Unhealthy eating and physical inactivity are major contributing factors to many chronic medical conditions, including cardiovascular disease, cancer, obesity, hypertension, dyslipidemia, and diabetes mellitus (Centers for Disease Control and Prevention [CDC], 2002). Each of these diseases is associated with prolonged illness and disability that decrease the quality of life for millions of Americans annually. The current recommendations/guidelines from many national organizations and expert panels (e.g., American Heart Association, American Cancer Society, Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults [ATP III], Joint National Committee Report on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [JNC-6]) advise that the first-line approach (before drug therapy) for treating these chronic diseases is making lifestyle modifications related to nutrition and physical activity (Byers et al., 2002; CDC, 2002 Krauss et al., 2000).

The need for patient counseling on nutrition therapy and physical activity has been recently promoted by the American Pharmaceutical Association (APhA) as an excellent opportunity for pharmacists to expand their provision of pharmaceutical care services (Dombrowski, 1999; Dombrowski & Ferro, 1999). In fact, for the past three decades the pharmacy profession has been broadening its role to include a range of patient-centered services beyond the traditional product-oriented functions.

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of dispensing and distributing medications (APhA, 1998). More specifically, counseling with the objective of providing patients with information to assist them in making lifestyle changes to improve their health is viewed as a task particularly well suited to pharmacists. Because they are recognized as credible sources of health information, accessible, and in frequent contact with the public (Americans on average visit a pharmacy once every month), community pharmacists could provide an important channel for delivery of counseling on proper diet and physical activity (Cooper, 1999; Dombrowski, 1999; Dombrowski & Ferro, 1999). Despite these seemingly favorable conditions, little is known about the extent to which pharmacists believe in the importance of healthy food choices and physical activity in promoting the health of their patients.

In one of the few studies reported to date, Kotecki and colleagues recently surveyed a random sample of 522 community pharmacists in Indiana regarding their beliefs and practices related to health-promoting behaviors (Kotecki, Elanjian, & Torabi, 2000). Their findings revealed that pharmacists were in strong agreement that eliminating cigarette smoking, always wearing automobile safety belts, and practicing safe sex were very important health-promoting behaviors. There was, however, considerably less agreement among pharmacists about the importance of diet and physical activity as health-promoting behaviors. Furthermore, pharmacists’ involvement, preparation, and confidence in dealing with patients’ habits related to diet, physical activity, and weight management was extremely low.

Among the more notable findings from Kotecki and his colleagues was that pharmacists did not feel it was their responsibility to be involved in diet and physical activity counseling. They also felt ill-equipped to provide instruction on these health-promoting behaviors due to a lack of information and training.

To further the role of community pharmacists in diet and physical activity counseling, faculty from two Indiana universities, the Department of Pharmacy Practice at Butler University and the Department of Health Science at Ball State University, collaborated on developing and implementing coursework related to the latest thinking about healthful diet and physical activity guidelines. Despite the emphasis placed on educating pharmacists in diet and physical activity by the APhA, there is no literature on implementing and measuring the effectiveness of this type of education. The purpose of this current study was twofold. First, the study was designed to determine pharmacy students’ self-reported beliefs about willingness to provide, and preparedness to provide counseling on nutrition and physical activity following completion of a coordinated and concentrated health education unit. Second, the study was designed to compare these results with the self-reported beliefs of currently practicing pharmacists.

METHODS

Subjects

A convenience sample of 78 doctor of pharmacy students enrolled in a nonprescription drug therapy course during the 2002 spring semester at Butler University participated in the study. The course, titled Self-Care and Health Promotion, is required for all fifth-year doctor of pharmacy students. The overall focus of the course is health and wellness, but it concentrates exclusively on over-the-counter drug therapy and alternative remedies such as herbal products and other dietary supplements as self-care treatment options. To meet the study purposes, an immediate posttest (IPT) and a delayed posttest (DPT) design were employed. The IPT was conducted at the conclusion of the intervention and the DPT was conducted 5 weeks later.

The currently practicing pharmacists (CPP) self-reported health promotion beliefs originated from a recent research study conducted in Indiana (Kotecki et al., 2000). Five hundred twenty-two randomly selected community pharmacists participated in a cross-sectional mail survey of community pharmacies in Indiana. Respondents ranged in age from 22 to 70 years, with a mean age of 41.12 and a standard deviation of 10.98. The majority of pharmacists were men (65.6%) between 30 and 49 years of age (59.1%) who had practiced for 10 or more years (67.8%). The descriptive characteristics of this sample are similar to those observed in other research (Kotecki, 2002).

Intervention

A series of seven 1-hour lecture sessions focusing on national dietary and physical activity guidelines and practical and reliable behavior change techniques were implemented in the nonprescription drug therapy course. Three 2-hour laboratories providing experiential-learning opportunities supported the lecture and classroom discussions.

The lecture material was primarily based on assigned readings from the APhA’s Dynamics of Pharmaceutical Care Continuing Education monograph series. The Pharmacist’s Role in Nutrition and Physical Activity Counseling (APhA, 2000) and Managing Obesity as a Chronic Disease (APhA, 2001). In addition, recently updated diet and physical activity recommendations from expert panels on managing hypertension (Vollmer et al., 2001), hypercholesterolemia (“Executive Summary,” 2001), and diabetes mellitus (American Diabetes Association, 1998, 1999) were also assigned readings. Finally, articles related to the transtheoretical model of behavior change and its stages-of-change construct (Berger & Hudmon, 1997; Prochaska & Velicer, 1997) were also assigned as readings to inform pharmacy students about the importance of assessing a patient’s motivational readiness and the need for tailoring interventions accordingly.

The experiential-learning laboratories provided pharmacy students the opportunity to display their comprehension of the lecture material and implement strategies based on the stages-of-change approach to assist in health-related behavior change. This opportunity was facilitated largely through simulated one-on-one patient consultations and group presentations. The seven lectures and three laboratories
were implemented during the first 3 weeks of the course by the visiting professor of health education. The assigned pharmacy professor of the course assisted in the implementation of this health education material.

**Instrument**

A survey questionnaire used to measure Indiana pharmacists’ health promotion beliefs and practices served as the basis for the data collection instrument (Kotecki et al., 2000). Items relating to nutrition and physical activity health areas were selected from the questionnaire; those that did not apply were discarded. In addition, six new items were added to measure students’ attitudes toward prevention. The questionnaire was subsequently provided to three community pharmacists and two survey researchers to assess content validity. Minor changes in wording were incorporated into the final structured questionnaire, which consisted of 34 multiple-choice items designed to yield scaled responses.

The nutrition and physical activity beliefs were measured by listing 14 health-related behaviors and asking respondents to indicate on a 5-point Likert scale (very unimportant, somewhat unimportant, equally unimportant and important, somewhat important, very important) the importance of each behavior in promoting the health of an average adult. Ten items dealt directly with the Dietary Guidelines for Americans, three items related to maintaining normal blood pressure, cholesterol, and glucose levels, and one item with taking a multivitamin/mineral supplement daily (Table 1).

A 5-point Likert scale (very uninvolved, somewhat uninvolved, equally uninvolved and involved, somewhat involved, very involved) was used to measure whether pharmacy students believed pharmacists should be responsible for counseling patients with regard to four habits: diet modification, weight management, physical activity, and alcohol use.

Pharmacy students’ confidence in their ability to help future patients change behavior was measured in two ways using 5-point Likert scales. For each of the four health promoting habits, students were asked to indicate the extent to which they felt prepared to counsel patients (very unprepared, unprepared, equally unprepared and prepared, prepared, very prepared) and their level of comfort with implementing behavioral modification strategies in helping patients achieve changes in their behavior for each health promoting behavior (very uncomfortable, mildly uncomfortable, equally uncomfortable and comfortable, somewhat comfortable, very comfortable).

Finally, students’ attitudes toward prevention were measured by listing six items (Table 2) using a 5-point Likert scale (strongly disagree, somewhat disagree, equally disagree and agree, somewhat agree, strongly agree). Test-retest reliability was assessed on the responses following the IPT and DPT using Pearson’s correlation coefficient and was found to be 0.78. Internal reliability was assessed on the DPT responses using Cronbach alpha and was found to be 0.83. The questionnaire took 10–15 minutes to finish and was completed under conditions of anonymity. The Institutional Review Boards at Ball State University and Butler University approved the research methodology and survey instrument.

**Data Analysis**

The collected data were analyzed using SPSS 10.0. The Pearson chi-square and descriptive statistics were used to examine relationships between self-reported beliefs of currently practicing pharmacists and pharmacy students’ self-reported beliefs about, willingness to provide, and preparedness to provide counseling on nutrition and physical activity post intervention. The alpha level was set at p<.05.

**RESULTS**

Of the 78 students who participated in the course, all completed IPT questionnaires, and 68 completed DPT questionnaires. Of the DPT participants, 52 (76%) of the

<table>
<thead>
<tr>
<th>Behavior</th>
<th>IPT</th>
<th>DPT</th>
<th>CPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aim for a healthy weight</td>
<td>89</td>
<td>85</td>
<td>39</td>
</tr>
<tr>
<td>2. Maintain normal blood pressure</td>
<td>89</td>
<td>82</td>
<td>70</td>
</tr>
<tr>
<td>3. Choose a diet low in saturated fat and cholesterol and moderate in total fat</td>
<td>87</td>
<td>82</td>
<td>51</td>
</tr>
<tr>
<td>4. Maintain normal blood cholesterol level</td>
<td>86</td>
<td>82</td>
<td>58</td>
</tr>
<tr>
<td>5. Maintain normal blood glucose level</td>
<td>86</td>
<td>83</td>
<td>nm</td>
</tr>
<tr>
<td>6. Be physically active each day</td>
<td>76</td>
<td>71</td>
<td>29</td>
</tr>
<tr>
<td>7. Choose a variety of fruits and vegetables daily</td>
<td>74</td>
<td>74</td>
<td>51</td>
</tr>
<tr>
<td>8. Keep food safe to eat</td>
<td>74</td>
<td>68</td>
<td>nm</td>
</tr>
<tr>
<td>9. If one drinks alcoholic beverages, do so in moderation</td>
<td>64</td>
<td>59</td>
<td>52</td>
</tr>
<tr>
<td>10. Choose a variety of grains daily, especially whole grains</td>
<td>63</td>
<td>61</td>
<td>51</td>
</tr>
<tr>
<td>11. Choose and prepare foods with less salt</td>
<td>61</td>
<td>52</td>
<td>34</td>
</tr>
<tr>
<td>12. Let the Food Pyramid guide food choices</td>
<td>60</td>
<td>56</td>
<td>48</td>
</tr>
<tr>
<td>13. Choose beverages and foods to moderate intake of sugars</td>
<td>59</td>
<td>55</td>
<td>33</td>
</tr>
<tr>
<td>14. Take a multivitamin/mineral supplement daily</td>
<td>14</td>
<td>18</td>
<td>nm</td>
</tr>
</tbody>
</table>

* IPT = immediate posttest (n=78).
* DPT = delayed posttest (n=68).
* CPP = current practicing pharmacists (n=522); published data from Kotecki et al., 2000.
* Chi-square test for differences among DPT and CPP = p<.05.
* Chi-square test for differences among IPT and CPP = p<.05.
* nm = not measured.
respondents were women and 16 (24%) were men. Forty-two (62%) of the participants planned on working in a community pharmacy setting, 20 (29%) in a hospital setting, and 6 (9%) indicated “other.”

Beliefs About Health Promotion

Table 1 presents the results of the rating of the 14 health-related behaviors concerning diet and physical activity beliefs, based on the proportion of pharmacy students and currently practicing pharmacists (CPP) who stated that these items were “very important.” Of the 14 items, 13 received a 50% or higher student rating of “very important” at both the IPT and DPT. These items included aim for a healthy weight (89 and 85%); maintaining normal blood pressure (89 and 82%); choosing a diet that is low in saturated fat and cholesterol and moderate in total fat (87 and 82%); maintaining normal blood glucose level (86 and 83%); maintaining normal blood cholesterol level (86 and 82%); being physically active each day (76 and 71%); choosing a variety of fruits and vegetables daily (74 and 74%); keeping food safe to eat (74 and 68%); drinking alcohol in moderation (64 and 59%); choosing a variety of grains daily, especially whole grains (63 and 61%); choosing and preparing foods with less salt (61 and 52%); letting the Food Pyramid guide food choices (60 and 56%); and choosing beverages and foods moderate in sugar (59 and 55%). The only item receiving less than a 50% response as “very important” was taking a multivitamin/mineral supplement daily (14 and 18%). No statistically significant associations (p>.05 by the chi-square test) were found between pharmacy students’ IPT and DPT items. When matching the pharmacy students DPT and CPP beliefs, it was found that statistically significant differences existed for 9 of the 11 comparable behaviors (p<.05 by the chi-square test) (Table 1). Significant statistical differences (p<.05) existed on each of the 11 comparable behaviors tested with IPT and CPP. In other words, immediately following the intervention the pharmacy students were more likely to believe in the importance of each of the health-promoting behaviors than were the current practicing pharmacists.

Beliefs About Pharmacist Involvement

At least 3 of every 10 pharmacy students at both IPT and DPT believed that pharmacists should be “very involved” in counseling patients on weight management (44 and 39%), alcohol use (39 and 30%), diet modification (37 and 33%), and physical activity (37 and 30%) (Table 3). The figures reflect significant increases for the DPT over the CPP group in the proportions of respondents who thought pharmacists should be very involved on three (weight management, diet modification, and physi-
Table 5. Percentage of Responses by Pharmacy Students to Attitudes About Prevention (N=68)

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>Equally disagree/agree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pharmacists should devote more time to providing preventive services to their patients.</td>
<td>64</td>
<td>27</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2. The most important thing a pharmacist can do to keep patients healthy is to influence them to adopt healthy lifestyles.</td>
<td>39</td>
<td>44</td>
<td>14</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3. In general, I think I would get a greater sense of gratification from diagnosing and treating ill patients than I do from preventive care.</td>
<td>12</td>
<td>23</td>
<td>20</td>
<td>33</td>
<td>12</td>
</tr>
<tr>
<td>4. In general, the preventive aspects of medicine—educating and counseling patients on healthy lifestyles—are not very interesting to me as a pharmacist.</td>
<td>8</td>
<td>12</td>
<td>15</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>5. More formal instruction on preventive medicine should be a required part of the curriculum in pharmacy school.</td>
<td>21</td>
<td>35</td>
<td>27</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>6. In general, I think I would find educating patients to be a challenging and enjoyable part of pharmacy practice.</td>
<td>33</td>
<td>52</td>
<td>11</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
pharmacists are the third most prevalent licensed health care professionals in Indiana, for a statewide pharmacist-to-population ratio of 1:1,085 or 95 per 100,000 (ISDH, 1999).

Pharmacists, like most health care professionals, are more willing to devote time and energy to counseling patients in areas in which they feel they have a reasonable possibility of success. One area in which pharmacists feel very successful in helping patients change behavior is with the proper use of medication (Kotecki et al., 2000), which is consistent with their academic curriculum. However, in many chronic medical conditions nutrition therapy and increased physical activity serve as the foundation of treatment (Byers et al., 2002; CDC, 2002; Krauss et al., 2000). Drug therapy is intended as an adjunct to, not a substitute for, proper diet and physical activity. Additionally, changing fundamental and ingrained behaviors, such as behaviors related to diet and physical activity, are extremely difficult and time-consuming and require different counseling techniques. Therefore, it is not surprising that pharmacists do not feel successful or believe they should be involved in these areas (Kotecki et al., 2000).

Still, when it comes to counseling on diet and physical activity, pharmacists should be involved. This conclusion is consistent with the emerging trend that recognizes the importance of an interdisciplinary team effort by all health care providers in helping Americans follow national diet and physical activity guidelines (Byers et al., 2002; CDC, 2002; Krauss et al., 2000). Pharmacists, as members of this team, can be a readily accessible source of information on the importance of an interdisciplinary team effort with a broad range of individuals and organizations outside their close-knit academic society (Seffrin, 1997). In fact, health educators can lend support in convincing pharmacists of the effectiveness of well-designed state-of-the-art behavioral interventions when it comes to diet and physical activity counseling. Moreover, health educators, by the nature of their skills and required professional competencies (National Commission for Health Education Credentialing, 1996), are ideally suited to assist in the education of pharmacists for health promotion counseling. To accomplish this, health educators will need to become familiar with pharmacy practice issues and to provide pharmacists with perspectives on how to counsel on health education and assist them to shape the broadening health promotion agenda.

Not only is there a need for educating preservice pharmacists, but there also appears to be a need to educate practicing pharmacists if this role is to be expanded. Although the samples are not equivalent in all characteristics, and self-reported data must be viewed cautiously, the considerable importance pharmacy students assigned to the diet and physical activity health-promoting behaviors indicates that a similar educational program may help currently practicing Indiana pharmacists sharpen their skills in these areas. Most of the currently practicing pharmacists surveyed in 2000 were eager to participate in continuing education to improve their health promotion expertise (Kotecki et al., 2000). Of course, like anything else health education is more valuable when done correctly. At a minimum, it is important that future health education efforts for pharmacists are comprehensive, coordinated, and concentrated.

Although the suggestions provided in this article are informative and useful, they should be viewed in light of a number of study constraints that might influence the generalizability of the results. The design of
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