












Original Research

Community pharmacists' use, perception and knowledge on dietary supplements: a cross sectional study

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Abstract

Background: Pharmacists are commonly tasked with recommending the appropriate dietary supplement and advising the patients of their correct and safe use. Previous research, conducted on pharmacy students, 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.

Objectives: 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 Croatian community pharmacists in September 2017. The questionnaire explored pharmacists' demographic characteristics, use, perceptions and knowledge of dietary supplements. 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, 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 dietary supplements 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 dietary supplement 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 dietary supplements 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; Pharmacies; Pharmacists; Attitude of Health Personnel; Health Knowledge, Attitudes, Practice; Cross-Sectional Studies; Croatia

INTRODUCTION

The use of various forms of complementary and alternative medicines (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%.¹ Furthermore, several factors that influence customers' decision of taking CAM have been recognized. Study by Tangkiatkumjai *et al.* 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.² 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.³

As most accessible health care 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. In Croatia, 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

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pharmacists' recommendation of CAM, alongside with lack of knowledge, perceived lack of evidence and lack of time for patient consultation.⁴ 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.⁴

In prior research, pharmacy students were identified as the most knowledgeable about dietary supplements, when compared to their medical and dental colleagues. However, pharmacy students used evidence based sources of information about dietary supplements in lesser extent and personal use was the most significant predictor if students would recommend dietary supplement to a patient.⁵ However, little is known how work experience of pharmacists would influence their decision to recommend a dietary supplement. 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 dietary supplements between the two groups of pharmacists, and to explore factors that could influence recommendation of dietary supplement to patients. A questionnaire used in the study was developed by Axon *et al.*⁶

METHODS

This cross-sectional study was conducted at single center, University of Split School of Medicine after the ethics approval was obtained from the Ethics Committee of the aforementioned institution. Questionnaire was translated and adapted for targeted population as described in prior research and it consisted of four sections.^{5,6} 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.⁷⁻⁹ 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 dietary supplements. The perception items were rated on a scale from 0 to 5, with 0 being the lowest score and 5 being the highest.⁶

Participants eligible for this study were community

pharmacists. A convenient sample of pharmacists that participated in continuing education lectures at University of Split School of Medicine were offered to participate in the study. Lectures did not offer education in dietary supplement use or any form of CAM. The study was conducted in September 2017. 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 dietary supplements between pharmacists with different levels of work experience from the study by Emiru *et al.*, with confidence level set as 0.95 and power as 0.80.⁹ Necessary sample size was determined to be 100.

The data were analyzed using MedCalc v. 11.5.1.0 (MedCalc Software, Ostend, Belgium) and SPSS for Windows v. 23.0 (IBM Corp., Armonk, NY, USA). Chi-square test was used to analyze pharmacists' use of dietary supplements 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 dietary supplements 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 health care, 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 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 ^a
Age; mean (SD)	29.4 (3.3)	45.9 (9.7)	<0.001 ^b
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 ^a
Dietary supplement use in past year; N (%)	37 (66.1)	32 (69.6)	0.989 ^a
Dietary supplement use ever; N (%)	45 (80.4)	36 (78.2)	0.777 ^a

^aChi-square test
^bMann-Whitney U test
N/A – not applicable; SD – standard deviation



Source; N (%)	Years of work experience		p-value ^a
	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

^aChi-square test

Sources of information that pharmacists use when choosing appropriate dietary supplement are presented in Table 2.

Both groups showed 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 3).

The perception items were rated on a scale from 0 to 5, with 0 being the lowest score and 5 being the highest.⁶ 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 dietary supplements. P0 group had median value 1 (IQR 1-2) and P1 group had median value 2 (IQR 2-3), $p < 0.001$. Pharmacists' perceptions and attitudes toward dietary supplement use are presented in Table 4.

Logistic regression analysis showed that two factors could influence pharmacists' decision to recommend dietary supplement 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), $p=0.003$.

DISCUSSION

In order to ensure appropriate patient care, health care professionals should make decisions based on best available evidence. However, the results of this study show that Croatia community pharmacists do not use high quality sources of information on matter of dietary supplements 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 dietary supplements 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 dietary supplement to a patient. There is a possibility that this finding could be explained by their positive experiences with dietary supplements during their clinical practice and positive feedback from patients. However, future studies should investigate other factors that could influence community pharmacists' recommendations of dietary supplements, or any other form of CAM. Furthermore, less than 10% of participants experienced adverse effects while using dietary supplements and there is a possibility that pharmacists who used dietary supplements, perceive them as safe. However, it is important for pharmacists to provide patient oriented care, and dietary supplements 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

Question	Years of work experience		p-value
	1 to 9 years	10 or more	
Regulatory agency requires that dietary supplements 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 ^a
Regulatory agency must monitor the safety of dietary supplements once they are on the market: number of pharmacists who answered correctly (%)	13 (23.2)	23 (50.0)	0.314 ^a
Match the adverse reaction to the appropriate dietary supplement by writing the letter in the blank: median (IQR)	4 (2-4)	3 (2-4)	0.206 ^b
Match each dietary supplement with its claimed health benefit: median (IQR)	8 (6-8)	8 (6-8)	0.278 ^b
Total score (median and IQR)	10 (9-12)	11 (9-12)	0.275 ^b

^aChi square test
^bMann-Whitney U test
 IQR - interquartile range



Item; median (interquartile range)	Years of work experience		p-value ^a
	1 to 9 years	10 or more	
How much do labels on herbal and dietary supplements 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 dietary supplements?	1 (1-2)	2 (2-3)	<0.001
How essential are dietary supplements to your health?	3 (2-4)	3 (2-4)	0.354
How important is it to have a basic understanding /knowledge about herbal and dietary supplements 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

^aMann-Whitney U test

evidence which is necessary for implementation of evidence based practice in their daily work. Study by Tan *et al.* 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.¹⁰ Unlike them, younger pharmacists had courses about evidence-based pharmacy and critical literature evaluation in their pharmacy degree programs, which would explain the differences.¹¹ 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.^{10,11} 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.¹⁰ Furthermore, they might have only limited access to higher quality sources.¹¹ Also, for some dietary supplement there might be a perceived lack of relevant information regarding their efficacy or safety.¹² Another limitation for pharmacists in Croatia and other non-English speaking countries is unavailability of high quality information in native language.

Previous research in the field of evidence based pharmacy have had divergent conclusions. Study by Al-Jazairi *et al.* 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.⁷ 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.¹³ Another study, by McKee *et al.*, also revealed that pharmacists' decision on over-the-counter (OTC) drugs was not influenced by evidence.¹⁴ Moreover, the authors concluded that if community pharmacists aim to be considered as scientific health care professionals, they should discuss evidence with their patients.¹⁴ 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.^{15,16} That role of pharmacists was accepted positively by the both pharmacists and patients.¹² However, this study showed a major obstacle in realizing that role as a significant factor influencing the decision to recommend dietary supplement was subjective, personal experience with the supplements. The need for stronger collaboration between all sides interested in ensuring the optimal use of dietary supplements was previously recognized.^{12,17} Inter-professional collaboration, especially

between pharmacists and physicians, was perceived as important in improving patients' treatment outcomes and safety.^{18,19} To contribute to that collaboration, pharmacists would need further education about principles and application of evidence-based pharmacy, with special emphasis on senior pharmacists.

To our knowledge, this is the first study conducted in Croatia that compared the use, perceptions and knowledge of dietary supplements between two groups of pharmacists. However, this study had few limitations. It had been conducted on convenient sample, which could have influenced the study results. Furthermore, our study did not have inclusion criteria for community pharmacists who experienced recommendations of CAM use and it did not provide questions about factors that influence pharmacists to suggest CAM to their patients. Moreover, it included only Croatian community pharmacists. Future studies should involve pharmacists from other countries. Its' cross-sectional design provides only an observation. Furthermore, all information in the survey was self-reported by the participants, therefore, causality conclusions should be stated taking these limitations into account.

CONCLUSIONS

All included pharmacists scored highly on general knowledge test about dietary supplements. Despite the good knowledge scores, they did not use the high quality sources when recommending dietary supplements 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.

CONFLICT OF INTEREST

The authors have no relevant financial or non-financial interests to disclose.



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