

## The Use, Perception, And Knowledge Of Dietary Supplements Among Community Pharmacists

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### Abstract

**Background:** The utilization of dietary supplement (DS) is dramatically increasing across the globe, but knowledge of the community pharmacists regarding these products has not been well studied. Pharmacists are commonly tasked with recommending the appropriate DS and advising the patients of their correct and safe use. Previous research showed that they did not always use the evidence based sources of information, with personal use identified as a significant predictor influencing the decision to recommend a supplement. **The study aims:** To compare use, perceptions and knowledge of dietary supplements of pharmacists with different years of work experience and to explore factors that could influence their recommendation of supplements. **Methods:** A questionnaire based cross-sectional study was conducted on community pharmacists in **Taif, KSA from January to February 2022**. The questionnaire explored pharmacists' demographic characteristics, use, perceptions and knowledge of DSs. Pharmacists (N=102) were divided in two groups based on their work experience: P0 (<10 years) and P1 (≥10 years). **Results:** All included pharmacists had high knowledge scores without differences between groups (P0=10,<sup>1</sup> IQR 9-12 vs P1=11, IQR 9-12, expressed as median and interquartile range (IQR), p=0.275). Less experienced pharmacists perceived there was less research conducted on the DSs compared to their more experienced counterparts (P0=1, IQR 1-2 vs P1=2, IQR 2-3, expressed as median and interquartile range, p<0.001). Groups differed in sources used when choosing the appropriate supplement with P0 using higher quality sources such as systematic reviews in comparison to P1 (32.1% vs. 8.7%, p=0.004). Pharmacists' decision to recommend a DS was influenced by their personal use (odds ratio 0.216, 95%CI 0.068:0.689, p=0.01) and work experience (odds ratio 0.154, 95%CI 0.045:0.530, p=0.003). **Conclusions:** Pharmacists did not use the high quality sources when recommending DSs and their decision to recommend the supplement was not based on objective evaluation of evidence. Further education about the practice of evidence-based pharmacy is necessary, with special emphasis on senior pharmacists who might have missed that aspect during their formal education.

**Keywords:** Dietary Supplements; Evidence-Based Pharmacy Practice; Pharmacists

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## Introduction

Due to the significant healthcare burden of chronic diseases, the World Health Organization (WHO) recommends dietary supplements (DS) may be useful to improve health in some situations<sup>(1,2)</sup>. Complementary and alternative medicine (CAM) could be defined as a group of diverse medical and healthcare systems, practices, and products that are not presently considered to be part of conventional medicine<sup>(3)</sup>. According to Dietary Supplement Health and Education (DSHEA), DS are defined as a wide array of non-food and non-drug substances intended to supplement the diet but are not proposed to treat human diseases<sup>(4)</sup>. These agents might constitute one or more dietary ingredients, such as mineral, vitamin, herbal preparation, amino acid, or a mixture of these ingredients, which may provide a valuable health benefit for patients with chronic diseases<sup>(4)</sup>.

The consumption of calcium and vitamin D, for example, improves bone mineral density and prevents fracture in patients with osteoporosis<sup>(5)</sup>, and the use of fish oil or other omega-3 fatty acid supplements prevents the rate of mortality in patients with cardiovascular disease<sup>(6)</sup>. The American Society of nutrition reports the consumption of DS by a large proportion of the population in their day to day life<sup>(7)</sup>. Both in Japan and the US has evidenced using DS, higher than 50% of the adult population<sup>(8,9)</sup>. More than 80% of the physicians and nurses recommended a different DS product to their clients<sup>(10)</sup>. Though the intake of these products suggested by the majority of health care providers, the frequent habit of consuming DS by a wide range of population may create the potential for misinformation, underestimation of side effects, and drug-supplement/herbal interactions<sup>(11-13)</sup>.

A majority of consumers have less piece of information regarding the contents and properties of DS product. As a result of this, numerous studies highlighted health risks of using DS<sup>(11-13)</sup> as well as development potential drug interaction between DS product and prescription drugs<sup>(14)</sup>. The use of various forms of CAM is increasing worldwide, despite questionable evidence of their efficacy and safety in patients. The most reported CAM form in Europe has been use of herbal medicine, with prevalence rates from 5.9% to 48.3%<sup>(15)</sup>. Furthermore, several factors that influence customers' decision of taking CAM has been recognized. Study by Tangkiatkumjai et al., (2020)<sup>(16)</sup> has showed that the top three reasons for use of CAM were expectation of CAM benefits, consumers' dissatisfaction with conventional medicine and their perception of CAM as safe. Moreover, internal health locus of control, social networks, affordability, easy access and tradition were documented as influencing factors.

Dissatisfaction with conventional medicine was recognized as the most important reason for use of herbal medicine. However, self-medication, missing risk awareness and non-expert consultation about herbal medicine could be harmful for the patient. Elderly patients are at higher risks because they are more frequent users of prescription medications, which could possibly interact with herbal medicines<sup>(17)</sup>. As most accessible healthcare professionals, pharmacists are likely to encounter patients seeking advice about variety of CAM forms in their daily practice, and most community pharmacies are suppliers of these medicines. Majority of pharmacy available forms of CAM are herbal products marketed as dietary supplements. A research conducted among Australian pharmacists identified safety concerns as primary barrier to pharmacists' recommendation of CAM, alongside with lack of knowledge, perceived lack of evidence and lack of time for patient consultation<sup>(18)</sup>. In order to assure effective and safe use of CAM, and provide informed use to patients in pharmacies, an incorporation of CAM education in pharmacy curricula was proposed<sup>(18)</sup>.

In prior research, pharmacy students were identified as the most knowledgeable about DSs, when compared to their medical and dental colleagues. However, pharmacy students used evidence based sources of information about DSs in lesser extent and personal use was the most significant predictor if students would recommend DS to a patient<sup>(19)</sup>. Pharmacists play an important role in ensuring that CAMs are used safely and appropriately in Saudi Arabia; therefore, they need to be better informed about CAMs and better able to advise patients, seeking alternative remedies<sup>(20)</sup>. However, little is known how work

experience of pharmacists would influence their decision to recommend a DS. Therefore, a study was conducted on population of pharmacists which were divided in two groups based on their work experience. The aim of the study was to compare use, perceptions and knowledge of DSs between the two groups of pharmacists, and to explore factors that could influence recommendation of DS to patients. A questionnaire used in the study was developed by Axon et al., (2017) <sup>(21)</sup>.

## METHODS

This cross-sectional study was conducted in **Taif, KSA from January to February** after the ethics approval was obtained from the Ethics Committee of the University. Questionnaire was translated and adapted for targeted population as described in prior research and it consisted of four sections <sup>(19, 21)</sup>. The first part of the survey collected demographic data. A question providing information about years of work experience was added, as previous research showed that working experience can influence evidence based practice in pharmacists <sup>(22-24)</sup>. The second part enquired about pharmacists' current and prior use of supplements. The third part tested the pharmacists' knowledge about dietary supplements, with maximum total score of 14, but also asked about sources of information they had used to educate themselves about the supplements. The final part of the survey assessed pharmacists' attitudes toward the use of DSs. The perception items were rated on a scale from 0 to 5, with 0 being the lowest score and 5 being the highest <sup>(21)</sup>.

Participants eligible for this study were community pharmacists. A convenient sample of pharmacists that participated was offered to participate in the study. Participation was completely voluntary and anonymous, and pharmacists did not receive any compensation for it. Sample size was calculated using differences in knowledge score on DSs between pharmacists with different levels of work experience from the study by Emiru et al., (2019) <sup>(23)</sup> with confidence level set as 0.95 and power as 0.80. Necessary sample size was determined to be 100.

The data were analyzed using SPSS for Windows v. 28.0. Chi-square test was used to analyze pharmacists' use of DSs and sources of information for their use. The Chi-square and Mann Whitney U tests were used to analyze pharmacists' perceptions and knowledge of dietary supplements. In order to evaluate factors that may affect pharmacists' decision to recommend DSs to the patients, the binary logistic regression with forward conditional algorithm has been performed. The following covariates were included: age, gender, year of work experience, family member in healthcare, chronic disease and personal use ever. Value of  $p < 0.05$  was considered statistically significant.

## RESULTS

In total, 102 pharmacists participated in the study. **Table (1)** shows demographic data of study participants. Pharmacists who stated that they had 1-9 years of work experience were assigned to group P0, and pharmacists that had 10 or more years of experience were assigned to P1, as the median value of years of work experience was 8.5. Both groups included mostly female participants. Out of 102 pharmacists included in the study, 38 had used dietary supplement in the last 30 days ( $p=0.01$ ), 69 have used it in the past year ( $p<0.001$ ), and 81 have used some dietary supplement during their lifetime ( $p<0.001$ ). There was no statistically significant difference observed between P0 and P1 in use of any of the listed dietary supplements. Most commonly used dietary supplements for both groups were fish oil/omega 3, cranberry and echinacea. Nine (8.8%) of all participants experienced an adverse effect after use of dietary supplements.

**Table (2)** shows the sources of information that pharmacists use when choosing appropriate dietary supplement.

**Table (3)** shows the both groups, high total knowledge score values, with no significant difference between them ( $p = 0.275$ ). Median value for P0 was 10 (IQR 9-12) and for P1 11 (IQR 9- 12), out of a maximum 14 points.

**Table (4)** shows the perception items were rated on a scale from 0 to 5, with 0 being the lowest score and 5 being the highest <sup>(21)</sup>. All the participants strongly perceived that knowledge of supplements is important, median value for both groups being 5, and interquartile range (IQR) being 4-5. The only statistically significant difference observed in perceptions between P0 and P1 groups was observed in an item regarding the rating of the amount of research conducted on DSs. P0 group had median value 1 (IQR 1-2) and P1 group had median value 2 (IQR 2-3),  $p < 0.001$ . Logistic regression analysis showed that two factors could influence pharmacists' decision to recommend DS to patients. First factor was their personal use, with odds ratio 0.216 (95%CI 0.068:0.689),  $p=0.01$  and the second was work experience with odds ratio 0.154 (95%CI 0.045:0.530),  $p=0.003$ .

**Table (1):** Demographic characteristics of the study participants

Characteristic	Years of work experience		p-value
	1 to 9 years	10 or more	
Number of participants; N (%)	56 (54.9)	46 (45.1)	
Male gender; N (%)	9 (16.1)	1 (2.2)	0.328 <sup>a</sup>
Age; mean (SD)	29.4 (3.3)	45.9 (9.7)	<0.001 <sup>b</sup>
Working years; mean (SD)	4.5 (2.5)	20.5 (9.8)	N/A
Dietary supplement use in past month; N (%)	19 (33.4)	19 (41.3)	0.563 <sup>a</sup>
Dietary supplement use in past year; N (%)	37 (66.1)	32 (69.6)	0.989 <sup>a</sup>
Dietary supplement use ever; N (%)	45 (80.4)	36 (78.2)	0.777 <sup>a</sup>

<sup>a</sup> Chi-square test      <sup>b</sup> Mann-Whitney U test      N/A – not applicable; SD – standard deviation

**Table (2):** Pharmacists' sources of information to determine whether they want to use DSs

Source; N (%)	Years of work experience		p-value <sup>a</sup>
	1 to 9 years	10 or more	
Labels on product containers	32 (57.1)	10 (21.7)	<0.001
Journals	13 (23.2)	11 (23.9)	0.934
Educational programs	26 (46.4)	31 (67.4)	0.034
Textbooks	17 (30.4)	9 (19.6)	0.216
Databases (PubMed)	41 (73.2)	27 (58.7)	0.123
Lecture material from classes	21 (37.5)	10 (21.7)	0.086
Consulting physician and pharmacist	9 (16.1)	4 (8.7)	0.269
Reports of clinical randomized trials (RCT)	18 (32.1)	7 (15.2)	0.049
Reports of systematic reviews or meta analyses	18 (32.1)	4 (8.7)	0.004
National agencies for medicinal products	15 (26.8)	8 (17.4)	0.332

<sup>a</sup> Chi-square test

**Table (3):** Pharmacists' knowledge about DSs

Question	Years of work experience		p-value
	1 to 9 years	10 or more	
Regulatory agency requires that DSs be proven to be safe and effective before they are marketed: number of pharmacists who answered correctly (%)	16 (28.6)	19 (41.3)	0.756 <sup>a</sup>
Regulatory agency must monitor the safety of DSs once they are on the market: number of pharmacists who answered correctly (%)	13 (23.2)	23 (50.0)	0.314 <sup>a</sup>
Match the adverse reaction to the appropriate DS by writing the letter in the blank:	4 (2-4)	3 (2-4)	0.206 <sup>b</sup>

Question	Years of work experience		p-value
	1 to 9 years	10 or more	
median (IQR)			
Match each DS with its claimed health benefit: median (IQR)	8 (6-8)	8 (6-8)	0.278 <sup>b</sup>
Total score (median and IQR)	10 (9-12)	11 (9-12)	0.275 <sup>b</sup>
<sup>a</sup> Chi square test <sup>b</sup> Mann-Whitney U test      IQR - interquartile range			

**Table (4):** Pharmacists' perceptions and attitudes toward the use of DSs

Item; median (interquartile range)	Years of work experience		p-value <sup>a</sup>
	1 to 9 years	10 or more	
How much do labels on herbal and DSs help you understand if it is the right supplement for you?	3 (2-3.75)	3 (2-4)	0.648
How would you rate the amount of research conducted on DSs?	1 (1-2)	2 (2-3)	<0.001
How essential are DSs to your health?	3 (2-4)	3 (2-4)	0.354
How important is it to have a basic understanding /knowledge about herbal and DSs before using them?	5 (4-5)	5 (4-5)	0.760
How would you rate the amount of education offered to students at the College of Pharmacy on dietary and herbal supplements?	3 (2-3)	3 (2-3)	0.121
<sup>a</sup> Mann-Whitney U test			

## Discussion

In order to ensure suitable patient care, healthcare professionals should make decisions based on best available evidence. However, the results of this study show that community pharmacists do not use high quality sources of information on matter of DSs in their daily practice, and this is especially case for more experienced pharmacists as newly educated pharmacists more frequently used reports from randomized clinical trials and systematic reviews. Larger proportion of experienced pharmacists stated educational programs as sources of information, compared to less experienced pharmacists. However, educational programs are not primary sources of information, usually are not peer reviewed and might lack the necessary critical appraisal. Therefore, they could not always be a highest level of evidence available about a given topic.

However, educational programs are life-long learning areas that can update pharmacists' knowledge with newest and most relevant information in the field of DSs and they should contain only evidence based information. Moreover, the results of this study also showed that more experienced community pharmacist were more likely to recommend DS to a patient. There is a possibility that this finding could be explained by their positive experiences with DSs during their clinical practice and positive feedback from patients. However, future studies should investigate other factors that could influence community pharmacists' recommendations of DSs, or any other form of CAM. Furthermore, less than 10% of participants experienced adverse effects while using DSs and there is a possibility that pharmacists, who used DSs, perceive them as safe.

However, it is important for pharmacists to provide patient oriented care, and DSs are not safe for all population of patients (e.g. patients on warfarin and ginkgo use). Interestingly, both pharmacists' groups stated databases (PubMed) among most frequent sources of information, but for experienced pharmacists' reports of systematic reviews as



sources of information was the least frequent source. One could assume that more experienced pharmacists were not educated in hierarchy of evidence, and lack knowledge on how to search the best available evidence which is necessary for implementation of evidence based practice in their daily work. Study by Tan et al., (2017)<sup>(25)</sup> was in accordance with this study's results showing that evaluation of scientific literature and application of the findings in practice had been significantly lower in senior pharmacists.

Unlike them, younger pharmacists had courses about evidence-based pharmacy and critical literature evaluation in their pharmacy degree programs, which would explain the differences<sup>(26)</sup>. Lack of formal education, was just one of the recognized obstacles for research utilization. Pharmacists might not use the higher quality sources as they did not have time to perform the necessary literature search and analysis<sup>(25, 26)</sup>. Senior pharmacists often had more responsibilities on managerial tasks which led to them having less time to work with the patients and utilizing evidence based pharmacy in their practice<sup>(25)</sup>. Furthermore, they might have only limited access to higher quality sources<sup>(26)</sup>.<sup>11</sup> Also, for some DS might be a perceived lack of relevant information regarding their efficacy or safety<sup>(27)</sup>.

Previous researches in the field of evidence-based pharmacy have had divergent conclusions. Study by Al-Jazairi et al., (2017)<sup>(22)</sup> found that senior pharmacists had more optimistic outlook on evidence-based practice, and authors assumed that this is due to the fact that senior staff had more patient care experience which could have shaped the need of evidence based concept in practice. A simulated patient study conducted in Australian pharmacies showed numerous shortcomings in their practices regarding CAM recommendation and dispensing, including advising use of products with unproven efficacy and safety<sup>(28)</sup>. Another study, by McKee et al., (2015)<sup>(29)</sup> also revealed that pharmacists' decision on over-the-counter (OTC) drugs was not influenced by evidence. Moreover, the authors concluded that if community pharmacists aim to be considered as scientific health care professionals, they should discuss evidence with their patients<sup>(29)</sup>.

Therefore, pharmacists were expected to be a relevant source of objective information to the patients and serve as an advisor helping them reach an informed decision<sup>(30, 31)</sup>. That role of pharmacists was accepted positively by the both pharmacists and patients<sup>(27)</sup>.<sup>12</sup> However, this study showed a major obstacle in realizing that role as a significant factor influencing the decision to recommend DS was subjective, personal experience with the supplements. The need for stronger collaboration between all sides interested in ensuring the optimal use of DSs was previously recognized<sup>(27, 32)</sup>. Inter-professional collaboration, especially between pharmacists and physicians, was perceived as important in improving patients' treatment outcomes and safety<sup>(33, 34)</sup>. To contribute to that collaboration, pharmacists would need further education about principles and application of evidence-based pharmacy, with special emphasis on senior pharmacists.

## Conclusions

All included pharmacists scored highly on general knowledge test about DSs. Despite the good knowledge scores, they did not use the high quality sources when recommending DSs to their patients. Interestingly, a large proportion of less experienced pharmacists used labels on product containers as a source of information, although labels do not provide enough information to determine whether to use particular dietary supplement but just the information on how to use it. Pharmacists' decision to recommend the supplement was not based on objective evaluation of evidence about their efficacy and safety but instead on their own personal experience with the supplement. That was especially apparent with the senior pharmacists. Further education about the practice of evidence-based pharmacy is necessary, with special emphasis on senior pharmacists who might have missed that aspect during their formal education.

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