	0.470**	1.000

**Correlation is significant at the 0.01 level (two-tailed)

significant difference in terms of gender. Attitude of female people was more positive toward dietary supplements while the results of MehrAlian et al. showed that the average knowledge score had a significant difference in terms of gender and attitude and performance of pharmacists had no significant difference in terms of gender.[19] The reasons here can be related to the differences between the study population.

Other findings showed that the average knowledge score had no significant difference in terms of sex, age, education, type of the university, and work experience. MehrAlian showed that the average knowledge score had no significant statistical difference in terms of age and work experience. While, the average knowledge score had no significant statistical difference in terms of sex, position, education, and rank of the university where educated.[19] Any other published study was not available to compare the findings in this regard.

The results of this study showed that the average of pharmacists' performance score toward dietary supplements had no significant difference in terms of sex and rank of the university where educated. The results of MehrAlian et al. showed that the average pharmacists' performance score had no significant difference toward dietary supplements in terms of sex and the rank of the university where educated.[19]

Table 4: Descriptive results of scientific questions about pharmacists' knowledge

Scoring category	Frequency *n* (%)
Poor	47 (23.5)
Weak	51 (25.5)
Average	88 (44)
Good	12 (6)
Excellent	2 (1)
Total	200 (100)

This finding can be rooted in this issue that the pharmacists working in Iran, regardless the place and quality of their educations, do not have any difference in terms of knowledge level, attitude and performance toward dietary supplements. After starting to work in a pharmacy, it can be explained that all universities inside and outside of the country despite the differences in the quality of education, teaching methods, and levels of professors with each other, have the minimum standard level in teaching pharmacology and suitable curriculum. Furthermore, the other cause of this issue can be the stronger effect of health culture of community and people's need, physicians' demand as the prescriber and support of the Ministry of Health and the Food and Drug Organization from the importation and distribution of dietary supplements across the country which needs to further investigation.

The results of this study showed that participants with higher knowledge had more positive attitude and their better performance. MehrAlian[19] also concluded that there is a significant relationship between KAP.

Assessing the knowledge of pharmacists showed that 49% of pharmacists were in "very weak" and "weak" groups and knowledge of the most pharmacists toward dietary supplement was at the intermediate level. Studies of Clauson et al.,[15] Dolder et al.,[24] and Welna et al.[23] also showed that the knowledge of 50% of pharmacists about dietary supplements is sufficient and intermediate and knowledge of a small number of pharmacists is high about dietary supplement. These findings indicated the necessity and importance of more attention to the retraining of employed pharmacists. On the other hand, it seems that the faculties of pharmacology educate pharmacists and deliver them to the community as their only mission and do not have an important role in retraining of employed pharmacists. While in Iran, Universities of Medical Sciences are required to develop educational programs for all subjects of retraining including pharmacists with the leadership of training hub that according to the above findings, it seems that the provided trainings by them had not been effective enough to improve the knowledge level of pharmacists which is recommended that further studies should be done to improve the effectiveness of training courses.

Moreover than what was discussed, it is recommended to pay attention to enrich the personal development plan of these pharmacists and add new topics the same as dietary supplements into their obligatory educational plan for improving their knowledge, attitude, and practice and at the same time a prerequisite for their pharmacy accreditation.[25]

From the limitations of this study, limiting the research population to the pharmacists of Shiraz, using the self-evaluation to evaluate performance, using the limited questions to evaluate knowledge, unwillingness of some pharmacists to cooperate and lack of enough researches conducted inside the country regarding the research topic can be mentioned. Hence, it is recommended that similar researches will be conducted regarding the KAP of pharmacists toward dietary supplements in the other universities in the country to develop the executive policies for directors and decision-makers of universities, the qualitative research method study with the same aim is also recommended to achieve the round views and deep ideas of pharmacists, physicians, and patients toward prescription and use of these supplements.

CONCLUSION

The results showed that participants with higher knowledge had a better attitude and performance toward dietary supplements. Since the most studied pharmacists had no sufficient knowledge about dietary supplements, redesigning more effective training courses for pharmacists at the top priority of policymakers of the country would be helpful.

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APPENDIX

Appendix Table 1: The applied questionnaire based on Mehralian et al[19]

Knowledge	Generally, I have sufficient information toward dietary supplement
	I have sufficient information about efficiency and effectiveness of dietary supplement
	I have sufficient information about adverse effects of dietary supplement
	I have sufficient information about dosage and administration of dietary supplement
	I have sufficient information about indications of some dietary supplement in specific groups such as pregnancy, breast feeding, pediatric, and geriatric
	I have sufficient information about drug-supplement interactions
	I have sufficient information about contraindication of dietary supplement and in special groups of patient for example with hypertension or kidney disease
Attitude	Dietary supplements have a positive impact on public health
	Therapeutic efficacy of dietary supplement may be considerable
	Pharmacists should be knowledgeable about supplements and consulting in this field is part of pharmacist's duties
	Supplement should dispense according to the nutritionist or physicians prescription
	Supplement should be sold in pharmacies under pharmacist's supervision
	Supplements considered as an important source of profit for pharmacies
	Price is important factor for recommending supplements to customers
	Customers usually are influenced by pharmacist's comments about supplements
Practice	I always allot enough time for giving advice to customers on supplements
	I've studied some scientific references regarding to supplements
	I could refer to valid web pages and scientific references relevant to dietary supplement in case of needed
	I always recommend supplements to consumers with confidence about their effectiveness.
	I always inform consumers about possible adverse effects of dietary supplements
	I always advise consumers about dosage and administration of supplements
	I always ask consumer's medical history when I recommend these products.
	I always check whether particular supplement taken by consumer interact with her/his prescription medicines
	I always inform consumers about drug-supplement interactions
	I have self-confidence for recommending supplement
Scientific questions	Effects of zinc poisoning
	The interference of glutamine and dietary supplements
	The effect of raw egg on nutritional absorption
	The forbidden use of HGH
	The side effects of creatine and carnitine and the relation between vitamins poisoning and osteoporosis