

Herbal Instruction in United States Pharmacy Schools

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Seventy-seven pharmacy colleges in the United States were surveyed to determine the extent and nature of herbal medicinal instruction. As a component of this, pharmacognosy instruction was also surveyed. In a 78 percent (60/77) response rate, it was noted that 74 percent (n=57) of the schools offered at least one course addressing herbs. Thirteen schools indicated the topic was not addressed in their curriculum. Seven schools indicated plans to implement courses addressing herbs. Only nine colleges of pharmacy maintained pharmacognosy in their curriculum. The average year of discontinuation was 1979 due to such reasons as curricular change, integration into medicinal chemistry course content and retirement of pharmacognosy faculty. Approximately two-thirds of the colleges offer herbal course material as an elective. With the resurgence of public interest in herbal medicinals, pharmacists need to resume their expertise in natural products and this needs to be addressed in uniform fashion in all colleges of pharmacy.

INTRODUCTION

Natural product research is one of our most promising sources of medicinals for the future (1-3). It is estimated that only 5,000 plant species have been studied exhaustively for medical application out of the total of 250,000 to 300,000 species(4). Hence plants, phytotherapy and herbal medicinals constitute a source of new agents. Additionally, the public's interest in botanical medicine is increasing steadily. In a 1993 survey, one-third of all Americans reported using some mode of alternative medicine in the previous 12 months with three percent citing herbal medicine use(5). Ten percent reportedly consulted a provider of herbal medicine(5). Retail sales of \$1.7 billion occurred in 1994 for herbal products representing a 300 percent increase from 1992 sales(6). The majority of these herbal products are ingested without benefit of consultation with a conventional health care provider. Hence the patient unwittingly exposes himself to herbal toxicities such as hepatotoxicity secondary to germander, chaparral leaf, and Senecio and well as bone marrow toxicity secondary to Chinese herbal medicines adulterated with unlabeled aminopyrine and phenylbutazone(7-12). Patients often take these herbal products with their conventional medicines heralding a new host of drug-herb interactions such as yohimbine attenuating the blood-pressure lowering effects of most antihypertensives and karela exacerbating the hypoglycemic effects of chlorpropamide(13,14). Patients may also be taking many herbal medications without consequence of adverse effects and they need to assured of herbal safety when appropriate. In unprecedented fashion, the pharmacists' assistance is needed in preventing adverse effects and drug interactions following concomitant use of herbs and conventional drug therapy. Yet, this occurs at a time when most colleges of pharmacy in the United States have either severely diminished or eliminated pharmacognosy from the curriculum. We conducted this

study to determine how herbal medicine education is being provided in colleges of pharmacy in the United States.

METHODOLOGY

A two-page questionnaire was sent to each of the 77 deans of the colleges of pharmacy in the United States as listed in the American Association of Colleges of Pharmacy directory. The Deans were asked to forward the questionnaire to the most qualified faculty member for completion. Two major areas were addressed: (i) current herbal medicinal instruction; and (ii) pharmacognosy offerings within the present curricula. Participants were not asked to identify themselves. A follow-up mailing was sent one month after the original mailing. Those who had previously responded were asked not to do so again. Completed questionnaire data were entered into a software program developed within Paradox™ (Borland Industries, Inc.), a relational database. Data were analyzed by the primary investigator.

RESULTS

Thirty schools (39 percent) responded to the first mailing with an additional 30 schools responding to the second mailing (78 percent response rate). Questionnaires were not consistently completed in full. Hence, response rates are based on a floating denominator with the denominator reflecting the number of respondents for that particular item. Thirteen schools indicated that no course was offered that addressed herbal products in any fashion. Seven schools stated that a new course was to be begun within the next year. Fifty-seven (74 percent) schools offered one course averaging 2.78 credit hours (range: 1-8 hours) with 35 percent (range 2-100 percent) of the content devoted to herbal products. In two-thirds of the responding schools, this course was offered as an elective. Sixteen (21 percent) of schools offered two courses, three (four percent) schools

Table I: Characteristics of courses addressing herbal medicinals

Number of courses offered	Number of schools (percent)	Credit hours average (range)	Percent of course content is herbal	Number of schools requiring the course (percent)
1	57 (74)	2.78 (1-8)	35	19 (33)
2	16 (21)	3.56 (2-12)	34	6 (38)
3	3 (4)	2.0 (1-3)	37	1 (33)
4	1 (1)	1	8	1 (100)

Table II Enrollment characteristics for courses addressing herbal medicinals

Highest degree attained	Number of schools responding	Total number of students enrolled	Average number of students enrolled (range)	Average professional year course is taken (range)
BS	23	1,632	71 (9-180)	3 (1-5)
PharmD	24	1,491	62 (1-185)	2.24 (1-5)
PhD	4	9	2.25 (1-6)	1.67 (1-2)
MS	4	10	2.5 (2-4)	2.0 (2-2)
RN	1	1	1	3
other (pre-Ed)	1	12	12	1

offered three courses and one (one percent) school offered four courses addressing herbal products to some extent in the course. See Table I for a complete analysis of credit hours, percent herbal content and required versus elective status for the schools who responded to these questions.

Seven schools offered courses which were totally devoted to herbal content. The remaining schools incorporated herbal topics into such courses as Nonprescription Products, Medicinal Chemistry, Professional Practice and Pharmaceutical Care Lab.

Of the 46 schools responding to this question, 43 (93 percent) indicated they engaged in didactic learning with 61 percent (25 of 41 respondents) indicating they required an average of 0.7 written reports (range: 1-5). Oral reports were required in nearly half of respondents (19 of 40; 48 percent) with only one school integrating computer learning via the Internet into course content. Other schools incorporated field trips, herbal videos, herbal advertisements, surveys and small group projects into the course.

A total of 3,155 students were enrolled in these courses (Table II). Most BS students took the course in their second or third years whereas PharmD students enrolled in the courses during their first or second year of pharmacy school. Of the 67 schools responding to the question regarding the instructor's professional degree, 36 (54 percent) indicated the course was taught by faculty with PhD's. Faculty with PharmD, BS and MS degrees accounted for 19 percent (n=13), 16 percent (n=11) and six percent (n=4) of the faculty teaching pool, respectively. Three schools indicated that herbal medicinals were taught in courses outside of the college of pharmacy. Specifically, these courses were taught in the Botany Department of an Arts and Sciences College, Agricultural College and a Continuing Education Division.

Pharmacognosy continues to be offered as an active course in only nine (17 percent) of the responding schools with 44 (83 percent) indicating the course had been discontinued. Of the eight schools responding to the credit hour questions, an average of 4.25 (range 2-11) credit hours are offered in pharmacognosy with 5 (62 percent) indicating that the class is an elective course. On average, 71 (range: 20-170) students are enrolled in these courses.

The average year for discontinuation of pharmacognosy from the pharmacy school curriculum was 1979 (range

1965-1993). The most commonly cited reason for discontinuation of pharmacognosy was a curricular change which resulted in incorporation of material into medicinal chemistry. Five schools cited perceived irrelevance of pharmacognosy to contemporary practice. Two schools cited retirement of pharmacognosy faculty as reasons for discontinuation of pharmacognosy. Nearly half of the schools responding to this item (n=18; 48 percent) indicated interest in reinstating pharmacognosy into the curriculum. Students (n=14) and faculty (n=12) were most interested in reinstating pharmacognosy followed by alumnae (n=8), other health care colleagues (n=8) and administration (n=5).

Textbooks were required by 57 percent (n=22) of the responding schools. The two most commonly required books are *Herbs of Choice* by Varro Tyler (Pharmaceutical Products Press, Binghamton, NY) and *Pharmacognosy and Pharmacobiotechnology* by James Robbers, Marilyn Speedie and Varro Tyler (Williams and Wilkins, Baltimore). The two most commonly recommended books are *The Honest Herbal* by Varro Tyler (Pharmaceutical Products Press, Binghamton, NY) and again *Herbs of Choice*.

DISCUSSION

Reasons to integrate herbal medicinal knowledge into pharmacy school curriculum include (i) increasing use of herbals as complementary therapy; (ii) need to differentiate benign and/or beneficial effects from detrimental or potentially dangerous interactions; and (iii) the pharmaceutical care initiative. As pharmacists advance the notion of pharmaceutical care into their practices, they need to integrate herbal medicinals knowledge into their arsenal of professional services(15). Since pharmaceutical education includes both the pharmacology of conventional drugs and pharmacognosy of herbal medicinals, the pharmacist is a logical information source.

Several barriers presently exist to effective implementation of the pharmacist in this role. First, the main supply source of herbal products is health food stores where pharmacist consultations are not available(16). However, many over-the-counter products (nonherbal) are also available in nonpharmacy locations. In analogous fashion, pharmacists must include questions regarding herbal medicinals in their drug history taking as they do for these over-the-counter

products. Hence this barrier is manageable. A second barrier, the lack of education regarding herbal medicinals and pharmacognosy, is not as easily overcome.

Pharmacy has a rich history steeped in the application of organic compounds in the treatment of disease states. Pharmacognosy, the study of medicinal plants and their properties, was until relatively recently, one of the three mainstays (*i.e.*, pharmacology, medicinal chemistry, and pharmacognosy) of most pharmacy schools(17). Gradually, pharmacognosy merged with medicinal chemistry, the science of synthetic drugs, until most colleges of pharmacy had eliminated pharmacognosy from their curriculum. As this study shows, by 1979 most colleges had eliminated pharmacognosy most often citing curriculum reform and retirement of pharmacognosy faculty as reasons for this change.

With the resurgence of public interest in alternative medicine, particularly herbal products, pharmacists have in essence been summoned to resume their expertise in herbal medicinals and pharmacognosy. Pharmacists need to reclaim this knowledge if they are to provide a toxicity and efficacy safety net for their patients(18–20). Most colleges of pharmacy (n=57; 74 percent) in the United States have heeded this summons with integration of herbal medicinals in some fashion into their curriculum. Only seven schools have courses entirely devoted to herbal medicinals; an additional nine schools have maintained pharmacognosy in their curriculum. Of concern is the 13 schools where herbal medicinals are not addressed within the curriculum. However, it is encouraging that seven of these schools have indicated plans to incorporate natural products into their curricula.

Presently no standardization exists regarding course content and expected outcomes and most (62–67%) offer such courses only as electives. We are obviously falling short in reaching all the students who will need this body of knowledge in their practices. In 1994–5, 7,837 first professional pharmacy degrees (*i.e.*, PharmD, BS) were awarded(21). Considering the 3,123 students (1,632 BS and 1,491 PharmD students) encompassed in this study, in an crude estimate, we have achieved only 40 percent penetration into entry-level degrees. Also in 1994–94, 350 PhD and 392 MS degrees were awarded. Our penetration here is even more dismal with only 2.6 and 2.5 percent penetration, respectively (9/350 and 10/392). Accreditation agencies may need to give some thought to how they can implement change in this area.

Most (54 percent) instructors of the courses where herbal medicinals are addressed have PhD's with only 13(19 percent) PharmD's involved in teaching herbal medicinals content. We suggest more integration of PhD's with expertise in medicinal chemistry and pharmacognosy with the clinical expertise of PharmD in joint teaching efforts to bring this body of knowledge into mainstream pharmaceutical care activities. In this role, the pharmacist would then apply their basic science knowledge in the clinical setting helping patients avoid drug-herb interactions and manage

adverse reactions caused or exacerbated by herbal medicinals. The pharmacist of the future will provide pharmaceutical care consultations assisting in selecting and monitoring drug therapy. They may target certain disease states such as diabetes mellitus, hypertension and asthma. They should add herbal medicinals to this targeted list. However, before they can adequately counsel regarding herbal products, this topic must be addressed within the curricula of today's pharmacy schools. We need to enhance our curricular efforts in presenting the data consistently to all pharmacy students.

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