

PREVALENCE OF NONVITAMIN, NONMINERAL SUPPLEMENT USAGE AMONG
UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF WISCONSIN-STOUT

By

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ABSTRACT

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The use of dietary supplements in the United States is increasing due to the growing interest in nutrition. Herbs, amino acids, vitamins, and minerals are all categorized together vaguely as dietary supplements. In the U.S., approximately fifty percent of the population use dietary supplements. Many dietary supplements are showing positive effects, but they have the potential to cause multiple problems if people that use supplements are undereducated or misinformed. Herbal supplements involve more safety concerns than vitamins and minerals, due to the lack of a guarantee that the product has known pharmacological effects. By determining the prevalence of nonvitamin, nonmineral supplementation among undergraduates, professionals

can be armed with knowledge to teach about appropriate use and potential side effects that are associated with supplement use.

This study was designed to: 1) quantify the prevalence of nonvitamin, nonmineral supplement usage among University of Wisconsin-Stout undergraduate students, 2) identify supplements consumed, 3) identify the rationale for supplement usage, 4) identify the source of supplement information, and 5) relate usage to selected demographic characteristics.

The subjects included undergraduate students enrolled in Health and Physical Education general education courses. A total of 486 students participated. There were 210 males and 276 females. Two hundred and twelve subjects (43.6%) reported that they were freshmen and 368 of the respondents (75.8%) were between the ages of 18 and 21.

Seventy-four (15.2%) of the participants reported current use of nonvitamin, nonmineral supplements. The students in this sample noted ginseng, creatinine, echinacea, green tea, and protein powder as the most common supplements used. Findings showed that the most prevalent reason for using supplements among students who used supplements was found to be to improve energy (55.1%). Of the students taking supplements the majority (69.4%) obtained supplement information primarily from family and friends. The recommendations determined from this study was that people who use nonvitamin, nonmineral supplements should look for side effects on the product label, look for proper dosage, do not believe outrageous claims, and seek the advice of a health care professional to determine if the product is safe.

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CHAPTER ONE

Introduction

Diet and health continues to grow in importance among Americans. Americans are looking for quick and easy ways to improve nutrition and health. The American Dietetic Association (2000a) found that 85% of the respondents to their nationwide opinion survey felt that diet and nutrition are personally important and 59% selected diet and nutrition as being important. Dietary supplements are becoming increasingly popular for their potential non-food source of nutrition (Ryan, Ferme, & McManamon, 2000b). Dietary supplements make up a vague category that includes herbs, botanicals, amino acids, protein, vitamins and minerals. It is estimated that about fifty percent of Americans are currently using some form of dietary supplement. A problem occurs due to the prevalence of people that use dietary supplements without the proper knowledge about the effects they may have on health, and how the products may react with prescription medications (Straus, 2001).

Dietary supplements are being taken to increase energy or improve function, to decrease vulnerability or seriousness of disease, to improve nutrition, or to obtain nutrients lacking in the diet. Scientific evidence that a high intake of specific nutrients decreases the risk of certain diseases could be another reason for the increasing use of dietary supplements. Herbs and botanicals are usually taken in place of conventional medical therapies (Department of Health and Human Services, n.d.). A nationwide survey that was conducted by the American Dietetic Association found that about forty eight percent of Americans used television and forty seven percent used magazines as their main source for nutrition information (Ryan, Ferme, & McManamon, 2000a). In 1994, there were about 600 dietary supplement manufacturers in the U.S., producing about 4,000 products, and total annual sales of at least four billion dollars

(Commission on Dietary Supplement Labels, n.d.b). In 1996, more than six and a half billion dollars were spent on dietary supplements by consumers (Kurtzweil, 1998). These growing numbers show that consumers are interested in supplements.

Congress passed the Dietary Supplement Health and Education Act (DSHEA) in 1994 due to the potential role of dietary supplements in a healthy life, the importance of accurate and current information relating to dietary supplements, and the debate about the role of the Food and Drug Administration (FDA) in regulation of dietary supplements. The DSHEA includes a definition of dietary supplements, requires manufacturers to be responsible for ensuring safety of their dietary supplements, describes labeling requirements, and encourages the development of good manufacturing practices (GMP) (Commission on Dietary Supplement Labels, n.d.e). Since 1994, dietary supplements are not subject to rigorous pre-market approval in the United States. Dietary supplements are not regulated as drugs, but rather as food. Unlike medications, dietary supplements do not have to be proven safe or effective before they can be sold and they are only removed from the market when proven to have harmful effects. Due to these lenient guidelines for manufacturers set by the FDA, consumers may be at risk of side effects from supplement use if not properly educated (Straus, 2001). DSHEA states that dietary supplements “are safe within a broad range of intake, and safety problems with the supplements are relatively rare” (Commission on Dietary Supplements, n.d.e, ¶10). Congress encourages that the government should take action if there are safety concerns about a dietary supplement but if the product is safe then the government should not limit access (Commission on Dietary Supplements, n.d.e).

Herbs have been used for many years as therapy and are currently drawing renewed interest. In 2000, there was approximately one of every third American who had used a herbal supplement at some time throughout the year. Sales have been increasing about twenty percent

every year since 1990, which equals about four billion dollars in estimated sales per year (Mar & Bent, 2000). The American Dietetic Association (2000b) found that approximately 12% of Americans surveyed were using herbal supplements daily and 61% never had used herbal supplements. The Society of Advancement of Women's Health Research found that botanical products are most popular among middle-aged women who are white and have a college education (Environmental Health Perspectives, 1998). A survey conducted by the FDA in 1994 found that people who used herbal supplements were more likely to be trying to lose weight, were younger, had a food allergy, and used books as their primary source for health information. People who were found to use amino acid supplements showed a trend to be younger, to be mostly male, and to obtain health information from healthcare providers (excluding doctors), books, newspapers, and magazines (Radimer, Subar, & Thompson, 2000).

A possible reason why herbal products are so popular may be due to the placebo effect. The placebo effect relates to a product being effective because the person believes it will be effective. One-third of the time, placebos work according to scientific studies (Oklahoma Cooperative Extension Service, n.d.). The main concern about herbal use is the lack of evidence on side-effects, consistency within similar products, and interactions with medications (Mar & Bent, 2000). A report in 1993 showed that the number of people using herbal products without telling their physicians is approximately 7 in 10 (American Pharmaceutical Association, n.d.). Herbal companies have the option of utilizing the United States Pharmacopeia (USP), which is a group of experts that test products to assure that they meet standards for purity, strength, packaging, and quality. The only herbs that currently have set standards are garlic, ginger, and valerian (Oklahoma Cooperative Extension Service, n.d.). Hopefully, there will continue to be more standards set for herbal products to help ensure safety. Nutritional professionals should

play a key role in helping consumers gain knowledge on the appropriate use of dietary supplements (Radimer, Subar, & Thompson, 2000).

Nonvitamin, nonmineral supplements (herbs, botanicals, protein, and amino acids) use has increased in the past seven years and advertising for those products has expanded. The increase is largely due to the enactment of DSHEA. A survey conducted of college students in Florida determined the prevalence of usage of nonvitamin, nonmineral supplements (NVNM). The results found that 26.3% of the students used NVNM supplements at the time of the study and 16% had used NVNM supplements in the past (Perkin et al., 2002). The Third National Health and Nutrition Examination Survey (NHANES III) results suggests that more studies should be focused on dietary supplement data in order to help determine the relationship between diet and health. NHANES III did not ask directly about supplements other than vitamins and minerals; therefore, the study suggests the true prevalence of nonvitamin, nonmineral supplement usage was much greater than they could determine (Hankin, 2000).

Statement of the Problem

The purpose of this study is to attempt to profile nonvitamin, nonmineral supplement usage among undergraduates attending the University of Wisconsin-Stout during the spring semester of 2003. Data was collected through a survey distributed to professors to administer to their students, enrolled in Health and Physical Education general education courses. The outcomes can assist health care professionals in targeting educational needs of the community.

Research Objectives

There are five research objectives this study will attempt to answer. They are:

1. To quantify the prevalence of nonvitamin, nonmineral supplement usage among University of Wisconsin-Stout undergraduate students.
2. To identify supplements consumed.
3. To identify the rationale for supplement usage.
4. To identify the source of supplement information.
5. To relate usage to selected demographic characteristics.

Definition of Terms

There are five terms that need to be defined for clarity of understanding. These are:

Alternative Medicine: “any medical practice or intervention that is not widely taught at US medical schools or is not generally reimbursable by health insurance providers” (Lee, Georgiou, & Raab, 2000, p. 543).

Botanicals: “substances derived from plants” (Radimer, Subar, & Thompson, 2000, p. 447).

Dietary Supplement: a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance used by man to supplement the diet by increasing the total dietary intake, or a concentrate, metabolite, constituent, extract or combination of any ingredient (Commission on Dietary Supplements, n.d., ¶6)

Herbs: “non-woody, seed-producing plants that die at the end of the growing season” (Radimer, Subar, & Thompson, 2000, p. 447).

Nonvitamin, nonmineral supplement: “include herbals, botanicals, and protein and amino acids, as well as Brewer’s yeast and shark cartilage” (Perkin et al., 2002, p. 412).

Assumptions and Limitations

It was assumed that participants completing the surveys were truthful and recorded reliable responses that accurately reflected their practices. Limitations identified include:

1. Sample size was small, consisting of 486 subjects. A larger sample size may have helped in identifying trends.
2. Students may answer the items on the survey the way they think the investigator wanted.

CHAPTER TWO

Review of Literature

Introduction

This chapter includes a discussion of the background of dietary supplements, consumer use, and information the public needs to know. In addition, the chapter includes an overview of the dietary supplement industry in the United States, the safety of dietary supplements, recommendations for use, and alternative health care. The chapter concludes with a discussion of popular nonvitamin, nonmineral supplements and their side effects.

Background of Dietary Supplements

It is essential to know what is considered a dietary supplement in order to profile users. The Dietary Supplement and Health Education Act (DSHEA) of 1994 defined a dietary supplement as:

a product (other than tobacco) that is intended to supplement the diet that bears or contains one or more of the following dietary ingredients: vitamin, mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily intake, or concentrate, metabolite, constituent, extract, or combinations of these ingredients. A dietary supplement is intended for ingestion in pill, capsule, tablet, or liquid form. (U.S. FDA, 1995, ¶5)

Dietary supplements are sold as tablets, powders, soft gels, gel caps, capsules, and liquids. They are sold in health food, grocery, national discount chain, and drug stores, as well as via mail order catalogs, the Internet, TV programs, and direct sales. Dietary supplements can not be labeled as drugs and are not to replace conventional diets (Kurtzweil, 1998).

The Federal Food, Drug, and Cosmetic Act (FDCA) of 1938 is the law that governs dietary supplements. In 1994, the DSHEA amended the FDCA. The Food and Drug Administration (FDA) was given authority on issues about product safety and labeling under the FDCA (Commission on Dietary Supplement Labels, n.d.b).

Other federal laws also help to regulate dietary supplements. The Federal Trade Commission Act of 1914 gave the Federal Trade Commission (FTC) the control to regulate advertisements for all consumer products, which includes supplements (Commission on Dietary Supplement Labels, n.d.b).

Key Legislation

As early as 1906, the Pure Food and Drug Act was developed to focus on unsafe foods, misbranded products, and unregulated elixirs. The FDCA created a category of foods for special dietary use. Also, the FDCA made it mandatory that labels include information on the vitamin, mineral, and other dietary properties of foods for special dietary use (Commission on Dietary Supplement Labels, n.d.b).

In 1990, the Nutrition Labeling and Education Act (NLEA) was passed by Congress, which pertained to nutrition labeling of food and dietary supplements. NLEA stated that all food labels must state specific information on the content of nutrients and now the labels could include claims that relate specific nutrients to disease or disorders. The “health claims” were only to be used when based on significant scientific agreement on the soundness of the claim about the nutrient and the disease relationship. Standards were then formed by the FDA for the different types and levels of evidence that are needed to meet for the approval of use of health claims (Commission on Dietary Supplement Labels, n.d.b).

Two considerations were directed to the FDA by the NLEA. The first asked the FDA to consider using a different approval process for health claims used for dietary supplements and for foods. Second, the FDA was asked to consider creating a list that contained ten health claims that could potentially be used for specific relationships between nutrients and disease (Commission on Dietary Supplement Labels, n.d.b).

In 1992, the Dietary Supplement Act was passed in Congress prohibiting the NLEA to be implemented in regards to dietary supplements except for the health claims that had already been passed. The FDA published a thorough Advanced Notice of Proposed Rulemaking (ANPR) in 1993. Factors that were covered in the ANPR were reports of serious illness due to using certain botanical supplements and an increasing use of dietary supplements by consumers. This ANPR reinforced the efforts that have been made by the industry and Congress to help pass the Dietary Supplement and Health Education Act in 1994 (Commission on Dietary Supplement Labels, n.d.b).

The Dietary Supplement and Health Education Act (DSHEA) was passed in 1994. Since 1994, the Congress and FDA have been attempting legislative and regulatory initiatives. The DSHEA has encouraged the FDA to advance some regulatory actions (Commission on Dietary Supplement Labels, n.d.b).

Consumer Use

The growing interest of Americans in the use of dietary supplements helped to advance legislative and regulatory reform, according to President Clinton. When he signed DSHEA into law, President Clinton stated, "...in an era of greater consciousness among people about the impact of what they eat and how they live, indeed, how long they live, it is appropriate that we

have finally reformed the way Government treats consumers and these supplements in a way that encourages good health” (Commission on Dietary Supplement Labels, n.d.b, p.1).

The National Health Interview Surveys from 1987 to 1992 found that the use of specified supplements stayed stable at approximately 24%. The specified supplements include: multivitamins, vitamin A, vitamin C, vitamin E, and calcium. When the data from the 1987 survey was compared to the 1992 survey, there was a decline of about 4.9% in the total population that stated use of any vitamin or mineral supplement (Commission on Dietary Supplement Labels, n.d.b).

After 1994, Congress estimated that about 50% of Americans consume dietary supplements on a regular basis in an effort to improve their nutrition. The DSHEA stated, “preventative health measures, including education, good nutrition, and appropriate use of safe nutritional supplements will limit the incidence of chronic diseases, and reduce long-term health care expenditures.” Also, the Act stated, “consumers should be empowered to make choices about preventive health care programs based on data from scientific studies of health benefits related to particular dietary supplements” (Commission on Dietary Supplement Labels, n.d.b, ¶22).

Vitamin and mineral supplement usage is well recognized, but data on the use of other supplements (e.g. botanicals and amino acids) has only recently begun. In 1994, the FDA conducted a survey of 1,945 people and found that about 51% of adults (18 and older) used a supplement of some form. The supplement users were broken down into categories, which included “light users” (used one or two supplements), “heavy users” (used three or more supplements), amino acid users, and botanical users. Of the people that used supplements, 73% were “light users,” 27% were “heavy users,” 10% used amino acids, and 16% used botanical

supplements (Commission on Dietary Supplement Labels, n.d.b, ¶28). The FDA conducted the same survey in 1995 and there was a six percent increase in people who used botanical supplements (Commission on Dietary Supplement Labels, n.d.b).

A study was conducted at a mid-Atlantic university involving thirty-seven students. The results found that 68% of the students did not believe that supplements helped with weight loss. Approximately 40% of students used supplements at least once a week, which was consistent with similar studies. The types of supplements that the students reported using were different when compared to earlier studies. Multivitamin/mineral supplements, echinacea, calcium, and vitamin C were the supplements used most frequently. Herbal supplements were used by 60% of the students who used a supplement (Naccarato & Hamilton, 1999).

The use of dietary supplements in the United States is thought to be increasing (Department of Health and Human Services, n.d.). Government surveys in the early and mid-1980's found that four out of ten Americans used dietary supplements regularly (American Dietetic Association, 1996). Thirty billion dollars a year is spent by Americans on products that are harmful or worthless (Short, 1994). In 1993, *Newsweek* conducted a poll that found about seven out of ten Americans used dietary supplements (American Dietetic Association, 1996). The Third National Health and Nutrition Examination Survey (NHANES III), which was conducted between 1988 and 1994, did not ask the participants about their use of "other dietary supplements," but some people stated use. Herbs, botanicals, amino acids, fish oils, sports drinks, biologic extracts, and metabolites are considered to be "other dietary supplements" (Department of Health and Human Services, n.d.).

NHANES III found that about 40% of the population two months or older were using a dietary supplement the month before being interviewed (Department of Health and Human

Services, nd.). When adults were asked to rate their health status, the adults who indicated their health to be very good or excellent were more likely to use dietary supplements. A finding that has been consistent among most surveys is that higher dietary supplement use is seen among people with higher incomes and educational levels, women, people living in the West, white people, and older adults. The results of NHANES III showed that about eight percent of the population takes some form of “other supplement,” although that number is probably an underestimate (Ervin, Wright, & Kennedy-Stephenson, 1999). The “other dietary supplements” that were stated include: ginkgo biloba, ginseng, St. John’s wort, echinacea, garlic, fish oils, energy-enhancing and body-building supplements, and amino acids (Department of Health and Human Services, n.d.).

NHANES III found that the main reasons why people were taking dietary supplements included: to increase energy or improve function, to decrease vulnerability to or seriousness of disease, to improve nutrition, or to obtain nutrients lacking in the food supply. Scientific evidence that supports the thought that diets high in specific nutrients could decrease the risk of certain diseases could be another reason for the increased use of dietary supplements. Herbs and botanicals are probably taken in place of conventional medical therapies (Department of Health and Human Services, n.d.). Interest in dietary supplements could be due to recommendations from family and friends, scientific literature, advertising, or the television and print media (Ervin, Wright, & Kennedy-Stephenson, 1999). Applied Biometrics conducted a telephone survey of 1,000 people. The survey found that the most prevalent reasons for using supplements included: to increase energy, to prevent disease or boost immunity, to reduce stress, to improve fitness, to treat a medical problem, and/or to increase alertness or mental activity (Commission on Dietary Supplement Labels, n.d.b).

Information the Public Needs to Know

Consumers need to be aware of deceptive products. In order for consumers to protect themselves from unsafe products, they should:

- Look for the U.S.P. notation, which shows that the producer followed the standards set by the U.S. Pharmacopoeia.
- Understand that “natural” does not guarantee that the product is safe.
- Look at the name of the manufacturer. Nationally known food and drug manufacturers are under tighter control.
- Request information from the manufacturer and ask about the type of conditions the supplement was made (Kurtzweil, 1998).
- Look for side effects stated on the product.
- Make sure the instructions for proper dosage are given on the product label.
- Do not believe outrageous claims such as: fountains of youth, weight loss miracles, or cancer cures.
- Tell the doctor and pharmacist what herbs are used (American Pharmaceutical Association, n.d.).

If a product sounds too good to be true, then it is probably not true. Consumers should not purchase products that claim to have “effortless,” “miracle,” and “secret” effects. A few claims that the Federal Trade Commission (FTC) look at questionably for truthfulness are: still eat what you want and lose weight, preventing insomnia, stress reliever, preventing impotency, causing hair to grow, delay the aging process, and improving memory or eyesight (Camire, Hunt, Miller, & Russell, 1997).

Federal standards do not exist for botanicals to guarantee dose, purity, or safety. The knowledge is lacking to know what is in the botanicals and what a safe and effective dose is. Products may be different depending on the producer. Generally, there is no nutritional value for herbal products and botanicals; they are not regulated as drugs, but they are often sold for their alleged drug effect (Camire, Hunt, Miller, & Russell, 1997).

United States Dietary Supplement Industry

In 1994, Congress estimated that in the U.S. there were about 600 dietary supplement manufacturers, producing about 4,000 products, and total annual sales of at least four billion dollars (Commission on Dietary Supplement Labels, n.d.b). According to Packaged Facts Inc. in 1996, consumers purchasing dietary supplements spent more than \$6.5 billion (Kurtzweil, 1998).

The *Nutrition Business Journal* conducted a review of the global dietary supplement industry. The United States was the second in total sales at \$8.2 billion in 1995. In the U.S., \$4.8 billion of sales was for vitamins and minerals, \$2.5 billion was for botanical products, and \$.8 billion was for sports nutrition supplements (Commission on Dietary Supplement Labels, n.d.b).

In the United States, approximately 1500 to 1800 botanicals are sold as dietary supplements or ethnic traditional medicines. A survey conducted about the U.S. botanical supplements market found that the ten most popular products in 1995 included: aloe, ma huang (ephedra), Siberian ginseng, saw palmetto, cranberry, ginkgo, garlic, ginseng, golden seal, and echinacea (Commission on Dietary Supplement Labels, n.d.b).

In 1994, the Bureau of Census, U.S. Department of Commerce, reported that the main “medicinal herbs” that were imported were oriental ginseng roots, licorice roots, plants used for herbal teas, mint leaves, and ephedra powder. The main products exported from the United

States were saw palmetto, goldenseal, peppermint, ginkgo, echinacea, and American ginseng (Commission on Dietary Supplement Labels, n.d.b).

DSHEA allows manufacturers to make claims pertaining to a product's "structure and function" when related to the effect on the body. Dietary supplements cannot imply or state outright that they prevent, treat, cure, or mitigate a disease unless the manufacturer has obtained permission from the FDA. The name of a product can not imply or claim that it can affect a disease (i.e. carpalhealth). Dietary supplements do not have to be proven safe by the manufacturer before they are marketed, manufacturers must have evidence available to prove their product is safe. Supplements are allowed to be sold by manufacturers without proof that they are safe or work or even that the ingredients that are claimed on the product are present. A supplements facts box must be included with a dietary supplement, but the information does not have to be verified by the FDA or an outside party (American Diabetes Association, 2000). The label on the product must contain information that is not misleading and is truthful. FDA regulates dietary supplements differently than conventional foods and drug products. FDA is responsible to take action against an unsafe supplement after it has reached the market (U.S. Food & Drug Administration, n.d.). A ten-year plan is in place by the FDA to try to regulate manufacturers for good manufacturing practices (GMPs) and to form a system to report drug interactions and side effects of dietary supplements (American Diabetes Association, 2000).

If manufacturers want to make a claim about the use of an herbal supplement, the FDA has to be contacted by 30 days after the supplement enters the market. In order to make a statement about usefulness for nutritional support, the product must state, "This statement has not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease" (American Pharmaceutical Association, n.d., ¶5).

Dietary supplements are not required to undergo rigorous testing like drugs before they can be sold. The lack of testing means that the consumer does not know if the product is of good quality or that it even contains what is claimed on the bottle. There is a website that performs laboratory analyses on many brands of dietary supplements and provides the results on their website (<http://www.consumerlab.com>). A supplement may be tested to find out if the amount of the active ingredient that is listed on the label is really present. When the site posted the results of its tests on ginkgo biloba products, it was found that only one out of four of the brands that were tested contained the adequate amount of active ingredient, even though the label claimed that it contained proper amounts. The products that did pass are available on the website, but the products that failed are not listed. On the website there is also an explanation of how they measured quality and how they determined what was “passing.” Supplements that pass the ConsumerLab’s tests can place a seal on their products that it passed, but that does not ensure that the product will be effective. The seal only signifies that the amount of active ingredient that is listed is truthful (Gershoff, 2000).

Some large companies sell dietary supplements but there are several hundred small companies selling dietary supplements. Small companies have less money to spend on research to determine efficacy of their products. Some of the small companies have marketed their products without label claims or without conducting reliable research (Commission on Dietary Supplements, n.d.a). The Commission on Dietary Supplements (n.d.a) recommended that in order to serve the public interest there needs to be more research focused on the relationship between dietary supplements and how they affect health and the prevention of disease.

Safety of Dietary Supplements

The US government does not guarantee that herbs that are available in the market place have known pharmacological effects and that the product actually contains what the label states (Ang-Lee, Moss, & Yuan, 2001). While DSHEA was being created, Congress concluded that dietary supplements were safe due to the large range of intake, and problems with safety were rare. The FDA was given authority under DSHEA to take action against a supplement if it poses a risk of harm. Safety is determined by relating the substance quantity and the risk when all the facts are examined. Dietary supplement safety is based on the recommended dose that is stated on the label. Before the FDA can report a possible violation of the DSHEA to the U.S. Attorney of Civil Enforcement Action, the FDA must give a notice of 10 days to the company, as well as a chance for the company to give its thoughts about the possible violation, unless an immediate safety issue to the public health exists. Most botanical products are safe if used within the directions stated on the label. There are very few scientific reports of health hazards from the use of botanical products (Commission on Dietary Supplement Labels, n.d.c).

The Commission on Dietary Supplement Labels stated that all dietary supplements that are marketed should be safe. The main responsibility for safety belongs to the manufacturer of the dietary supplement. The federal government is also responsible for the safety of dietary supplements to make sure that manufacturers have proper good manufacturing practices (GMPs) (Commission on Dietary Supplement Labels, n.d.c). GMPs would help to guarantee that dietary supplements are created under safe conditions and are labeled properly (Kurtzweil, 1998). When necessary, there are procedures for recalls and when safety problems occur, the public is alerted (Commission on Dietary Supplement Labels, n.d.c). In 1997, the FDA proposed that ephedrine alkaloid use should be limited in dietary supplements (marketed as Chinese ephedra, epitonin,

Ma huang, and ephedra) and that the products contain warnings about hazards due to use of those products. The hazards included: psychosis, stroke, seizures, hepatitis, heart attack, chest pain, and death. The proposal was formed due to adverse event reports that FDA reviewed scientific studies, and comments that were made by the public (Kurtzweil, 1998). Adequate information needs to be provided to consumers to ensure the safety of supplements (Commission on Dietary Supplement Labels, n.d.c). In addition to the FDA, an individual state can also stop the sale of dietary supplements that are possibly harmful within its borders. For example, Florida banned some products that contained ephedra, and similar action was considered by other states (Kurtzweil, 1998).

The mandatory labeling requirements that must be placed on the product for dietary supplements are: name of the product/statement of identity, statement of contents or net weight (i.e., “50 capsules”), directions for use (i.e., “Take one capsule per day”), ingredient list, supplement facts panel (includes the serving size, amount, and active ingredient), name and address of the manufacturer, packer, or distributor, and structure-function claim and the statement, “This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease” (Kurtzweil, 2001, ¶9). DSHEA requires that dietary supplements include the term “dietary supplement” on the label (Commission on Dietary Supplement Labels, n.d.c).

A growing trend is to add herbs to conventional foods. Recently, the FDA has sent warning letters to three beverage manufacturers regarding this practice. The letters were sent due to the possibility that the companies were adding ingredients that are not generally recognized as safe (GRAS), which is illegal. The additive *Echinacea* has been added to SoBe and Snapple lines of beverages. Herbal products (i.e. St. John’s wort and kava) have been found

in chips and snack crackers. The law states that additives placed in food products must be approved before marketing or be proven safe by scientific testing before they are allowed to be sold. The FDA requested information proving safety of the products. The FDA can remove the products from the market if proof is not received (Merritt, 2001b).

A study conducted in Oregon using 162 Licensed Dietitians as the subjects found that less than 75% were convinced that herbs are safe and approximately 50% felt that herbs were effective (Lee, Georgiou, & Raab, 2000). Due to concerns about the safety of herbal products, the National Toxicology Program is currently studying the following herbs and herbal components: aloe, thujone, pulegone, milk thistle extract, kava kava, grape seed extract, ginseng, ginko biloba, echinacea, comfrey, and black walnut extract (Burka, 2002).

Sports supplements are popular for their potential to promote slim down, bulk up, or effective competition. In 1999, about \$1.4 billion was spent by Americans on sports supplements. There have been few well-designed scientific studies conducted on these types of supplements, but the data show that the supplements are either totally ineffective or only produce a small change in performance. Many sports supplements contain substances that could be harmful, which includes androstenedione, creatine, and ephedra. Androstenedione has the potential to cause stunted growth and early onset of puberty in adolescents. Creatine is harmful due to its potential to cause kidney problems. Ephedra has been blamed for about twelve deaths and permanent injuries by investigators. These products are also unsafe due to the lack of rigorous safety testing and the lack of knowledge about the long-term effects.

A national survey that was completed by the Blue Cross and Blue Shield Association in 1999 showed that approximately 6% of people within the ages of 15 and 16 and 8% of people between the age of 17 and 18 had at some time used a sports supplement. There are two main

reasons for taking sports supplements. The reasons were to increase muscle size and to have extra energy to burn in the hopes of improving performance or decreasing weight. Half of the teenagers surveyed said that the supplements were either “very easy” or “pretty easy” to obtain (Consumer Reports, 2001).

Recommendation for use of Dietary Supplements

It is extremely important for health and nutrition professionals to gain knowledge about the types of dietary supplements and current research to be able to help consumers make healthy choices pertaining to the use of dietary supplements. The Commission on Dietary Supplement Labels works to ensure that the information on labels is high quality based on accurate scientific information, understandable, and consistent when compared to national nutrition policy.

Consumers’ lack of accurate information pertaining to dietary supplements is due to the possibility that they receive more information from the media about diet and health than from dietitians and health professionals (Commission on Dietary Supplement Labels, n.d.d). The Internet has become a popular resource for information on a variety of subjects. The Federal Trade Commission found that 29% of Americans use the Internet to find health information and 70% of those people search the web before visiting a health care professional (Johns Trissler, 1999).

Dietary supplement use should only be recommended if backed by well-accepted scientific evidence. Physicians or registered dietitians should be the main people to ask for recommendations pertaining to the use of dietary supplements. Recommendations should be based on individual dietary and nutritional assessment along with current scientific knowledge (American Dietetic Association, 1996). Physicians and/or registered dietitians should also enforce the fact that just because a product states that it is “natural” does not automatically mean

that it is safe. Patients need to be aware of potential herb/medication interactions that could occur. Due to the poor regulation of herbal marketing and sales, there has been misidentification of the plant species included in the products and during manufacturing there is potential for contamination. Herbal products should not be used by pregnant or lactating women, very young children, and the elderly (Cirigliano, & Sun, 1998).

The American Medical Association recommends that anyone who plans on taking a dietary supplement should visit a health professional for an evaluation of their dietary practices and lifestyle. The position of the American Dietetic Association (ADA) on dietary supplements encourages people to focus primarily on healthy food choices to achieve good nutrition. The ADA encourages people interested in supplements to seek the help of a dietetic professional. Dietetic professionals are uniquely qualified to determine appropriate supplement choices based on an individual's diet and science-based nutrition recommendations (Hunt, 2002).

The ADA formed a task force to develop guidelines for dietetics professionals to follow when deciding whether or not to recommend or sell dietary supplements. The client should first receive a diet assessment to determine their nutritional status. Supplements should only be recommended if there is current scientific evidence in support of use. Food is the main part of a diet and dietary supplements should only add to the diet when warranted. When recommendations are made the products should be safe for the client and not be toxic. The use of dietary supplements should be documented in a person's medical record. Recommendations for the use of dietary supplements should be based on an individual's nutritional need (Thompson et al., 2002).

Sports supplements should not be taken due to the lack of support for their effectiveness and there are too many concerns about the safety of use. People interested in losing weight or

increasing energy should focus on a well-balanced diet and a workout program that is disciplined and specific to the goals of the individual (Consumer Reports, 2001).

Alternative Health Care

In the United States about 40% of adults use some form of alternative therapy. Forms of alternative therapy include: massage, herbal medication, relaxation techniques, chiropractic, or mega-vitamins. The most common users of alternative therapy were women between the ages of 35 and 49 who had a college education, and those who made more than \$50,000 per year (Bagchi, 1999). A national survey showed a 8.3% increase in alternative therapy from 1990 to 1997. In both the 1990 and 1997 survey, alternative therapy was used most often for depression, headaches, back problems, and anxiety. In 1997, approximately 18.4% of people using prescription drugs were also using vitamins and/or herbal remedies (Eisenberg et al., 1998). A national survey in 1990 found that there were more visits made to unconventional therapy providers than to all medical doctors nationwide that offered primary care. It was estimated that Americans spent about \$13.7 billion on alternative therapies. In 1997, it was estimated that about \$5.1 billion was used to purchase herbal products (Box, Creswell, & Hagan, 2001).

The use of alternative medicine has been increasing. A survey conducted in 1991 reported that one in three Americans tried at least one method of alternative treatment in the past year. Diet, nutrition, lifestyle changes, and herbal medicine are a few of the most popular types of alternative medicine. Healthcare professionals consider high doses of nutrient supplements, herbs, and extreme diets to be dangerous due to the possibility of contamination and drug interactions (Lee, Georgiou, & Raab, 2000). The National Institutes of Health's Office of Alternative Medicine has increased its research budget over the past few years from 2 million to

about 12 million. Also, the American Medical Association has placed alternative medicine as an important issue that needs to be addressed soon (Cleveland Clinic Health Education Center, n.d).

Popular Nonvitamin, Nonmineral Supplements and their Side Effects

Before 1996, the World Health Organization received 5000 reports of suspected side effects related to the use of herbs. There were 2621 events related to dietary supplement use reported between 1993 and 1998 to the FDA, which also included 101 deaths. There are probably many more events that occurred, but due to the lack of a mandatory reporting mechanism, there is underreporting of side effects from dietary supplements (Ang-Lee, Moss, & Yuan, 2001). Medicinal herbs have many similarities to prescription drugs that patients do not know about. Patients are taking medicinal herbs with the mistaken belief that they do not contain bioactive ingredients that are very powerful (Mar & Bent, 2000).

Aloe

Aloe is not grown in the United States but is found in the Arabian Peninsula and Sudan. Aloe is most frequently used for dermatologic conditions. It has been thought that aloe may be useful for healing genital herpes, dermatitis, wound healing, and treating psoriasis. Overall, the evidence of the usefulness of aloe for any purpose is very limited and inconclusive (Mar & Bent, 2000). The juice from aloe is formed into a gel and used by consumers as a strong laxative drink. The clear gel is also used externally to treat abrasions, burns, skin injuries, and it is also used in cosmetic products (American Botanical Council, 2002). Possible side effects with oral use include diarrhea and hypokalemia (Mar & Bent, 2000).

Cranberry

Urinary tract infections are thought to be caused by *E. coli* bacteria and recent studies have found that the use of cranberries can work to prevent urinary tract infections (American

Botanical Council, 2002). Cranberry's or cranberry juice causes the urine to be acidic and prevent about 80% of the E. coli bacteria from sticking to the urinary tract. Bacterial infections of the bladder are reduced by the consumption of cranberries (Watson, 2001).

Creatine

Creatine is formed in the liver, kidneys, and pancreas from the amino acids: glycine, methionine, and arginine. In the body there is about 130 grams of creatine and 95% is found in the skeletal muscle. Creatine when converted to phosphocreatine is used for adenosine triphosphate (ATP) (energy) production in the muscle. During high-intensity exercise lasting two seconds to thirty seconds, phosphocreatine is the major source of energy for the muscle. It is thought that creatine supplementation will help to achieve quicker recovery of ATP to improve high-power activity.

The marketing claims used for creatine include: increases amount of fat burned, increases muscle mass, improves strength in people with muscular disease and/or heart disease, improves strength in the elderly, improves muscular strength, and slows the fatigue of muscle. There are no defined dietary requirements for creatine, which can be found in animal products and small amounts in plant foods. Creatine is sold in the form of powders, beverages, and pills, which are available as creatine monohydrate.

There are a large number of studies testing the benefits of creatine supplementation. Some, but not all, studies have found evidence that muscular power/strength is increased during short bouts of exercise when creatine supplementation is used. The benefit of creatine supplementation on overall competitive performance needs more research. In studies, creatine has not been found to improve the metabolism of fat; therefore, there is a need for additional research on the effect creatine has on body composition. No benefit has been found for the

elderly to use creatine supplements. There has been some evidence that strength may be improved in people with neuromuscular diseases and/or congestive heart failure if creatine is supplemented, but more studies are needed.

A few potential harmful effects of creatine supplementation are diarrhea, muscle cramping, and dehydration. A physician should be consulted before starting the use of creatine supplements and only the recommended dose on the container should be used. If a person has renal disease/insufficiency, creatine supplements should be avoided. No serious side effects have been reported, but the effects of creatine supplements after eight weeks are unknown (Sarubin, 2000).

Echinacea

Echinacea is part of the plant species purpurea or purple sunflower and is native to the United States (Mar & Bent, 2000). The Native Americans used echinacea for many health problems and most of the research done on echinacea has been conducted in Germany. The marketing claims for echinacea include enhancement of the immune system and prevention of the flu/common cold. Echinacea is not found in food. Inconsistent results have been found relating echinacea and upper respiratory infections (Sarubin, 2000). Evidence is available that shows echinacea has a benefit in helping to reduce the severity of cold symptoms. Studies have suggested that echinacea may work to destroy harmful bacteria, increase immune cells in the blood, repress production of viruses, and it stimulates chemicals in the blood that are responsible for the length and amount of immune responses. However, studies on echinacea are thought to be of poor design.

FDA has labeling requirements for echinacea, but it was found by ConsumersLab.com that many manufacturers do not follow the requirements. The four requirements included: state

the species of echinacea used, what part of the plant echinacea was extracted, the herb form, and the total amount of active ingredient in each pill. A variety of 25 echinacea products were tested by ConsumersLab.com and only 56 percent passed their tests. A product would fail the tests due to either inadequate amount of active ingredient or excessive amount of bacteria (Rosenberg, 2001). Echinacea seems to be well tolerated when ingested orally (Sarubin, 2000). Echinacea should not be taken by anyone who has AIDS, tuberculosis, auto-immune disease, or multiple sclerosis. Echinacea should not be taken for a long period of time because it may begin to restrain the immune system. It should only be used short term and not for more than eight weeks (Cleveland Clinic Health Education Center, n.d.). There is inconclusive evidence on the usefulness of echinacea (Mar & Bent, 2000).

Fish Oil

In many epidemiological studies, fish oil is thought to decrease the risk for coronary artery disease. The omega-3 (n-3) fatty acids are thought to be the beneficial part of fish and are needed by the body for normal development and growth. The marketing claims used for fish oil include: lowers blood pressure; reduces chance for stroke, heart attacks, atherosclerosis; treats rheumatoid arthritis; and improves inflammatory diseases. Food sources for fish oil include cod liver oil, blue fish, anchovy, salmon, swordfish, tuna, herring and mackerel.

Pregnant women should avoid using fish oil supplements that have high levels of vitamin A, such as halibut and shark liver oils. People having surgery or taking anticoagulant medication should avoid the use of fish oil due to its ability to prolong bleeding time. Belches that smell like fish is a possible side effect of fish oil supplements. A study that was conducted over seven years did not find any side effects from the 295 subjects eating 10-20 ml refined fish oil per day.

An average diet among Americans only supplies a small amount of n-3 fatty acids. An inadequate intake of n-3 fatty acids has been associated to the increased risk of many chronic diseases. Studies have shown that fish oil plays a positive role on blood lipids, blood pressure, cardiovascular disease, and glycemic control in diabetes. More research is needed to determine if fish oil supplementation is beneficial for rheumatoid arthritis, ulcerative colitis, Crohn's disease, and psoriasis. The use of n-3 fatty acid supplements should be discussed with a physician. To increase the amount of n-3 fatty acids in the diet, it is suggested to eat two to three servings per week of fatty fish (Sarubin, 2000).

Garlic

For more than 5,000 years, garlic has been grown around the world for culinary and medicinal purposes (Mar & Bent, 2000). Garlic has a flowering stem and a perennial bulb (American Pharmaceutical Association, n.d.). In the U.S., garlic is among the top ten most sold herbal supplements. The two food sources of garlic are garlic powder and cloves. Garlic is sold as a nonprescription medicine used to lower cardiovascular risk factors. The marketing claims that are used for garlic include: controls blood pressure, decreases cholesterol, increases circulation, prevents cancer, and prevents antibacterial growth (Sarubin, 2000).

The National Institutes of Health created a report on clinical studies of garlic use in humans. The conclusions of the report were that there are potential benefits for small, short-term effects on lipids when garlic is used but the effectiveness for more than three months is not known. No studies found garlic to have positive effects on insulin sensitivity or glucose. There were inconsistent reports on garlic's effect for lowering blood pressure. Many different types of preparations of garlic are available, which limits the ability to summarize findings from studies involving garlic. Studies that focus on garlic's effect on cancer are rare (Agency for Healthcare

Research and Quality, 2000). No thorough studies are available that examine antiatherosclerotic, antiplatelet, and antitumor effects of garlic. If a person is taking warfarin or any anticoagulant medication, garlic should be avoided but otherwise garlic is tolerated well (Mar & Bent, 2000). The potential side effects of garlic use are gastrointestinal upset, gas, reflux, smelly breath, body odor, dermatitis, allergic reactions, antiplatelet effects, and nausea (Mar & Bent, 2000). Better-controlled studies need to be conducted before garlic should be recommended for treatment of cardiovascular disease, cancer, hypertension, and for improving circulation (Sarubin, 2000).

Ginkgo

Ginkgo is taken from ginkgo biloba's leaf (Ang-Lee, Moss, & Yuan, 2001). Ginkgo biloba is one of the oldest tree species alive in the world and has been grown for over 200 million years in China. The three main cognitive deficits that it is used to improve are Alzheimer's dementia, peripheral vascular disease, and multi-infarct dementia. Ginkgo biloba's active ingredients are thought to reduce clotting and protect nerve cells and vascular walls (Mar & Bent, 2000). Germany prescribes ginkgo for cognitive disorders (Sarubin, 2000). The potential benefits of ginkgo include: improve cognitive function, improve antioxidant effects, inhibit platelet action, and alter receptor and neurotransmitter activity (Ang-Lee, Moss, & Yuan, 2001). Two studies found that ginkgo is useful for increasing concentration and memory in people with cerebral insufficiency. A study also showed improvement in Alzheimer's disease when ginkgo biloba was used. Ginkgo should be used with caution if the person is also using anticoagulants, but otherwise it has been tolerated well (Mar & Bent, 2000). Clotting time may be affected by ginkgo supplementation (Sarubin, 2000). Potential side effects if high doses are consumed include restlessness, nausea, vomiting, and diarrhea. Ginkgo lacks any long-term studies to prove its efficacy (Cleveland Clinic Health Education Center, n.d.).

Ginseng

Ginseng is used to describe plants that belong to the genus *Panax*. For more than 2000 years, Asian ginseng has been used in Korea, Japan, and China for medicinal purposes. The most popular herb sold worldwide is ginseng. It is also the most expensive (Mar & Bent, 2000). In North America, American ginseng is grown and mostly exported to the orient. Siberian ginseng is not botanically related to American or Asian ginseng but it is usually sold and promoted with them (Sarubin, 2000).

Ginseng is thought to be able to protect the body from stress and revive homeostasis (Ang-Lee, Moss, & Yuan, 2001). The marketing claims used for ginseng include: improves exercise endurance, improves mood and energy, stimulates the heart, acts as a aphrodisiac, and helps regulate body energy imbalances (Sarubin, 2000). Studies have been done to test the effect of ginseng use on glucose control, fertility, athletic ability, and the immune system, but the studies were of poor quality and produced inconsistent results (Mar & Bent, 2000). It is rare for ginseng to produce side effects if it is used for a short period of time. The intake of more than three grams of ginseng daily may cause nervousness, headache, edema, hypertension, sleepiness, acne, and/or diarrhea (Sarubin, 2000).

Goldenseal

Originally, the goldenseal root was used as an antiseptic by American Indians. Goldenseal is thought to have antiseptic wound-healing properties and is often used with echinacea for upper respiratory tract infections. Six percent of the total sales of herbal products in the United States is for goldenseal even though there have been no randomized controlled studies that show its usefulness (Mar & Bent, 2000). The marketing claims that are used for goldenseal include: detoxifies and cleanses urine, improves mental difficulties, prevents

parasites and traveler's diarrhea, and acts as a herbal antibiotic to improve a sore throat and decrease mucous (Sarubin, 2000). Goldenseal is popular for the use in treating the flu and colds (American Botanical Council, 2002). The potential side effects of goldenseal may be vasoconstriction, hypertension, and diarrhea, if used in high doses or for a long period of time (Mar & Bent, 2000). There is a lack of research on goldenseal's effects so marketing claims cannot be supported by scientific evidence (Sarubin, 2000).

Herbal Teas

China and India have had the tradition of drinking tea for more than 5,000 years. It is thought to help contribute to good health. Tea is now being studied for the potential to prevent and treat different forms of cancer. Tea is being studied mostly due to antioxidants called catechins that are found in tea and have the potential to inhibit cancer growth. So far the studies that have been conducted using humans have resulted in inconclusive findings. The National Cancer Institute is currently studying the catechins in tea. The tea that contains the highest amount of catechins is green tea, possibly due to being less processed (National Cancer Institute, 2002).

The amount of tea that is safe is unknown and that is the main problem of use. Different sources of the same herb can have different amounts of chemicals, which does not allow for consistent knowledge of the concentration in teas. The reaction a person has to different varieties of teas is different. Confrey tea is dangerous due to the possibility of fatal liver damage (Oklahoma Cooperative Extension, n.d.). There is a lack of long-term studies to determine the safety of green tea supplements. In China, green tea has been used for more than 4,000 years without any established safety concerns. Before recommendations should be made about the

intake of green tea supplements there needs to be more safety and efficacy information (Sarubin, 2000).

Kava

Kava is found in the pepper plant's dried root in the Pacific Islands (Ang-Lee, Moss, & Yuan, 2001). The roots have been used for many years to make a bitter-tasting beverage, which was drunk during ceremonial occasions. The beverage was thought to be a relaxant and tranquilizer. The two main marketing claims made about kava are for the use as a natural way to prevent anxiety and/or depression, and to promote relaxation and sleep (Sarubin, 2000). If discoloration of hair, skin, and/or nails occurs, kava use should be stopped. People who are pregnant, nursing, or experiencing endogenous depression should not use kava. Without medical advice, kava should be used for less than three months (Sarubin, 2000). If kava is used heavily, it may produce scaly cutaneous eruptions that are reversible. This condition is classified as *kava dermatopathy* (Ang-Lee, Moss, & Yuan, 2001). Also, high consumption of kava has been associated with dyskinesia, abnormal liver function tests, poor health, and malnutrition. More research is needed before kava should be recommended to treat anxiety and depression. Determining kava's role with improving sleep requires better-controlled studies. Kava should not be used if the person is using anti-anxiety medications, alcohol, or prescription drugs, unless advised by their doctor (Sarubin, 2000).

Ma Huang

The Chinese name for the *ephedra* species of plants is ma huang (Merritt, 2001a). China has used ma huang for more than 5,000 years medicinally (Sarubin, 2000). Examples of supplements that contain ephedra include: Xtreme Lean, Metabolife 356, and Trim Fast (Consumer Reports, 2003). The best-selling herb on the market today is ephedra even though

there have been findings that it is not safe or effective. People that believe in ephedra's usefulness claim that it is effective for improved concentration, enhanced sexual and athletic performance, increased energy, and weight loss. Brain function, heart function, and the metabolism are stimulated in a powerful way by ephedra (Chase et al., 2002). Ma huang contains ephedrine, which is a stimulant often used along with aspirin or caffeine to promote weight loss. The usefulness of ephedrine in combination with caffeine is supported by several studies. Ephedrine and caffeine may have positive results if patients are provided the product through a weight loss program that is supervised (Merritt, 2001a). In 1983, the FDA banned the over-the-counter sale of supplements that contained the combination of ephedra and caffeine because the combination of those two ingredients was so dangerous (Consumer Reports, 2001). Consumer Reports published about a study on the effects of the use of the combination of ephedra and guarana. The study found that the combination did produce moderate weight loss but due to the side effect of heart palpitations some of the subjects in the study dropped out (Consumer Reports, 2001).

Ephedra has been used by humans for more than 5,000 years but the use is still controversial (McCaleb, n.d.). It is not recommended to use ma huang supplements without supervision due to harmful effects that have been reported (Merritt, 2001a). Some of the potential harmful effects include: headaches, seizures, constriction of the arteries, tremors, insomnia, heart attack, high blood pressure, irregular heart beat, injury, nerve damage, stroke, and possibly even death (Kurtzweil, 1998). Ephedra use has been associated with more than 1070 serious side effects. Deadly complications with the heart and the central nervous system are examples of the side effects (Ang-Lee, Moss, & Yuan, 2001). Metabolife International was recently ordered to pay \$4.1 million to four people who had taken the company's ephedra pills

and had a stroke or heart attack from use (Consumer Reports, 2003). The FDA has attempted for many years to obtain copies of health complaints that had been filed with the company that sells Metabolife. Recently, Metabolife has submitted to the Justice Department more than 16,100 reports related to ephedra products that were sent to the company from consumers since 1997. Two thousand of those reports were due to side effects from the use of ephedra products. There were 3 reports of deaths, 20 for heart attacks, 40 for seizures, and 24 for strokes (Consumer Reports, 2003). Now, in eleven states ephedra has been either banned or there are regulations for use (Consumer Reports, 2003). The FDA is continually trying to remove ma huang from the market due to no proven effectiveness or safety (Sarubin, 2000).

Melatonin

Melatonin is a synthetic hormone that has been used as a sleep aid, but long term safety is not known (McCaleb, n.d.). Melatonin is secreted in the brain by the pineal gland. Melatonin signals the body when it is time to rest. A good night's sleep requires adequate melatonin production. The older we get, less melatonin is produced causing trouble sleeping. Supplements of melatonin are used to help to sleep throughout the night. To avoid grogginess with the use of melatonin it is recommended to take it at least eight hours before the desired time to wake up. When melatonin has been used as directed there have been no side effects (Mindell, & Hopkins, 1999).

Protein and Amino Acids

Athletes, specifically strength athletes, are interested in protein and amino acid supplements due to the possible effect of increasing muscle mass. Post-exercise use is the most common time to try to help increase muscle hypertrophy, but it is not clear if that is effective.

Research has shown that over time, increased protein intake without exercise does not improve muscle protein balance (Tiptin, 2003).

Creatine is a popular amino acid that is sold as a sports supplement. There has been research published that has shown improvement in performance for some athletes depending on the type of exercise. Creatine is produced in the body by the pancreas, kidneys, and liver. Creatine can also be found naturally in fish and meat. The main role of creatine in the body is to produce bursts of energy and it is stored in muscle in other parts of the body. Rapid weight gain is seen by people taking creatine supplements but the gain is thought to be from water in the muscles that is retained. Creatine has not been seen to be useful for endurance activities. However, well-designed studies have shown improvement in sports such as high jumping and weight lifting that require short, extreme bursts of strength. Long-term effects of creatine supplementation are unknown and the possible side effects are muscle cramping and kidney problems (Consumer Reports, 2001).

Saw Palmetto

Saw palmetto grows in the southeastern United States and is a ripe berry that grows on low, scrubby palm trees (Rosenberg, 2001). Years ago, berries from the saw palmetto plant were used to treat bronchitis and cystitis (Sarubin, 2000). Saw palmetto originally had consumers thinking that it reduced the risk for prostate cancer. However, research has shown that saw palmetto does help to reduce the symptoms of benign prostatic hyperplasia (BPH), which is a non-cancerous condition that involves prostate enlargement. Saw palmetto helps to make urinating easier and less frequent in people with BPH. Also, it may have anti-inflammatory effects.

The pass rate for 19 products tested by ConsumersLab.com was 70 percent. If the products failed, it was due to insufficient levels of fatty acids, which are thought to contain the active components. The minimum level of fatty acids that is required is 85 percent (Rosenberg, 2001). The safety of long term saw palmetto supplementation is unknown but use for less than six months has been found to be well tolerated. A possible side effect is gastrointestinal discomfort (Sarubin, 2000).

St. John's Wort

The plant hypericum perforatum contains St. John's wort, which is a yellow-flowered weed. St. John's wort has been used for many years for anxiety and depression (Mar & Bent, 2000). The marketing claims for St. John's wort include: improves mood, improves well-being emotionally, and helps to treat depression naturally (Sarubin, 2000). There was improvement in depression shown in a study that conducted 23 trials involving 1757 patients. St. John's wort has minimal side effects and is usually well tolerated. The possible side effects include: gastrointestinal upset, fatigue, headache, allergic reactions, and phototoxicity. St. John's wort is not to be taken if the person is using other antidepressants (Mar & Bent, 2000). St. John's wort has the potential to treat mild-to-moderate depression for a short period (Ang-Lee, Moss, & Yuan, 2001). Long-term safety of use is unknown due to lack of studies that were conducted for longer than eight weeks. Before St. John's wort is an accepted form of therapy for depression, more research needs to be conducted that uses consistent preparations and doses (Sarubin, 2000).

In addition, St. John's wort is supposed to stimulate serotogenic activity and decrease appetite. This product is often used along with ma huang and sold as "herbal phen/fen." One study conducted over an eight week period reported weight loss of .64-.78 kg per week, with use

of the combination of St. John's wort and ma huang. Harmful effects of use have been reported. There is no evidence of usefulness for weight loss (Merritt, 2001a).

Valerian

Valerian is the name used for plants that are included in the genus *Valeriana* and for many years has been used for a sleep aid. Valerian is thought to cause the relaxation of muscle by depressing the central nervous system (Sarubin, 2000). The common uses of valerian are for treatment of insomnia and anxiety (Mar & Bent, 2000). The marketing claims for valerian include: improves sleep, treats insomnia, and protects against anxiety.

Improvement in the quality of sleep has been found in preliminary studies. Valerian's role in reducing stress requires more research (Sarubin, 2000). Studies to show any benefit of the supplement are inconclusive. The possible side effects include headache, tremor, and fatigue (Mar & Bent, 2000). The long-term safety, efficacy, and potential active components of valerian need to be examined by more research. People with liver damage should avoid the use of valerian (Sarubin, 2000). Valerian is different from sleep and anxiety medication because it is not thought to be habit forming (American Botanical Council, 2002).

CHAPTER THREE

Methodology

This chapter includes information on sample selection and the instruments used to collect data. In addition, data collection and data analysis procedures are given. The chapter concludes with the methodological limitations.

Subject selection

Prior to initiating this study, the research protocol was reviewed and approved by the Institutional Review Board for the Protection of Human Subjects at the University of Wisconsin-Stout (UW-Stout). Subjects were selected from undergraduate students enrolled in Health and Physical Education general education courses during the Spring semester of 2003 at UW-Stout. Participation was completely voluntary and subjects were assured of confidentiality. Access Stout was utilized to identify professors who taught the Health and Physical Education courses. There were seventeen professors who were teaching the courses, thirteen professors agreed to administer the consent forms and surveys to students who volunteered in their classes. After being contacted by telephone. Professors were asked to mail back the surveys to the investigator. A copy of the cover letter for the professors and the consent form given to the students are located in Appendix A and B, respectively. There were 1,361 undergraduate students enrolled in the Physical Education general education courses during Spring semester 2003.

Instrumentation

The questionnaire used for this study was designed to be easy to fill out. For thorough collection of data, the two most important components were readability and understandability. Questionnaire items were answered by only having to place an "X" in spaces provided or by

providing a simple short answer to questions, so minimal writing was necessary for the participants.

The questionnaire included a consent form, which stated that the participants were agreeing to participate in the study by filling out the questionnaire. The questionnaire consisted of fifteen items, including pertinent demographic items and descriptive items that were related to the usage of nonvitamin, nonmineral supplements. Demographic items one through five, included: gender, age, status in college, and whether or not they smoked cigarettes. Demographic information was included in the survey to provide further information to form conclusions about the study sample.

Descriptive data was obtained by providing a list of eleven nonvitamin, nonmineral supplement products, which was item eight on the questionnaire. The list consisted of dietary supplements that were most popular to the general population according to literature (Burka, 2002; Commission on Dietary Supplement Labels, n.d.b.; Consumer Reports, 2001; Department of Health and Human Services, n.d.; Naccarato, & Hamilton, 1999). The questionnaire (items eight, eleven and twelve) asked subjects to identify supplements currently used, give reason for use and source of information about supplement use. The descriptive data also included items that asked subjects about their present health status, physical activity level, likelihood of future supplement use, and reason for using or not using a nonvitamin, nonmineral supplement in the future (items thirteen through fifteen).

The items were constructed using reports from similar studies (American Dietetic Association, 2000a; American Dietetic Association, 2000b; Ervin, Wright, & Kennedy-Stephenson, 1999; Naccarato & Hamilton, 1999; Perken et al., 2002; Radimer, Subar, & Thompson, 2000). Since there were no instruments that met the specific needs of this study, an

original questionnaire was designed by the researcher in Spring 2003. Because it was constructed specifically for this study, there were no measures of reliability or validity. A copy of the survey instrument is located in Appendix C.

Data collection

Permission to conduct the study in the Health and Physical Education general education courses at UW-Stout was obtained from the professors of those courses. This occurred during the Spring semester of 2003. Once permission was granted, the professors were given a cover letter to explain the nature of the study. The professors then distributed consent forms and questionnaires to their students. After reading the consent forms, each subject who was willing to complete the questionnaire was asked to complete the items by placing a check mark in the appropriate spaces for demographic information. The subjects were also asked to respond to all descriptive items on the questionnaire. When the subjects had completed the questionnaire, they were asked to give them back to the professors and the professors then sent the surveys back to the researcher through intercampus mail.

Data analysis

Christine Ness, Research and Statistical Consultant at the University of Wisconsin-Stout, computed the statistics for the study. All questionnaires were coded and responses statistically analyzed using SPSS. Questionnaires that were incomplete or lacked significant portions of information that was needed for this study were discarded.

The questionnaire items were examined using descriptive statistics such as frequencies, means, and percentages. In addition, cross tabulations were done to compare male and female responses with use of supplements, reason for use, and source of supplement information. Chi-square analysis was used to test the association between what supplement was used and gender;

also gender and reason for supplement use. For the Chi-square analysis, a probability of less than .05 was considered significant.

Limitations

The study was limited to students enrolled in general education Health and Physical Education courses during the spring semester of 2003. The study was also limited to students in attendance the day the questionnaires were administered. The responses received may or may not reflect the total undergraduate student population at UW-Stout.

The main limitation of this study was that those who completed the survey may have been those who were most interested in nutrition. Persons who participated may have an interest in nutrition and may also have more knowledge of nutrition than those who did not choose to participate.

CHAPTER FOUR

Results

This chapter includes the findings of this study. Demographic information and item analysis are discussed. The chapter concludes with the findings for research objectives under investigation.

Demographic Information

The characteristics of the subjects are summarized in Table 1. There were 1,356 students enrolled in Health and Physical Education general education course during the time of this study. Four hundred and eighty-six students completed usable questionnaires, therefore representing 35.8% of the total possible participants.

Of the 486 respondents, 276 (56.8%) were female students and 210 (43.2%) were male. There were 212 (43.6%) freshman students, 106 (21.8%) sophomore students, 94 (19.3%) junior students, 70 (14.4%) senior students, two (.4%) graduate students, one (.2%) special student, and one student (.2%) chose not to respond to this item of the survey. The two questionnaires that were completed by the graduate students were not included in the results.

Respondents were from six different ethnic backgrounds. The study included 459 (94.4%) white students, five (1%) African American students, one (.2%) Native American student, 13 (2.7%) Asian American students, and one (.2%) multi-racial student, and seven (1.4%) classified as other students.

The age of respondents ranged from 18 years to 49 years old. Thirty-four (7.0%) of the respondents chose not to answer this item. Three hundred and seven students (63.2%) were 18-20 years old, 122 (25.1%) were 21-23 years old, 13 (2.6%) were 24-26 years old, and 10 (2.0%)

were 27 years and older. The highest percentage of participants was 19 years old (36.0%). The mean age of the respondents was 20 years old.

TABLE 1. Demographic Information of Respondents (N=486)

Category	Number (N)	Percentage (%)
<u>Gender</u>		
Female	276	56.8%
Male	210	43.2
<u>Academic Status</u>		
Freshman	212	43.6
Sophomore	106	21.6
Junior	94	19.3
Senior	70	14.4
Graduate Student	2	.4
Special Student	1	.2
No Answer	1	.2
<u>Ethnic Background</u>		
White	459	94.4
African American	5	1.0
Native American	1	.2
Asian American	13	2.7
Multi-racial	1	.2
Other	7	1.4

<u>Age of Respondent</u>		
18-20	307	63.2
21-23	122	25.1
24-26	13	2.6
27 or older	10	2
No Answer	34	7.0

Health Status

The respondents were asked about their smoking status. Ninety-nine (20.4%) of the students (n=486) reported that they smoked cigarettes. Of the 99 smokers, 58 were female and 41 were male students.

The participants of this study were asked to rate their present health status. Of the 478 students who responded to this item, 93 (19.5%) stated excellent, 332 (69.5%) stated good, 48 (10.0%) stated fair, and 5 (1.0%) stated poor for their current health status.

The next item pertained to the number of times per week the participants engaged in physical activity for more than ten minutes. Of the 478 students who responded to this item, 13 (2.7%) stated none, 109 (22.8%) stated 1-2 times, 188 (39.3%) stated 3-4 times, and 168 (35.1%) stated 5 times or more per week.

Supplement Usage

When respondents (N=486) were asked if they had ever used a nonvitamin, nonmineral supplement, 104 (21.4%) responded “yes”. Seventy-four (15.2%) of the respondents were currently using nonvitamin, nonmineral supplements.

The results for the specific supplements that the respondents reported using are summarized in Table 2. Of the 104 students who have ever used a nonvitamin, nonmineral supplement, protein powder, echinacea, ginseng, green tea, and creatinine were the five supplements used most frequently.

Table 2. Supplements Used by Respondents (N=104)

Supplement Name	Number (n)	Percentages (%)
Ginseng	25	24
Amino Acids	12	11.5
Creatinine	23	22.1
Fish Oil	3	2.9
Kava Kava	8	7.7
Echinacea	28	26.9
Ginko Biloba	8	7.7
Green Tea	24	23.1
Golden Seal	6	5.8
Melatonin	3	2.9
Protein Powder	30	28.8
St. John's Wort	9	8.7
Garlic	8	7.7
Coenzyme Q-10	3	2.9
Chamomile Tea	12	11.5
Other	24	23

The results of the reason why the respondents have used supplements are summarized in Table 3. Ninety-eight of the participants of the study responded to this item. The three most frequent reasons were to improve energy, build muscle and prevent/treat colds.

Table 3. Reason for Use of a Nonvitamin, Nonmineral Supplement (N=98)

Reason	Number (n)	Percentage (%)
Improve Energy	54	55.1
Burn Fat	23	23.5
Build Muscle	39	39.8
Prevent/Treat Colds	32	32.7
Enhance Athletic Performance	13	13.3
Enhance Sleep	14	14.3
Gain Weight	15	15.3
Prevent Cancer	8	8.2
Promote Weight Loss	14	14.3
Supplement Inadequate Diet	8	8.2
Relieve Stress/Improve Mood	23	23.5
Improve Memory	10	10.2
Improve Circulation	7	7.1
Promote Skin/Hair Health	7	7.1

The results of the item pertaining to source of supplement information are summarized in Table 4. Of the 486 students who participated in this study, only 98 answered this item. Of the 98 respondents, the most frequent source stated was friends and family (69.4%).

Finally, participants were asked if they were likely to use nonvitamin, nonmineral supplements in the future. Of the 474 students who responded, 165 (34.8%) answered yes and 309 (65.2%) answered no.

TABLE 4. Source of Information about Supplements (N=98)

Source	Number (n)	Percentages (%)
Friends & Family	68	69.4
Dietetic Professionals	12	12.2
Health Professionals	23	23.5
Television	7	7.1
Health Food Stores	30	30.6
Magazines & Newspapers	31	31.6
Internet	16	16.3
Other	13	13.3

Research Objectives

Research Objective #1 – To quantify the prevalence of nonvitamin, nonmineral supplement usage among University of Wisconsin-Stout undergraduate students. Descriptive statistics were used for this objective, which included frequencies and percentages. Of the 486 students, 104 (21.4%) stated that they have used a nonvitamin, nonmineral supplement either in the past or presently. When the participants were asked if they were currently using a nonvitamin, nonmineral supplement, 74 (15.2%) stated yes out of the 486 participants.

Research Objective #2 – To identify supplements consumed. Descriptive statistics were used for this objective, which included frequencies and percentages. Among the supplements

that were consumed the most often among the participants of this study were ginseng at 24% (n=25), echinacea at 26.9% (n=28) and protein powder at 28.8% (n=30) out of the 104 participants who answered this item of the survey. The supplements that were used least often among the participants of this study were fish oil at 2.9% (n=3), coenzyme Q-10 at 2.9% (n=3), and melatonin at 2.9% (n=3).

Research Objective # 3 – To identify the rationale for supplement usage. Descriptive statistics were used for this objective, which included frequencies and percentages. The three most popular reasons to take nonvitamin, nonmineral supplements according to the 98 participants of this study that answered this item were to improve energy at 55.1% (n=54), build muscle at 39.8% (n=39), and to prevent/treat colds at 32.7% (n=32). The two least popular reasons to take nonvitamin, nonmineral supplements according to the participants of this study were to improve circulation 7.1% (n=7) and to promote skin/hair health 7.1% (n=7).

Research Objective # 4 – To identify the source of supplement information. Descriptive statistics were used for this objective, which included frequencies and percentages. The three most frequently used sources for information about nonvitamin, nonmineral supplements were friends and family at 69.4% (n=68), health food stores at 30.6% (n=30), and magazines and newspapers at 31.6% (n=31) out of the 98 students who answered this item of the survey. The source selected least was television 7.1% (n=7).

Research Objective # 5 – To relate usage to selected demographic characteristics. Gender will be compared to usage to address this objective using cross tabulation. Also, chi-squared analysis will be utilized to determine if there were significant differences between males and females. The demographic characteristics of age and ethnicity were not compared to items on the survey because there were not enough participants from each group. There were 452

people who answered what age they were and 436 of those were between the ages of 18 and 24. There were only 16 people in the age group of 25-49. Four hundred and eighty-six participants responded to the ethnicity statement on the survey and 459 of those were of white ethnicity and only 27 were non-white.

When the participants were asked if they had ever used a nonvitamin, nonmineral supplement, there were 104 out of 486 who stated yes. Of those 104, 50 (53.2%) were male and 54 (56.8%) were female. The next item on the survey pertained to if the respondents were still using a nonvitamin, nonmineral supplement and 74 participants stated yes out of the 104 participants who had previously stated that they had ever used a nonvitamin, nonmineral supplement. Of the 74 participants who were currently using a nonvitamin, nonmineral supplement, 36 (48.6%) were male and 38 (51.4%) were female.

The questionnaire asked the participants to select what nonvitamin, nonmineral supplements that they have used or are currently using. One hundred and four participants responded to this item and of those, 50 were male and 54 were female. The most popular supplements among the male respondents were: creatine (n=23, 46.0%); protein powder (n=23, 46.0%); ginseng (n=10, 20.0%), and amino acids (n=8, 16%). The most prevalent nonvitamin, nonmineral supplements used by the female respondents were: echinacea (n=24, 44.4%); green tea (n=17, 31.5%); ginseng (n=15, 27.8%); and chamomile tea (n=10, 18.5%). There were significant differences of the following supplements used between males and females: creatine ($p<0.05$); echinacea ($p<0.05$); and protein powder ($p<0.05$). This finding suggests that the types of supplements used are different depending on gender.

Participants were asked if they have or are using a nonvitamin, nonmineral supplement and 98 students responded to this item. Of the 98 respondents, 47 were male and 51 were

female. The most selected reason for males to use this type of supplement was to: build muscle (n=35, 74.5%); improve energy (n=26; 55.3%); gain weight (n=14, 29.8%); and burn fat (n=12, 25.5%). The most popular reasons for using nonvitamin, nonmineral supplements for females were to: improve energy (n=28, 54.9%); prevent/treat colds (n=25, 49.0%); relieve stress/improve mood (n=15, 29.4%); and burn fat (n=11, 21.6%). There were significant differences of the following reasons for supplement use between males and females: build muscle ($p<.05$); prevent/treat colds ($p<.05$); and gain weight ($p<.05$). This finding suggests that males and females use nonvitamin, nonmineral supplements for different reasons.

Ninety-eight of the students who participated in this study answered the question pertaining to what source was utilized for information about nonvitamin, nonmineral supplements. Of the 98 respondents, 47 were male and 51 were female. The most prevalent sources of information for males were: friends and family (n=31, 66.0%); health food stores (n=21, 44.7%); and magazines and newspapers (n=16, 34%). The most frequently selected sources of information for females were: friends and family (n=37, 72.5%), magazines and newspapers (n=15, 29.4%); and health professionals (n=10, 19.6%)

CHAPTER FIVE

Discussion, Conclusions, and Recommendations

Introduction

This chapter includes a discussion comparing and contrasting the results of the present study with pertinent findings of earlier studies. Conclusions were made to summarize the findings of this study. The chapter concludes with recommendations for further study, to the health field, and to the participants of this study.

Discussion

This study found that the current use of nonvitamin, nonmineral (NVNM) supplements was lower when compared to other research that also used college students as the subjects. Only 15.2% of the 486 students who were surveyed for this study were currently using NVNM supplements. The percentage of students in this study who had ever used a NVNM supplement (includes the students currently using) was consistent with other research on this age group. This study found that 21.4% (15.2% were currently using) of the 486 students had used a NVNM supplement. Naccarato and Hamilton (1999) conducted a study at a mid-Atlantic University that included 37 students. Of those 37 students, 24% were currently using an herbal supplement. Mar and Bent (2000) found that about 1/3 of Americans had used a form of herbal supplement at some point in the year. According to the American Dietetic Association (2000b), 12% of respondents to their survey were using herbal supplements and 61% had never used herbal supplements. A very recent study that was conducted with college students in Florida found that 26.3% of the students used nonvitamin, nonmineral supplements (NVNM) at the time of the study and 16% had used NVNM supplements in the past (Perkin et al., 2002).

Findings of this study were consistent with other research studying the most popular NVNM supplements. This study included use of the following NVNM supplements: ginseng, amino acid, creatine, fish oil, kava kava, echinacea, ginkgo, green tea, golden seal, melatonin, protein powder, St. John's wort, garlic, coenzyme Q-10, chamomile tea, and other. The students who stated other (24 people out of 486) may have been using aloe, saw palmetto, cranberry, or another NVNM supplement, but those were not specifically stated. The five most popular supplements that were found in this study included: protein powder, echinacea, ginseng, green tea, and creatine, respectively. In 1995 the most popular botanical supplements were: aloe, ma huang (ephedra), Siberian ginseng, saw palmetto, cranberry, ginkgo, garlic, ginseng, golden seal, and echinacea (Commission on Dietary Supplements, n.d.b). The NHANES III did not ask the participants specifically about their use of nonvitamin, nonmineral supplements but the participants responded with the following NVNM supplements under the category of other dietary supplements: ginkgo biloba, ginseng, St. John's wort, echinacea, garlic, fish oils, energy-enhancing and body-building supplements, and amino acids (Department of Human Services, n.d.).

The reasons for use of NVNM supplements found by this study were similar with other research conducted on this subject. The reasons for use that were stated by participants of this study were: improve energy, burn fat, build muscle, prevent/treat cold, enhance athletic performance, enhance sleep, gain weight, prevent cancer, promote weight loss, supplement inadequate diet, relieve stress/improve mood, improve memory, improve circulation, and promote skin/hair health. The five most frequently stated reasons for use of a NVNM supplement that were found by this study include improve energy, build muscle, prevent/treat colds, burn fat, and relieve stress/improve mood, respectively. The Department of Health and

Human Services (n.d.) found that dietary supplements are being consumed to increase energy or improve function, decrease risk of disease, improve nutrition, or to obtain nutrients missing in the person's diet. A survey conducted by the Commission on Dietary Supplement Labels (n.d.b) found that the most frequent reasons for supplement use are: increase energy, prevent disease, boost immune system, reduce stress, improve fitness, treat a medical problem, and/or to increase alertness or mental activity.

The findings of this study about the source of information about NVNM supplements were similar to other research, except for the most popular reason was surprising. Television was expected to be a higher percentage, but friends and family was the most popular source of NVNM supplement information. The sources that the participants had to choose from in this study included friends and family, dietetic professionals, health professionals, television, health food stores, magazines and newspapers, Internet, and other. The four most frequently selected sources of information were family and friends, magazines and newspapers, health food stores, and health professionals, respectively. There were a surprising amount of students who used health food stores as their source of information. According to Ervin, Wright, and Kennedy-Stephenson (1999), the reasons that people could be interested in dietary supplements is due to recommendations from family and friends, scientific literature, advertising, or the television and print media. The Federal Trade Commission found that 29% of Americans use the Internet to find health information and 70% of those people search the web before visiting a health care professional (Johns Trissler, 1999). A survey that was conducted by the American Dietetic Association found that 48% of Americans used television and 47% used magazines as their main source for nutrition information (Ryan, Ferme, & McManamon, 2000a).

In the NHANES III, it was found that higher dietary supplement use is seen among people with higher incomes and levels of education, women, people living in the West, white people, and older adults (Department of Human Services, n.d.). The findings of this study found that the use of NVNM supplements is the close to the same percentage for males and females. This study did not look at income levels, older adults, or people living in the West. Also, this study did not include enough diversity in ethnic backgrounds to determine if supplement use is higher among white people.

Conclusions

The small sample size, involvement of only those college students enrolled in Physical Education general education courses, and geographical location of this study limit the generalization to other populations of college students. The findings indicate that a small percentage of undergraduates at the University of Wisconsin-Stout are using nonvitamin, nonmineral supplements. A high percentage of those students learn about supplements from friends and family, which does not ultimately assure that accurate information is being received for proper use of supplements. The subjects in this study were consuming supplements that have inconsistent evidence of effectiveness and safety.

People who decide to use nonvitamin, nonmineral supplements should look for side effects on the product label, look for proper dosage on the label, do not believe outrageous claims (i.e. weight loss miracle, cancer cure), and know that if a product states that it is natural, it is not guaranteed safe. There are no federal standards to guarantee dose, purity, or safety of botanicals (Camire, Hunt, Miller, & Russell, 1997).

Consumers' lack of accurate information about the use of dietary supplements is due to the possibility that they receive more information about diet and health from sources other than

dietitians and health professionals. It is extremely important for health and nutrition professionals to learn the different types of dietary supplements and keep up to date with current research to be able to help consumers make healthy choices about whether or not to use dietary supplements (Commission on Dietary Supplements, n.d.d). Anyone who plans to take a dietary supplement should visit a health professional so that they can evaluate their dietary practices and lifestyle. The position of the American Dietetic Association (ADA) on dietary supplements encourages people to focus primarily on healthy food choices to achieve good nutrition (Hunt, 2000).

The objectives of this study were met.

Objective 1: To quantify the prevalence of nonvitamin, nonmineral supplement usage among University of Wisconsin-Stout undergraduate students.

Outcome: Seventy-four (15.2%) of the 480 college students surveyed were using nonvitamin, nonmineral supplements at the time of the study.

Objective 2: To identify supplements consumed.

Outcome: The most common supplements used by this sample of students at the University of Wisconsin-Stout in Menomonie were identified to be ginseng, echinacea, and protein powder.

Objective 3: To identify the rationale for supplement usage.

Outcome: The highest percentages of subjects were using supplements to improve energy, build muscle, to prevent/treat colds, burn fat, and relieve stress/improve mood.

Objective 4: To identify the source of supplement information.

Outcome: The students in this sample obtained supplement information from a variety of sources. The majority obtained supplement information from friends and family.

Objective 5: To relate usage to selected demographic characteristics.

Outcome: Age and ethnicity were not compared to items on the survey because there were not enough students in each group. The majority of the participants were between the age of 18 and 24. Four hundred and fifty nine of the 486 participants of the survey were of white ethnicity and only 27 were non-white. There was a similar amount of males (n=36) and females (n=38) currently using a nonvitamin, nonmineral supplement at the time of the study. The most prevalent supplement used by males and females was different. Males had the highest usage rate for creatine and protein powder, whereas females used echinacea most frequently. The findings for why the students used supplements were different between males and females. The most frequent reason reported by males was to build muscle, and the most popular reason for females was to improve energy. The most prevalent source of information for nonvitamin, nonmineral supplements was the same for males and females. Friends and family was the most frequent source of information utilized.

The conclusions drawn from this study can ultimately assist area community and health care professionals. By researching this sample, community educators will know what nonvitamin, nonmineral supplements college students need information about use and safety to further their knowledge. This study also should help health professionals realize the need for them to be well educated about dietary supplements in order to relay accurate information to the consumers.

Recommendations

1. A larger study sample would have been more helpful in showing trends of supplement practices. This study showed that supplement practices were not common in this sample, but a larger sample may help in identifying the most popular nonvitamin, nonmineral supplements, and targeting groups that are in need of accurate supplement information.

2. Having the opportunity to distribute the surveys in person may have helped clarify the purpose of questionnaire items. The questionnaires were given to professors to distribute to their students and then the professors were to send the surveys back through intercampus mail. If the students had questions, there is a possibility that the professors were not able to accurately answer the questions. If the questionnaires would have been handed out in person, the students could follow through the survey as a class while the surveyor was explaining what each item on the survey was about and why it was important. Having had a chance to explain the directions thoroughly to the students may have had a positive effect on the results of the study.

3. Including individuals with more diversity in age and race may also have been more helpful in showing trends for nonvitamin, nonmineral supplement users, but this study focused in on college students. Including persons beyond the college students may assist professionals in knowing how to access other ages and groups of people in the community to educate and distribute information regarding nonvitamin, nonmineral supplements.

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APPENDIX A
Cover Letter

March 31, 2003

Professor
University of Wisconsin-Stout
Menomonie, WI 54751

Dear Professor,

My name is Amy Swenson. I am a student in the Food and Nutritional Science graduate program at the University of Wisconsin-Stout. I am conducting a research project titled, "Nonvitamin, Nonmineral Supplement Usage Among Undergraduate Students at the University of Wisconsin-Stout."

I would appreciate your cooperation in this study by distributing surveys, which I have created, to all of your **general education** classes. Please inform your students that the survey asks questions pertaining to current supplement use, exercise, and why or why not they are likely to use a nonvitamin, nonmineral supplement in the future. The students will also be asked their gender, age, status in school, race, and smoking status. Enclosed are copies of the survey for each of your general education classes that you teach. When the surveys have been completed, I would like you to place them in the self-addressed envelope that I have provided and send them through campus mail to my research advisor, Dr. Esther Fahm (342 Home Economics Building). I would like the surveys to be administered between the time period of **March 1, 2003 and April 10, 2003**.

Once the study is completed, the analyzed findings will be available for your information. This study is part of a Plan B thesis and when the thesis is complete, it will be available through the UW-Stout library webpage.

Questions or concerns about the research study should be addressed to Amy Swenson at (715) 556-5408 or Dr Esther Fahm at (715) 232-2550. Thank you for your willingness to distribute this survey to your undergraduate general education classes.

Sincerely,

Amy Swenson

APPENDIX B

Consent Form

Informed Consent Statement

Amy Swenson, a student in the Food and Nutritional Science program at the University of Wisconsin-Stout is conducting a research project titled, "Nonvitamin, Nonmineral Supplement Usage Among Undergraduate Students at the University of Wisconsin-Stout." Nonvitamin, Nonmineral Supplements include herbals, botanicals, protein and amino acids, as well as Brewer's yeast and shark cartilage. She would appreciate your participation in this study by filling out the attached survey.

It is not anticipated that this survey will present any medical or social risk to you. The information gathered will be kept strictly confidential and any reports of the findings of this research will not contain your name or any other identifying information.

Your participation in this survey is completely voluntary. If at any time you wish to stop completing the survey, you may do so by not handing it to your professor, without coercion or prejudice.

Once the study is completed, the analyzed findings would be available for your information. This study is part of a Plan B thesis and when the thesis is complete, it will be available through the UW-Stout library webpage.

Questions or concerns about the research study should be addressed to Amy Swenson, the researcher at (715) 556-5408 or Dr. Esther Fahm, the research advisor at (715) 232-2550. Questions about the rights of research subjects can be addressed to Sue Foxwell, Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research, 11 Harvey Hall, Menomonie, WI, 54751, (715) 232-1126.

APPENDIX C
Survey Instrument

Nonvitamin, Nonmineral Supplement Survey

Your completion of this survey indicates that you have read the informed consent form and have agreed to participate in this study. You may stop participating in this study at anytime. Please answer the following items to the best of your ability. Please **do not** place your name or any personal identification on this survey. When completed with the survey, please hand the survey to your professor.

Gender: ___ Male
 ___ Female

Age (years): ___
If younger than 18, please stop here.

Status: ___ Freshman ___ Sophomore ___ Junior ___ Senior
If you are not an undergraduate please stop here.

Race: ___ White ___ Native American
 ___ African American ___ Asian American
 ___ Hispanic
 ___ Other, Please specify: _____

Do you smoke cigarettes:
 ___ Yes ___ No

1) Have you ever used a nonvitamin, nonmineral supplement (herbals, botanicals, and protein and amino acids, as well as Brewer's yeast and shark cartilage)?

 ___ Yes ___ No

If you answered No, please skip to item eight.

2) Are you currently using a nonvitamin, nonmineral supplement?

 ___ Yes ___ No

If you answered No, please skip to item eight.

3) Please check any of the following nonvitamin, nonmineral supplements that you are currently using (check all that apply).

___ Ginseng	___ Echinacea	___ Protein Powder
___ Amino Acid	___ Ginko Biloba	___ St. John's Wart
___ Creatinine	___ Green Tea	___ Garlic
___ Fish Oil	___ Golden Seal	___ Coenzyme Q-10
___ Kava Kava	___ Melatonin	___ Chamomile tea

4) If you are taking a nonvitamin, nonmineral supplement that is not listed in the previous item, please list it/them below.

- 5) Please specify how long you have been using the above stated nonvitamin, nonmineral supplement (i.e. weeks, months, and/or years).
-

- 6) Please check your reason for using a nonvitamin, nonmineral supplement (check all that apply).

<input type="checkbox"/> Improve energy	<input type="checkbox"/> Promote weight loss
<input type="checkbox"/> Burn fat	<input type="checkbox"/> Supplements inadequate diet
<input type="checkbox"/> Build muscle	<input type="checkbox"/> Relieve stress/improve mood
<input type="checkbox"/> Prevent/Treat colds	<input type="checkbox"/> Improve memory
<input type="checkbox"/> Enhance athletic performance	
<input type="checkbox"/> Enhance sleep	<input type="checkbox"/> Improve circulation
<input type="checkbox"/> Gain weight	<input type="checkbox"/> Promote skin/hair health
<input type="checkbox"/> Prevent cancer	

- 7) Please check your source of information about nonvitamin, nonmineral supplements.

<input type="checkbox"/> Friends and family	<input type="checkbox"/> Health food stores
<input type="checkbox"/> Dietetic professionals	<input type="checkbox"/> Magazines and newspapers
<input type="checkbox"/> Health professionals	<input type="checkbox"/> Internet
<input type="checkbox"/> Television	
<input type="checkbox"/> Other, Please specify: _____	

- 8) Please rate your present health status (check only one).

Excellent Good Fair Poor

- 9) Please check how many times per week you engage in physical activity lasting 10 minutes or more.

None 1-2 times 3-4 times 5 or more times

- 10) Are you likely to use nonvitamin, nonmineral supplements in the future?

Yes No

Why? _____

Thank you for your participation.