

# A Survey of Dietary Supplement Knowledge, Attitudes, and Use in a Rural Population

Christopher Owens\*, Tiffanie Toone and Michelle Steed-Ivrie

Idaho State University College of Pharmacy, Pocatello, Idaho, USA

## Abstract

Dietary supplements, including vitamins and herbal products, are often used to treat self-diagnosed conditions and/or to promote health. We conducted a community-based survey in a rural population to assess consumers' knowledge, practices, and attitudes regarding the use of dietary supplements. A total of 526 adults ( $\geq 18$  years) completed the survey. Information collected included product(s) used, frequency and use in combination with prescription or over-the-counter medications, and perceptions of efficacy and safety. Most respondents (71.5%) indicated a preference for dietary supplements over conventional pharmaceuticals to maintain health. Most (71.1%) reported daily or almost daily use of conventional pharmaceuticals use as well. Most respondents ( $>86\%$ ) indicated they were comfortable discussing the use of supplements with their physician or pharmacist; there was weaker agreement regarding perceived potential for drug-supplement interactions or adverse effects, indicating that these issues may be under-recognized. These results indicate that dietary supplements are often used in combination with pharmaceuticals and there is continuing need for clinicians to assess patients' use of these products and to provide direction for their appropriate place in therapy.

**Keywords:** Dietary supplement; Herbal dietary supplement; Over-the-counter medication; Prescription medication; Drug-herb interactions; Attitudes; Survey; Rural population

## Introduction

Dietary supplements, including vitamins, minerals, and herbal products are used by millions of Americans to treat self-diagnosed conditions and/or to promote health. Their usage and popularity continues to grow in the twenty-first century [1-3]. Defined by the Dietary Supplement Health and Education Act (DSHEA) of 1994, dietary supplements include a wide array of non-food, non-drug substances intended to supplement the diet, but are not intended to treat diseases or disorders of the human body. According to DSHEA, these products may contain one or more dietary ingredients such as a vitamin, mineral, herb or other botanical, amino acid, concentrate, metabolite, or combination of these ingredients. They may be purchased without a prescription and federal regulation of these products differs significantly from that of food or drugs [4]. Standardization of active ingredients, as well as quality assurance related to identity, purity, and bioavailability is largely left up to individual manufacturers, although the United States Pharmacopeia (USP) and other independent testers, such as Consumer Lab, may also provide certification [5].

Data from the National Health and Nutrition Examination Survey (NHANES) collected from 2003-2006 on the use of dietary supplements reported that 54% of American adults reported use of at least one dietary supplement, the most common type being multivitamin/multi-mineral products [1]. A 2002 National Health Interview Survey indicated that nearly 1 in 5 adults report using an herb for treatment of health conditions and/or health promotion [6]. The 2007 National Health Interview Surveys revealed that the number of adults in the United States that ever used herbals or supplements grew from 50.6 million in 2002 to 55.1 million in 2007 [7]. A 2012 report by *Nutrition Business Journal* reported that the dietary supplement industry surpassed \$30 billion in US sales for the year 2011 [8].

In addition to increases in dietary supplement use, Americans are also using more prescription and over-the-counter (OTC) medications than ever before. Over the last decade the use of multiple prescription

drugs increased by 20% and the use of five or more drugs increased by 70%. By 2007-2008, one-half of Americans were taking at least one prescription drug and 1 out of 10 were taking five or more [9].

Given the increasing prevalence of dietary supplement and prescription as well as OTC medication usage in the US population, clinicians and health educators have expressed concerns regarding the potential for drug-supplement interactions and other safety concerns [2,10,11]. The purpose of our survey was to assess typical dietary supplement consumers' knowledge, practices, and attitudes regarding the use of these products for health-related purposes, alone and in combination with conventional pharmaceuticals. We sought to determine which products were being used, individuals' willingness to discuss the use of dietary supplements with healthcare professionals, and preferred sources of information that were consulted when choosing a product or for guidance on appropriate use.

## Methods

An 18-question survey was developed to assess consumer's knowledge, practices, and attitudes related to dietary supplements (Appendix A). The survey instrument contained items adapted from similar surveys conducted previously [12,13]. Individual survey items were reviewed by a group of College of Pharmacy faculty members and consensus was reached regarding clarity and importance of each item. The survey was pretested and additional comment was utilized to further refine the instrument. The survey was distributed from February to April 2013 in two rural Southeast Idaho communities (Pocatello

\*Corresponding author: Christopher Owens, Idaho State University College of Pharmacy, Pocatello, Idaho, USA, Tel: (208) 282-4454; E-mail: ctowens@pharmacy.isu.edu

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and Chubbuck, combined population approximately 70,000). Surveys were distributed at community health-fair events, local supermarkets and pharmacies, and fitness centers. Participation was solicited at the different sites where background information on the scope and purpose of the survey was also provided. Participants were asked to complete paper surveys privately on the spot within 5-10 minutes, but participants could take as much time as desired to fill out the survey. Additional clarification was provided if needed. Surveys were briefly assessed by the survey team for completeness on location before being filed for later analysis.

Participants were required to be at least 18 years of age to complete the questionnaire and only respondents who reported taking at least one dietary supplement for a health-related reason within the past year were eligible to complete the survey. Respondents indicated which supplement(s) they had used from a list of common dietary supplements included on the survey. They also had the option to indicate "other" and write in any other product used. Basic demographic information was collected including respondent age, sex, occupation, and highest level of education.

The frequency of dietary supplements use, as well as the frequency of prescription and non-prescription medication use in the past year was assessed (as daily, weekly, monthly, or occasionally for each) to determine possible concomitant use. Respondents were asked to indicate if they had a preference for dietary supplements over conventional medicines for treating medical conditions or for health maintenance. Items addressing knowledge, practices, and attitudes were answered using a 5-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5). Survey items in this area asked consumers perceptions of the efficacy of dietary supplements for treating medical conditions and/or for promoting health and wellness, as well as their beliefs related to the potential for harmful side effects and interaction potential with other supplements or medications. Respondents were also asked to rate their level of comfort in discussing dietary supplements with health care providers and pharmacists. Individuals were asked to indicate which resources were consulted when choosing a dietary supplement or for guidance on appropriate use. Possible answers included print resources (including books or magazines), television programs, friends or family, healthcare professionals, or the Internet. They also had the option to indicate "other" and write in other resources used.

Knowledge-related survey items asked respondents to indicate their familiarity with the role of the FDA and the DSHEA legislation in the regulation and definition of dietary supplements. Respondents were also queried regarding the role of the United States Pharmacopeia (USP) and Consumer Lab in verifying the accuracy of dietary supplement label information related to purity, potency, and quality. The final two survey items asked respondents to indicate their level of trust in the accuracy of the label information for dietary supplements as compared to non-prescription pharmaceuticals.

The survey was conducted following approval from the Institutional Review Board at Idaho State University. Local businesses that were invited to host the study received an invitation to participate and also provided their consent. Confidentiality was ensured throughout data collection and analysis. Mean values were calculated for Likert scale agreement questions, and overall percentages were reported for survey responses. Data was analyzed using SPSS version 21.0, IBM Corp., Armonk, NY, 2012.

## Results

A total of 526 surveys were collected and analyzed. A breakdown

of respondent demographics is shown in Table 1. Approximately 60% of respondents were female and nearly half were in the age range of 18-30 years. Most respondents (>85%) indicated at least some college education.

The majority of respondents (71.5%) reported a preference for herbal products over prescription and OTC medicines for treating medical conditions and/or to maintain health. Overall, respondents agreed that dietary supplements are useful for treating medical conditions and/or promoting health and wellness (Likert scale mean = 4.31). The mean agreement level for consumers' comfort in discussing use of herbal products and dietary supplements with healthcare professionals was high, 4.39 for physicians and 4.32 pharmacists. The lowest level of agreement was related to consumers' perception of potential harmful side effects with dietary supplements and interactions with other supplements or medications (Likert scale mean = 3.39 and 3.94, respectively) (Figure 1).

A list of dietary supplements reportedly used by respondents is included in Table 2. Vitamins and minerals topped the list with 83.1% of respondents reporting use. Other commonly used supplements included fish oil (53%), cranberry (19.6%), and melatonin (18.1%). The breakdown of frequency of use of dietary supplements was reported as: daily or almost daily (71.1%), occasionally (13.8%), weekly (11.1%), and monthly (4%). The majority of respondents (74.0%) also reported taking prescription medication in the past year. The frequency of prescription drug use was: daily or almost daily (64.6%), weekly (3.8%), monthly (2.2%), and occasionally (29.4%). Even more respondents reported OTC medication use in the past year (87.2%) with occasional use being most common; OTC frequency of use breakdown: daily or almost daily use (19.6%), weekly (12.8%), monthly (12.3%), and occasionally (55.2%). There was near equal agreement in respondents' trust in the accuracy of label information for both OTC products and dietary supplements, most indicated that they "usually" trust the label of non-prescription medications (58%) and dietary supplements (56.5%); approximately 10.4% of respondents indicated that they "always" trust

Demographics	Total No. (%)
<b>N</b>	526
<b>Gender</b>	
Male	211 (40.2)
Female	314 (59.8)
<b>Age</b>	
18-30	210 (43.9)
31-45	115 (23.0)
46-64	130 (24.8)
≥ 65	31 (6.2)
<b>Occupation</b>	
Healthcare	49 (9.4)
Non-Healthcare	264 (50.8)
Student	132 (25.4)
Retired	41 (7.9)
Unemployed	9 (1.7)
Other/Unknown	25 (4.8)
<b>Highest Level of Education</b>	
High School	74 (14.2)
Some College	182 (35.0)
Associates Degree	71 (13.7)
Bachelors Degree	128 (24.6)
Graduate Degree	65 (12.5)

Table 1. Demographics of dietary supplement consumers.

the label of non-prescription medications, while 8.1% “always” trust dietary supplement labeling.

For the knowledge-based questions, the majority (61.1%) responded correctly that dietary supplements are not currently regulated by the FDA for purity, potency, safety and efficacy; however, approximately 66% reported that they have never heard of DSHEA legislation of 1994. There was similar reporting of familiarity with USP-certified labeling or the role of Consumer Lab in verifying purity and potency of herbals, vitamins, and other dietary supplements. Approximately 81% of respondents indicated that they “had never heard of” or had only heard “a little bit” about USP-certified labeling of dietary supplements or the role of Consumer Lab in this regard.

Of the sources identified by participants to access dietary

Herbal Products and Dietary Supplements	Total No. (%)
Vitamin/Mineral	437 (83.1)
Fish Oil	279 (53)
Cranberry	103 (19.6)
Melatonin	95 (18.1)
Glucosamine	95 (18.1)
Cinnamon	94 (17.9)
Echinacea	86 (16.3)
Garlic	86 (16.3)
Probiotics	70 (13.3)
Other	67 (12.7)
Ginseng	55 (10.5)
Ginkgo	36 (6.8)
Milk Thistle	29 (5.5)
Protein	27 (5.1)
St. John's Wort	23 (4.4)
Black Cohosh	16 (3.0)
Saw Palmetto	16 (3.0)
Kava	12 (2.3)
Green Tea	8 (1.5)

Table 2. List of dietary supplements used by respondents.

supplement information, the Internet had the highest percentage of reported use (58.6%), followed by family/friends (57.1%), books/magazines (40.8%), physician/nurse (37.9%), pharmacist (21.5%), and TV programs (18.6%). Other reported sources of information consulted included gym trainers, medical journals, and chiropractors.

## Discussion

While many surveys concerning dietary supplement use have been conducted in recent years [12-16] our survey was unique in several important ways. To our knowledge, this was the largest survey to date in a rural area that included a significant population of health-conscious dietary supplement users (as evidenced by participation in health fairs and fitness center attendance). Our survey also sought to better quantify frequency of concomitant use of supplements and pharmaceuticals, an important area of ongoing clinical concern. We also assessed consumer preference related to information sources consulted to help guide use of supplements as well as consumers’ knowledge regarding dietary supplement regulation, standardization, and how to determine quality products when making their decisions.

Since the establishment of the National Center for Complementary and Alternative Medicine (NCCAM) in 1998 there has been increased information availability concerning the appropriate use and place in therapy of herbal products and dietary supplements; however, not all information has been positive. Several large, controlled clinical trials have found that many supplements are inferior to conventional pharmaceuticals or placebo and/or have important safety concerns [17-21]. Most of our respondents indicated a preference for dietary supplements to conventional pharmaceuticals for treating medical conditions or to maintain health. Many also indicated a lower level of concern regarding potential adverse effects and drug-supplement interaction potential. These findings may reflect the ongoing public erroneous perception that as natural products, dietary supplements must be safer and more efficacious than conventional pharmaceuticals [2,10,22].

The reported concomitant use of dietary supplements and pharmaceuticals indicated by our survey continues to demonstrate

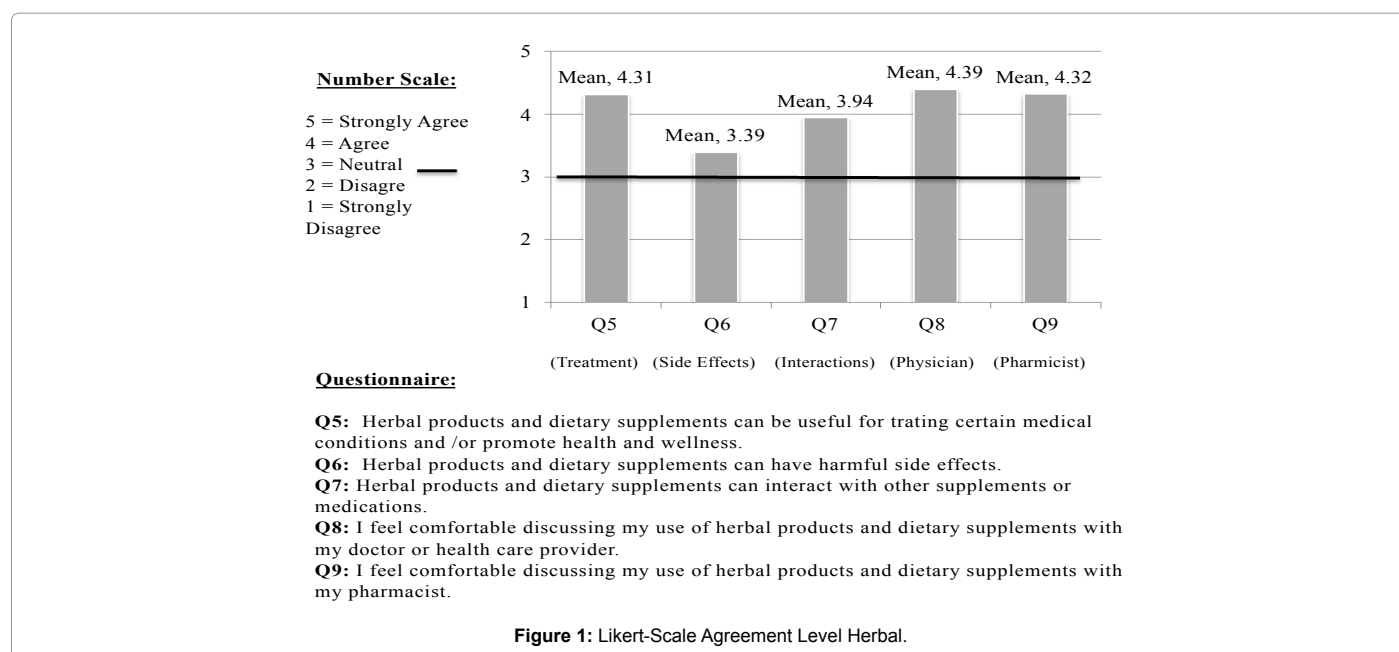


Figure 1: Likert-Scale Agreement Level Herbal.

risks for drug-supplement interactions and adverse patient outcomes. According to the Natural Medicines Comprehensive Database all of the top 20 selling herbal dietary supplement products are associated with potential for drug interactions. Among these, major herb-drug interactions have been noted with St. John's wort, soy, garlic, ginseng, green tea, evening primrose, valerian, and aloe vera [23]. Our survey results indicated that many of these supplements may be potentially used in combination with pharmaceuticals. Over 60% of our respondents reported daily use of a dietary supplement and a prescription drug. Over 55% indicated at least occasional use of OTC drugs. This represents a population that is at-risk for drug-supplement interactions.

Dietary supplements are regulated differently from drugs with regard to labeling and quality assurance of products [5,10]. The standardization of active ingredients is regulated by individual manufacturers and no regulatory process exists for these products comparable to OTC and prescription medications [5,24]. Supplement manufacturers are not required to have proof of efficacy, safety, or batch-related standards of quality control. Furthermore, dietary supplement manufacturers may include information on labeling that may not be substantiated by evidence or include disease claims that the product may prevent, treat, cure, mitigate, or diagnose diseases [3,10,25-27]. Most of our respondents indicated that they were aware that the FDA does not regulate dietary supplements in the same way it regulates drugs, but the details and implications of this may still not be well understood. The indication from our respondents that they "usually" or "always" trust the labeling of dietary supplements as much as they do OTC medications also raises concerns. Although each undergo significantly different approval processes for marketing and distribution, supplements and pharmaceuticals may still be viewed similarly in the public's eye in this regard. This finding is also complicated by the fact that most respondents were unaware of the role of USP or Consumer Lab as quality assurance testers whose seal may be found on products that meet minimum standards of purity and potency.

Because these products may be purchased without a prescription in grocery and drug stores or via the Internet, patients often do not seek professional guidance prior to their purchase and use [14,28,29]. This finding was further substantiated by our survey results. While information sources abound for these products, the validity of many is questionable [25,26,29]. In our survey, the Internet was the most commonly reported resource that consumers consult to guide their use of dietary supplements. While the Internet does provide a convenient tool for consumers to obtain a wide-range of health-related information, reviews of Web site quality have found that many omit important safety precautions, including potential adverse effects and drug-supplement interactions [3,29].

A frequently reported finding of other surveys indicate that many individuals fail to inform their primary health care providers of all the herbal products and dietary supplements they may be taking for a variety of reasons, including fear of judgment or ridicule [12,14,15]. However, according to a recently published cross-sectional survey, the main reason for non-report was due to healthcare providers not asking [15]. A positive finding of our survey was the reported comfort level of respondents in discussing use of dietary supplements with both physicians and pharmacists. This is encouraging and reinforces the need for healthcare providers to assess the use of dietary supplements in their patients prior to initiating treatment. Strengthening communication between patients and healthcare professionals will support positive outcomes in patient treatment.

Our survey had important limitations. First, because it was completed by a convenience sample derived from a rural population, our results may not necessarily reflect that of the general population. In addition, of the different locations where the survey was distributed, the two largest demographic groups (totaling approximately 64% of respondents) were gym members and/or participants in local health fairs, which could likewise affect the generalizability of our findings. Still, our survey responses do capture the perceptions of an important group of health-conscious dietary supplement consumer that is an important voice in the dialog that should exist between regular users of these products and healthcare professionals. Another limitation of our study was the self-reported nature of the information that detailed a personal and even controversial practice –taking dietary supplements to promote health or treat medical conditions. Respondents may have been hesitant to fully disclose their preferences, there may have been differing interpretations of what constitutes a certain level of agreement, and there may well have been differing levels of health literacy in the population surveyed. While worth considering, it is important to note that these factors play a role in most surveys of this type. A reassurance of confidentiality and use of clear and understandable survey language based upon past validated survey items was likely helpful in mitigating such concerns. A final limitation regards the caution with which certain findings related to drug-supplement interactions must be interpreted. Although we were able to determine that a majority of dietary supplement users also took one or more prescription or OTC products in the past year, we were unable to determine the exact scope and frequency of true concurrent use. Any conclusions as to the frequency and severity of drug-supplement interactions in this regard must be made cautiously.

## Implications for Research and Practice

This survey in a rural population found that dietary supplements are commonly taken on a daily basis and their use concomitantly with prescription and OTC medication is also frequent. Most consumers of these products perceive a benefit to their use and often prefer them to conventional pharmaceuticals for treating medical conditions or to maintain health. A promising finding of our survey is the reported comfort of dietary supplement users in discussing usage of these products with healthcare professionals. Physicians should make consistent efforts to assess use of these products before prescribing medications or recommending OTC treatments. There is a continuing need for patient as well as provider education to better determine the place in therapy and appropriate use of dietary supplements as well as to improve awareness of the potential for adverse effects and supplement-drug interactions.

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