American Journal of Pharmaceutical Education **2003; 67 (2) Article 41.**

RESEARCH ARTICLE

Knowledge and Attitudes of Pharmacists in Missouri Regarding Natural Products

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Objectives. The purpose of this descriptive investigation was to determine the perceived knowledge of and attitudes toward natural products by pharmacists in Missouri.
Methods. A questionnaire was mailed to 2921 licensed pharmacists. Assessments were conducted regarding the venues and specific resources these pharmacists utilized in order to gain knowledge in the area of natural products.
Results. Over half (56.9%) of those surveyed indicated that they received natural product questions on a weekly basis, but only a minority (2.4%) felt they could "always answer natural product questions." The most commonly used means for education was printed continuing education (70.2%). Only 12.5% of pharmacists indicated that they had gained knowledge about natural products from their didactic pharmacy education.
Conclusions. These results confirm the need to provide pharmacists with additional education on natural products. Ideas for integrating education on natural products into pharmacy school curricula are presented.

Keywords: drug information, natural products, pharmacist attitudes, pharmacist knowledge, natural product references

INTRODUCTION

Over the last decade, the numbers of Americans using complementary and alternative medicines (CAM) have increased.[1] A survey by Eisenberg noted a 380% increase in the use of herbal remedies and a 130% increase in the use of high-dose vitamins from 1990 to 1997.[1] Estimates of the numbers of people using herbal or other natural product treatments range from 12.1% to 51%.[1, 2] Regional usage rates may differ; one survey in Northwest Ohio found that 40% of respondents had used herbal remedies within the last year.[3] Whatever the actual rates may be, this increased use means that pharmacists across all practice settings are receiving more questions from patients about natural products than ever before (refer to Appendix 1 for a glossary of complementary and alternative medicine terms). A survey of pharmacists conducted by *Drug Topics* found that "almost all" respondents reported receiving questions about herbals and that 56% and 85% of respondents reported receiving questions about nutraceuticals and homeopathic products, respectively.[4] A specialized group of ambulatory care pharmacists reported a 21% increase in their responsibility for "determining the use of herbal products and dietary supplements" in their patient populations since 1999.[5] A National Nutritional Foods Association (NNFA) survey found that 70% of elderly patients, a population that is already at high risk for experiencing complications from polypharmacy, take vitamins, minerals, and/or herbs.[6] Eighty-four percent of these patients cited pharmacists as a source of information about these dietary supplements. In fact, more patients are buying supplements in pharmacies than ever before; in 1999, the growth of natural product sales in pharmacies was only exceeded by the growth of Internet and practitioner-direct sales.[7]

Few studies of the current knowledge levels and perceptions of pharmacists about natural products have been performed. The results of one survey (n=164) administered at state and regional meetings focused exclusively on herbal medicine indicated that practicing pharmacists had a greater knowledge of the purported uses for herbal medicines than of the precautions, drug

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interactions, and side effects of these products.[8] A second small survey of practicing pharmacists (n=18) evaluated their knowledge of and clinical opinion about commonly used herbal products,[9] and found that pharmacists had more knowledge of herbal product indications than of adverse events, interactions, or dosing. Finally, a third survey focusing on pharmacists' opinions and attitudes, reported that 41% believed that herbal medicines have a high degree of placebo effect and 15% thought they are only a form of quackery.[10] Most importantly, responders almost unanimously (96%) felt they did not have enough information about herbal product interactions.[10]

Because recognition of the importance of education on herbals and other dietary supplements is fairly new, evaluations of the knowledge and opinions of pharmacy students regarding natural products are necessary. Unfortunately, literature regarding this population and natural products is also minimal. One survey that evaluated pharmacy students' knowledge of alternative medicine found that course work focusing on this topic significantly improved the students' knowledge base.[11] Those students also strongly indicated that alternative medicine coursework should be required in pharmacy curricula.[11] A second survey of 370 students examined the extent of student knowledge of specific herbal products. Less than half of pharmacy students were able to identify purported uses and adverse events of commonly used herbal products. Most students cited the lay press as their method of learning about these products (39.1%) with only 1.2% percent citing coursework as a learning method.[12]

Although practitioners and students have now conducted and published the results of several surveys, there is still a paucity of information about pharmacists' knowledge and opinions of natural products. Therefore, the 3-fold purpose of this survey was to more closely define the knowledge and attitudes toward natural products of practitioners in Missouri, to provide information that may be useful in the design of educational objectives in pharmacy schools and continuing education programs, and to serve as a pilot for a national survey that would further address the information void in this area.

METHODS

Survey Design

Data were collected by a self-report mail survey. Pharmacists were included if they were licensed and maintained a residence in Missouri. The survey database was developed using information provided by the Missouri Department of Economic Development[13] and used Smart Mailer™ (Pitney Bowes, Stamford, Conn) software to detect error codes in mailing addresses. The survey instrument was piloted in 32 people resulting in minor modifications to the tool in order to enhance question clarity. In its final form, the survey consisted of 17 items with 11 assessment questions and 6 demographic questions. Assessment questions focused on the attitudes of pharmacists toward natural products education; perceived level of knowledge and satisfaction; resources used for self-education, and preferences for future methods and venues of natural product education. The project was approved by the University of Missouri-Kansas City Social Sciences Investigational Review Board. As a method of determining consistency of respondents with national norms, demographic information was examined relative to the results of the Pharmacy Manpower Project (PMP), a national survey that gathered demographic information on a representative sample of pharmacists throughout the United States.[14]

To assess how pharmacists gained knowledge about natural products, various methods (eg, live CE programs, newsletters, internet sites) were listed and respondents were asked to indicate whether they had used these methods. Use of reference materials containing natural product information was assessed by listing common references and asking respondents to identify if they had either heard of or used any of those particular references. In order to assess differences between the time pharmacists spent acquiring knowledge about natural products and the time they spent acquiring knowledge about conventional pharmaceuticals, respondents were queried about the average number of times per year they attended educational events about each.

Three survey items were stratified and the pharmacists used Likert-type scales to respond. These included a self-rating of level of knowledge, an assessment of the importance that pharmacists assigned to natural product issues (eg, interactions, product quality), and determination of preferred methods for increasing natural product knowledge (eg, seminars, newsletters).

Demographic information collected included degree(s) held, age, gender, ethnic background, work setting, years in practice. Respondents were asked not to identify themselves or to provide any means of contact, such as a return address, in order to assure confidentiality. Data were managed and analyzed by the Statistical Package for Social Sciences (SPSS, Chicago, Ill).

Table 1. Demographic Information on Respondents (N=534)

Demographic Variable	Percentage of Respondents
Terminal Degree	
BS Pharmacy	88.0
PharmD	12.2
MS Pharmacy	2.6
PhD	0.6
Age (years)	
20-30	15.6
31-40	25.9
41-50	28.9
51-60	17.6
61-70	7.3
Over 70	4.7
Gender	
Male	49.8
Female	50.2
Ethnicity	
African-American	1.3
Asian-American	0.9
Caucasian	94.4
Hispanic	0.4
Native American	0.9
Other	2.1
Work Setting	
Chain Pharmacy	35.7
Hospital – Clinical	8.5
Hospital – Staff	15.8
Independent Community	21.2
Long-term Care	4.1
Managed Care/HMO	1.3
Home Care Organization	1.7
College/University	0.9
Consultant	2.1
Pharmaceutical Industry	1.7
Other	7.0

RESULTS

Respondents

Addresses of 3321 pharmacists fit inclusion criteria and of these, 2921 addresses (88%) were considered valid. Five hundred fifty-one responses were received, of which 17 were unable to be evaluated. The net response rate was 18.2%. Demographic data of respondents is listed in Table 1. The demographic data were compared to the results of the Pharmacy Manpower Project to check the sample for agreement with national norms. Our sample demonstrated no significant differences, except for a marked difference in the numbers of Asian respondents (0.9% in the Manpower Project vs 7.5% in the current study), which is reflective of differences in the Missouri population.[15]

Assessment

Over half (56.9%) of all Missouri Pharmacist Survey (MPS) respondents indicated that they received questions about natural products on a weekly basis, with the vast majority (82.4%) reporting that they received questions at least monthly (Table 2). Only 2.4% of

Table 2. Responses to Survey Questions (N = 534)

Question	n (%)
How often NP questions received by individual:	
Weekly: 4+ times a week	162 (30.3)
Weekly: 2-3 times a week	142 (26.6)
Monthly: 1-4 times per month	136 (25.5)
Yearly: 7-12 times per year	30 (5.6)
Yearly: 2-6 times per year	40 (7.5)
Never	24 (4.5)
Level of knowledge of natural products rated as:	
Rarely able to answer natural product questions that arise	55 (10.3)
Sometimes able to answer natural product questions that arise	329 (61.6)
Often able to answer natural product questions that arise	137 (25.7)
Always able to answer natural product questions that arise	13 (2.4)
Satisfaction level with natural products knowledge:	
Not satisfied	242 (45.4)
Somewhat satisfied	236 (44.3)
Satisfied	46 (8.6)
Very satisfied	9 (1.7)
How often effort made to learn about natural products	
>12 times per year	36 (6.70
7-12 times per year	41 (7.7)
3-6 times per year	172 (32.2)
1-2 times per year	254 (47.6)
Never	31 (5.8)
How often effort made to learn about allopathic pharmacy*	
>12 times per year	109 (20.5)
7-12 times per year	99 (18.6)
3-6 times per year	106 (19.9)
1-2 times per year	104 (19.5)
Never	115 (21.6)

*one missing value, n=533

respondents reported being able to "always answer natural product questions" and 1.7% were "very satisfied" with their level of natural product knowledge. Most respondents felt that they were "sometimes able to answer natural product questions" (61.6%) and that they were "somewhat satisfied" with their level of natural product knowledge (44.3%).

The majority of respondents (79.8%) made efforts to learn about natural products 1 to 6 times per year. However, 5.8% of responding pharmacists stated that they "never" made an effort to learn more about natural products. Additionally, 21.6% indicated they "never" made an effort to learn more about allopathic, or conventional, pharmacy practice. Efforts to learn about allopathic pharmacy were evenly distributed between the timeframes (see Table 2).

The most commonly used methods to gain knowledge about natural products are listed in Table 3. Written continuing education (CE) was the most popular at 70.2%. There were no differences in the methods used to gain knowledge when stratified by years in practice for new pharmacists versus those who have been in practice for more years. Table 4 presents rankings of the educational methods that respondent pharmacists would be "very likely" to use for self-education on natural products. There were no differences observed in preferred methods for pharmacists working in different practice sites or for new pharmacists versus those who have been in practice for a greater number of years. A study specifically focusing on this issue might provide more information that would be useful in tailoring types of CE offerings to the preferences of various subgroups. The most commonly used references are noted in Table 5, with 4 resources being listed by more than a third of respondents. The topic areas (Table 6) that pharmacists ranked as "very important" were "interactions" (84.5%), "side effects/adverse

events" (80.0%), "patient counseling" (71.2%), "therapeutic uses" (68.2%), and "dosing" (59.2%). Complete rankings of topic importance are in Table 6.

Table 3: Methods Used to Gain Knowledge of Natural Products by Greater than 10% of Respondents (N=534)

Method	Percentage of Respondents
CE (written)	70.2
Newsletter	41.8
CAM texts	39.0
Internet sites	33.1
CE (live)	26.8
CAM journals	22.3
General textbooks	18.2
Medical journals	18.2
Seminars	15.0
Pharmacy school education	12.5
Association meetings	10.1

DISCUSSION

This project was subject to limitations. CAM-related topics remain controversial and still have a great potential for producing polarized positions. Thus, response bias could have been a confounding factor. Whether this underlying controversy leads to an increase or decrease of responses is unknown. In retrospect, it is possible that the explanation provided by the survey tool (that allopathic meant "non-natural product" pharmacy) for the question regarding efforts to gain knowledge was not sufficient to clarify its definition to those surveyed. If true, this would limit the validity of this question's results.

Most of the surveyed pharmacists felt unprepared to answer questions about natural products and were concerned about the quality of the answers they were able to provide. This is not surprising in light of the lack of formal education about natural products in pharmacy school curricula. Responding pharmacists appear to have recognized their personal knowledge deficits and have sought ways to educate themselves about natural products, as reflected by the 94.2% of pharmacists who have made at least some effort to learn more about natural products.

The natural product reference of choice for pharmacists was determined more by pharmacists' familiarity with and the accessibility of a resource than by the quality of the resources itself. The Internet and popular media sources with the least scientific basis were among those most frequently used. Those sources are often rife with problems and misinformation because they are generally not peer-reviewed and do not come under the oversight of any agency to ensure quality or accuracy of information. Contributing factors to the frequency of use may include ease of access and the pharmacist's familiarity with the Internet as a source of health information.[16] Higher quality resources such as Natural Medicine Comprehensive Database (online), *Herbal Medicine: Expanded Commission E Monographs, and the Professional's Handbook of Complementary and Alternative Medicine* remained largely ignored.[17-19] (Table 5). The authors took special interest in the low percentage (4.5%) of responders who used drug information centers to gain natural product knowledge. It is unknown whether this low percentage can be attributed to a lack of utilization of drug information centers in general, or a belief that drug information centers do not have the necessary expertise or resources despite existing recommendations for their core holdings, which include resources that would adequately address most natural product questions.[20]

Table 4. Methods Preferred for Self-Education on Natural Products by Greater Than 10% of Respondents

Method	Percentage of Respondents
CE (written)	61.0
Newsletter	45.9
Internet sites	36.9
CE (live)	30.9
Medical journals	26.4
CAM texts	20.6
CAM journals	18.9
General textbooks	14.2
Seminars	12.9
Association meetings	12.2
Software/CD-ROM	12.0
Drug information center	10.3

Surveyed pharmacists appeared not to recognize the importance of some issues surrounding natural products that are considered vital by natural product specialists. One example is "standardization," with over a third of respondents significantly undervaluing its importance. Standardization is important for botanical preparations in order to be confident that there are sufficient, but not excessive, quantities of the component(s) believed to confer pharmacologic activity. Of additional concern is

Table 5. Natural Product Resources Used by Greater than 5% of Respondents

Information Resource	Percentage of Respondents Using
Newsletters	47.9
Facts and Comparisons' Review of Natural Products	35.2
Internet sites	34.8
Popular media	34.6
CAM journals	22.1
AltMedDex	18.2
Natural Medicines Comprehensive Database (print version)	12.5
Commission e monographs	12.2
Herbs of choice	10.3
APhA Guide to	9.7
Honest Herbal	8.8
Other	8.2
USP monographs	7.7
Encyclopedia of Natural Products	6.2
Software/CD-ROM	5.8
Natural Medicines Comprehensive Database (online version)	5.4

that 4.3% of responding pharmacists ranked the topic of "interactions" as not important. This could be due to pharmacists not perceiving natural products as pharmacologically active moieties in the same sense that conventional medications are, having side effects and the potential for interactions and contraindications. Reports of interactions with natural products are appearing more often in the medical literature and these reports help to negate this perception of harmlessness; however, nothing will substitute for appropriate direct education in this area.

The American Association of Colleges of Pharmacy (AACP) identified complementary and alternative medicine as a target area for educational change in 1997.[21] The Chair report of the Academic Affairs committee of AACP asserted that pharmacists' drug information knowledge and capabilities should include natural products as well as allopathic pharmaceuticals. However, a survey in 1998 revealed that only 7 of the 60 responding pharmacy schools offered a course devoted entirely to natural products.[22] The inclusion of natural products and other CAM in pharmacy education has not been universally adopted, nor is it without controversy,[21] perhaps in large part because the majority of CAM therapies have not undergone rigorous scientific testing. However, with the increasing call to add or integrate these subjects into pharmacy school curricula[12, 23] the necessity for CAM education will continue to grow. The practice environment of pharmacists requires an effort to include CAM education, especially concerning natural products, in pharmacy curricula as well as in continuing education programs.

In addition to facts about products themselves, pharmacy school education must provide knowledge of the fundamental natural product issues (eg, safety, product quality) and, most importantly, the ability to evaluate claims regarding natural products. The legal and regulatory issues surrounding natural products must be included; specifically, the Dietary Supplement Health and Education Act (DSHEA) of 1994 and its impact on pharmacy practice are essential.

There are a number of effective ways to incorporate natural product education into planning school curricula. Published descriptions of various ways in which CAM and natural product education have been included in pharmacy school curricula provide ideas for discussion and further development.[24-28] Some schools have chosen to incorporate natural product education as one part of a curricular element addressing CAM in general,[25] while others have limited themselves to inclusion of natural product education. Each school will have to determine what methods of inclusion are most appropriate for their

institution to achieve its desired educational objectives. These methods may include integrating substantial

Table 6. Rankings of Topic Importance

Topic	Percentage of Respondents			
	Very Important	Fairly Important	Not as Important	Not Important
Interactions	84.5	11.0	0.2	4.3
Side effects/adverse events	80.0	15.2	1.1	3.7
Therapeutic uses	68.2	25.8	2.4	3.6
Dosing	59.2	30.1	6.6	4.1
Pharmacology/MOA	30.9	41.2	19.5	8.4
Efficacy information	47.9	36.0	8.8	7.3
Formulations	16.9	33.5	35.8	13.9
Standardization	35.8	33.1	21.2	9.9
Product availability	15.4	33.0	36.5	15.2
Product quality	47.2	33.9	11.0	7.9
Regulatory issues	28.8	32.8	26.4	11.8
Sales/marketing data	5.6	11.6	42.3	40.3
Patient counseling information	71.2	21.5	2.4	4.9

information on natural product therapeutic options into existing therapeutics, pharmacology, and nonprescription drug therapy courses, as well as developing a separate course focusing on natural products. A natural product companion course could also be established which parallels disease state organizational outlines of the primary therapeutics/therapy class. Discussions on how to talk with patients about their use of natural products can be included in classes that address patient communication and counseling. Pharmacology courses could incorporate a section on common natural products. All coursework involving natural products should involve the application of the principles of evidence-based medicine (EBM) to ensure that there is no unintentional dissemination of unsubstantiated claims.[29,30] Providing the skills to critically evaluate claims about natural products may be the best preparation a pharmacy education can offer students to practice in an environment of constant change.[24]

CONCLUSIONS

This investigation was conducted with the hopes of directing future assessments and guiding decision making for educational programming. There is an educational gap of natural product knowledge that needs to be filled now for both future and practicing pharmacists if we are to offer optimal pharmaceutical care for all patients. Our results provide support for the addition or expansion of natural product education elements to existing pharmacy school curricula and for the development of continuing education modules in the area of natural products. The intention behind inclusion of natural products into a pharmacy education is not to create experts in natural product therapeutics. Rather, the goal is to produce pharmacists who can provide optimum pharmaceutical care to patients who are using or considering using natural products. With this in mind, the authors propose that the following concepts should shape the development of natural product content in pharmacy education:

- Encourage students to focus on avoidance of harm when natural products are used by patients.
- Provide students with knowledge of reliable sources for quality information.
- Provide students with current evidence on the efficacy of products and the skills necessary to evaluate new information as it becomes available.
- Provide students with the skills to successfully communicate with patients about their use of natural products.
- Provide students with a basic knowledge of the Dietary Supplement Health and Education Act

of 1994 and other regulatory issues relevant to CAM and natural products.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Denise Woolf, Research Associate, for her assistance on this project, and to thank Patricia Marken, PharmD, for her significant editorial guidance.

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Appendix 1. Glossary of Common Complementary and Alternative Medicine Terms

Allopathic Medicine – generally refers to the "conventional," science-based system of medicine practiced in the United States and elsewhere.

Biologically-based Treatments – The NIH defines as use of "substances found in nature, such as herbs, foods, and vitamins. Some examples include dietary supplements, herbal products, and the use of other so-called "natural," but as yet scientifically unproven, therapies (for example, using shark cartilage to treat cancer)." (http://www.nccam.nih.gov/health/whatiscam/#d4)

CAM (Complementary and Alternative Medicine) – According to the National Institutes of Health, **"**a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine." (http://www.nccam.nih.gov/health/whatiscam/#d4)

Homeopathic products – are composed of serial dilutions of a substance. In many instances, preparations have been diluted past the point that any molecules of the original substance remain

Homeopathy – a medical system based on the principle that symptoms may be alleviated by the ingestion of very small amounts of a substance that, in larger doses, would cause those same symptoms.

Natural products – includes, but is not limited to, herbs, mega-dose vitamins, minerals, hormones, and other chemical entities used by patients to maintain or improve their health.

Naturopathy – a medical system in which physicians are trained, with an emphasis on prevention, to treat disease by use of natural products, physical manipulation, exercise, massage, or other natural therapies. Initial training in anatomy, physiology and diagnosis are identical to that of MDs or DOs.

Nutraceuticals – foods or components of food taken for a medicinal or therapeutic-effect.