A Report of Vitamin and Mineral Supplement Use Among University Athletes in a Division I Institution

Chad J. Krumbach, Dave R. Ellis, and Judy A. Driskell

The influences of gender, ethnicity, and sport of varsity athletes on their vitamin/mineral supplementation habits were examined. Subjects included 145 females and 266 males from 22 varsity teams; 80% were Caucasian; 12% African American; and 8% Combined-Other. Over half of the subjects took supplements. Males were more likely than females to give “too expensive” as a reason for not taking supplements, and “improve athletic performance” and “build muscle” as reasons for taking supplements. The most common supplement was multivitamins plus minerals. Females were more likely to take calcium and iron, and males vitamins B₁₂ and A. African Americans were the most likely to take vitamin A. Males were more likely to get supplement information from nutritionists/dietitians and self, and females from family members or friends and physicians or pharmacists. Football players were more likely to get supplement information from nutritionists/dietitians, and males in other sports from coaches/trainers. There were some differences in vitamin/mineral supplement habits of the athletes by gender, ethnicity, and sport.

Key Words: nutrient supplementation, gender, sport, ethnicity, football players

The use of vitamin and mineral products to supplement the diet is a common health practice for millions of Americans. The most recent national survey, the National Health and Nutrition Examination Survey III (NHANES III) of 1988–91, indicates that 37.2% of women and 23.9% of men 20 to 29 years of age reported taking vitamin and/or mineral supplements (5). Sales of dietary supplements in 1996 were more than $6.5 billion (6), and the majority of these were of the vitamin/mineral variety.

People who use supplements give a variety of reasons for taking them (2). These reasons or beliefs may be scientifically correct or incorrect. Some believe that vitamin and mineral supplements may decrease their chances of contracting disease or, if they do contract disease, it may be less severe. Diseases or problems that are thought to be prevented or blunted due to addition of a vitamin and/or mineral supplement to the diet include serious illnesses, stresses, colds, skin problems, heart attacks, and cancer (11). Other supplement users feel that taking the supplements

The authors are with the Department of Nutritional Science and Dietetics at the University of Nebraska–Lincoln, Lincoln, NE 68583.
gives them greater control over their health (10). Still another group believes that taking vitamin or mineral supplements may increase their energy levels (22).

The reasons for taking vitamin and/or mineral supplements are just as varied for the athletic population as they are for the general public. Performance enhancement, prevention of illness, compensation for inadequate diet, providing extra energy, and meeting special nutrient demands for high levels of physical activity are major reasons offered to justify supplement consumption among athletes (16). Some athletes choose not to take supplements, though no studies have been done as to why.

Sobal and Marquart (16) summarized the studies that have been published on supplement usage by athletes; these varied in size (number of subjects), sport, and whether gender and ethnicity were taken into account. Learning more about the prevalence and reasons for using vitamin and/or mineral supplements may help athletic personnel in counseling athletes of all types.

The objectives of the present study were to (a) determine the prevalence of vitamin or mineral supplement usage by University of Nebraska–Lincoln athletes; (b) determine the reasons for use or non-use of vitamin or mineral supplements among these athletes and their sources of information on supplementation; (c) determine the kinds of vitamin or mineral supplements used; and (d) evaluate whether the above were influenced by gender, ethnicity, or sport.

Methods

Questionnaire Development and Pilot-Testing

Following approval of the study by the university’s institutional review board for the protection of human subjects, a written survey questionnaire was developed based on questionnaires used in national surveys (8, 9). It included questions on demographics, health, regularity of usual use of vitamin and/or mineral supplements, reasons for taking or not taking supplements, sources of information for taking or not taking supplements, and types of supplements taken. The questionnaire was critiqued by 12 professionals (strength coaches, trainers, nutritionists, and registered dietitians); some modifications were made as to language and content. The modified 2-page questionnaire was then pilot-tested using a representative sample of 16 varsity athletes varying in gender, ethnicity, and sport to determine whether the questions and responses were understood; no changes were needed.

Subjects and Statistical Analyses

Athletes 19 years of age and older participating in all 11 female and 11 male varsity teams were recruited as subjects. The athletes voluntarily completed the written questionnaires before or after eating at the training table and at team meetings. Data were collected between March 15 and April 7, 1997.

Descriptive data were calculated as frequencies. Data were evaluated by gender and ethnicity using chi-square ($\chi^2$) analyses. In that the number of subjects in many of the sports was low, $\chi^2$ analyses by sport were conducted only on data from football players and those in all other male sports combined. Differences were considered significant at $p < 0.05$. 
Table 1  Prevalence of Vitamin/Mineral Supplement Usage by Varsity Sport

<table>
<thead>
<tr>
<th>Female sport</th>
<th>% Taking supplements</th>
<th>Male sport</th>
<th>% Taking supplements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-country</td>
<td>85.7 (0/0)*</td>
<td>Tennis</td>
<td>83.3 (0/0)</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>81.8 (0/0)</td>
<td>Gymnastics</td>
<td>81.2 (0/4)</td>
</tr>
<tr>
<td>Tennis</td>
<td>80.0 (0/2)</td>
<td>Track &amp; field</td>
<td>71.4 (3/1)</td>
</tr>
<tr>
<td>Swimming/Diving</td>
<td>78.3 (0/2)</td>
<td>Baseball</td>
<td>64.3 (4/4)</td>
</tr>
<tr>
<td>Golf</td>
<td>63.6 (1/1)</td>
<td>Swimming/Diving</td>
<td>66.7 (0/2)</td>
</tr>
<tr>
<td>Soccer</td>
<td>58.8 (1/1)</td>
<td>Cross-country</td>
<td>58.3 (1/1)</td>
</tr>
<tr>
<td>Volleyball</td>
<td>55.5 (0/1)</td>
<td>Football</td>
<td>51.6 (23/6)</td>
</tr>
<tr>
<td>Yell squad/Dance</td>
<td></td>
<td>Yell squad/Dance</td>
<td></td>
</tr>
<tr>
<td>team</td>
<td>50.0 (2/2)</td>
<td>team</td>
<td>45.4 (1/0)</td>
</tr>
<tr>
<td>Track &amp; field</td>
<td>48.0 (3/2)</td>
<td>Wrestling</td>
<td>28.6 (1/0)</td>
</tr>
<tr>
<td>Softball</td>
<td>42.9 (0/1)</td>
<td>Golf</td>
<td>27.3 (1/1)</td>
</tr>
<tr>
<td>Basketball</td>
<td>30.8 (1/1)</td>
<td>Basketball</td>
<td>20.0 (6/0)</td>
</tr>
</tbody>
</table>

*Total number of respondents who were in the African American/Combined-Other groups; otherwise, respondents were in the Caucasian group.

Results

A total of 411 varsity athletes, over 90% of all enrolled athletes from our university, participated in the study. There were 145 females and 266 males. The majority (80.5%) were Caucasian; 11.7% were African American; 2.6% Hispanic; 1.4% Asian; and 3.6%, mixed ethnic background. The last three ethnic groups were combined and referred to as Combined-Other. The number of subjects in each varsity sport by ethnic group is given in Table 1. At least 20% of the respondents were African American or Combined-Other in the following sports: female—tennis, yell squad/dance team, and track & field; male—gymnastics, baseball, football, and basketball. All subjects indicated that their overall health was excellent or good.

Prevalence of Taking Supplements

Over half (56.7%) of the subjects reported taking vitamin/mineral supplements with usual regularity of usage indicated as regular (≥5 times week) by 18%, occasional (2–4 times week) by 21.2%, seldom (once a week) by 21.2%, and never by 43.3%. The prevalence of taking supplements was higher, though nonsignificantly, for women (59.3%) than men (55.3%). Similar percentages of athletes in the three ethnic groups reported consuming supplements. The percentages of subjects reporting taking supplements ranged from 30.8 to 80.0% for women’s varsity sports, and 20.0 to 83.3% for men’s (Table 1). No differences were observed in the prevalence of supplementation by football players (51.6%) and those in other male sports (58.6%).
Table 2  Reasons for Not Taking Supplements by Gender (by Rank Order)*

<table>
<thead>
<tr>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal or religious beliefs (35%)b</td>
<td>Diet adequate (37%)</td>
</tr>
<tr>
<td>Diet adequate (26%)</td>
<td>Personal or religious beliefs (31%)</td>
</tr>
<tr>
<td>Too expensive (14%)</td>
<td>Too expensive (30%)</td>
</tr>
</tbody>
</table>

*Subjects could select as many reasons as applied. Other reasons, selected by <10% of nonsupplemented subjects, included recommended by family member or friend, recommended by nutritionist or dietician, recommended by coach or trainer, recommended by physician or pharmacist, tend to increase appetite, media, and other. *Percentage of nonsupplement takers selecting this reason.

Reasons for Not Taking Supplements

The top three reasons given by gender for not taking supplements are listed in Table 2. Subjects could check all reasons that applied. A significantly larger \( p < 0.05 \) percentage of males gave the reason “too expensive” than females; otherwise, the reasons given by both sexes were similar. The reasons given for not taking supplements were not significantly different by ethnicity or by football players versus those in other male sports. Although nonsignificant, 33.6% of Caucasians and 33.3% of Combined-Others gave the reason “personal or religious beliefs,” as compared to 22.7% of the African American group.

Reasons for Taking Supplements

Reasons given by gender for taking supplements (rank-order format) are listed in Table 3. Subjects could check as many as applied. The two most common reasons for taking supplements were “recommended by family member or friend” and “improve athletic performance.” Females were significantly more \( p < 0.05 \) likely to give the reasons “recommended by family member or friend” and “recommended by physician or pharmacist.” Males were significantly more \( p < 0.05 \) likely to give the reasons “improve athletic performance” and “build muscle,” with the reason “feel better/increased energy levels” approaching significance \( p = 0.063 \).

The reasons given by ethnicity for taking supplements were not significantly different. Although statistically nonsignificant, 36.9% of Caucasians and 25.0% of the Combined-Other group used “improve athletic performance” as a reason to take supplements, while only 17.4% of the African Americans used the same reason. Also, Caucasians used the reason “build muscle” 26.7% of the time and the Combined-Other group listed that reason 30.0% of the time, while African Americans used it only 8.7% of the time.

The reasons given by subjects on the football team versus those of other male sports were not significantly different, with one exception: males in other sports were significantly more \( p < 0.05 \) likely to give “recommended by coach or trainer” as a reason for taking supplements than football players.
Table 3 Reasons for Taking Supplements by Gender (by Rank Order)*

<table>
<thead>
<tr>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended by family member or friend (48%)</td>
<td>Improve athletic performance (43%)</td>
</tr>
<tr>
<td>Prevent disease (31%)</td>
<td>Build muscle (36%)</td>
</tr>
<tr>
<td>Recommended by coach or trainer (29%)</td>
<td>Recommended by family member or friend (31%)</td>
</tr>
<tr>
<td>Recommended by nutritionist or dietitian (26%)</td>
<td>Feel better/increased energy levels (29%)</td>
</tr>
<tr>
<td>Recommended by physician or pharmacist (25%)</td>
<td>Recommended by coach or trainer (25%)</td>
</tr>
<tr>
<td>Inadequate diet (24%)</td>
<td>Prevent disease (24%)</td>
</tr>
<tr>
<td>Improve athletic performance (19%)</td>
<td>Recommended by nutritionist or dietitian (22%)</td>
</tr>
<tr>
<td>Feel better/increased energy levels (18%)</td>
<td>Inadequate diet (18%)</td>
</tr>
<tr>
<td>Present illness (17%)</td>
<td>Present illness (14%)</td>
</tr>
<tr>
<td>Build muscle (7%)</td>
<td>Recommended by physician or pharmacist (5%)</td>
</tr>
</tbody>
</table>

*Subjects could select as many reasons as applied. Other reasons, selected by <10% of population, included self-determined health risk, media, and other. *Percentage of supplement takers selecting this reason.

Individuals Providing Information About Supplements

Subjects most often listed “self” (40.6%) as the individual giving them information about supplements, followed by nutritionist/dietitian (32.1%), family member or friend (31.1%), coach or trainer (23.6%), and physician or pharmacist (12.2%). Subjects could select as many sources as applied. Females were significantly more (p < 0.05) likely to list family members or friends (38.6 vs. 27.1%) and physician or pharmacist (21.4 vs. 7.1%) as information sources. Males were significantly more (p < 0.05) likely to list nutritionist/dietitian (36.5 vs. 24.1%) and self (45.1 vs. 32.4%). No differences were observed between the ethnic groups as to sources of information on supplements. Football players were significantly more (p < 0.05) likely than males in other sports to give nutritionist/dietitian (42.9 vs. 30.7%) and significantly less (p < 0.05) likely to give coach or trainer (15.9 vs. 27.9%) as sources of information on supplements.

Types of Supplements Taken

The subjects reported taking multivitamins and minerals more frequently than other vitamin/mineral supplements, followed by vitamin C, multivitamins (no minerals), B-complex vitamins, and calcium, respectively.

The types of supplements taken by gender are given in Figure 1. Females were significantly more (p < 0.05) likely to take calcium and iron than males, while the
Figure 1 — Types of supplements taken by subjects reporting taking supplements by gender\abc. aSubjects could check all that applied. bSupplements listed are those reported by all categories of supplement users. cAll other supplements used were checked <5 times. d\chi^2 analysis indicated that a significantly larger (p < 0.05) percentage of females reported using this supplement. e\chi^2 analysis indicated that a significantly larger percentage of males used this supplement.

Reverse was true for vitamin B\textsubscript{12} and vitamin A. Females reported taking multivitamins with minerals most frequently, followed by vitamin C, multivitamins (no minerals), calcium, and iron; the percentages of females consuming iron and calcium were significantly higher than that of males.

Supplements taken by the different ethnic groups were similar except that vitamin A was used significantly more (p < 0.001) frequently by African Americans as compared to the other two groups, but only 10 subjects reported taking this vitamin.

The prevalence of taking the various types of supplements between football players and those in other male sports were statistically similar with two exceptions. Subjects in other male sports were significantly more (p < 0.05) likely to take multivitamins + minerals than football players (80.0 vs. 60.9%). Football players were significantly more (p < 0.05) likely than those in other male sports to take multivitamins without added minerals (28.1 vs. 10.6%).
Discussion

The percentage of subjects who reported taking vitamin/mineral supplements was higher than the 47% reported in the 1994 review by Sobal and Marquart (16) for high school and college/university athletes, and higher than the 24 and 37% reported in 1988-91 NHANES III (5) for 20 to 29 year old men and women, respectively, representative of the U.S. population. Our data were collected in 1997. Over time, increasingly larger percentages of the population, particularly athletes, reportedly are taking vitamin/mineral supplements (1).

In the present study, female athletes were more likely, though nonsignificantly so, to take supplements than their male counterparts. Similar findings were reported by Sobal and Marquart (16) for athletes; however, Stewart et al. (17) and Subar and Block (18), both surveying the general population, found the gender difference to be significant. This may relate to females reportedly paying more attention to nutrition than males (13). The prevalence of supplementation by the athletes in the three ethnic groups in the current study was similar. Only 48 African-Americans (12% of subjects) were on varsity athletic teams at our university, and their supplementation behavior may have been influenced by their being members of teams or by ethnicity or both. Caucasian adults in the general population in the NHANES III survey (5) more frequently reported consuming supplements than African Americans. Published information could not be found on ethnicity of athletes and their use of supplements.

These prevalences of supplementation by sport in the current study were usually slightly higher than those cited by Sobal and Marquart (16), but over time supplementation has become more popular (1). In agreement with findings reviewed by Sobal and Marquart (16), basketball players, both females and males, in the current study reported taking vitamin/mineral supplements less frequently than athletes in other sports. Telford et al. (19) reported that athletic performance in terms of jumping ability improved in basketball players (5 men and 7 women) that received vitamin/mineral supplements, but not in swimmers, gymnasts, or rowers; however, the number of subjects rather limits conclusions.

To date, only one study with elderly subjects (12) has been published, which examined why individuals do not take supplements. The reasons most frequently given were “there’s no need for them,” “don’t believe in them,” and “the cost was too high.” These were similar to the reasons given by athletes in the present study for not using supplements. Men and women in the current study gave similar reasons for not taking supplements, though the rank ordering of these reasons was different.

In studies on the general population “recommended by family member or friend” has been cited among other reasons for taking supplements (7, 14), but “improving athletic performance” has not. The most common reasons a group of male and female university athletes in a 1988 study by Schulz et al. (15) gave for taking supplements were “nutritional insurance” and “avoiding illness,” though 45% of the group gave the reason “increasing energy, vitality, or strength,” with a larger percentage of males giving these reasons. These responses are somewhat similar to the reasons “improve athletic performance” and “feel better/increased energy levels” given by 34.1 and 24.6% of subjects in the present study. Performance enhancement has been cited as a reason athletes have given for taking supplements, though the findings were not given by gender (16). The women and men
included in the present study had different priorities when deciding to take vitamin/mineral supplements. Limited information is available as to why women and men differ with regard to reasons given for taking supplements.

Subjects in the current study reported using self as a source for information about vitamin/mineral supplements. This finding is consistent with Levy and Schucker (7) in that yourself/instinct was cited by about 35% of their subjects as an influencer; 40.6% of the subjects in the current study cited self as an information source.

The athletic department at our university provides performance nutritionists, coaches, trainers, and physicians to the athletes at no charge. These individuals work with the athletes on a daily basis. All varsity team members eat at the training table, which is in the facility where the performance nutritionists are located, and athletes work out in this facility or at a nearby building on campus. Wolf et al. (20) reported that 35% of coaches and trainers surveyed indicated that they recommend using a vitamin/mineral supplement. The athletic personnel who work with athletes appear to have a major influence on the athletes’ decision making process. Perhaps members of smaller varsity teams felt more comfortable getting advice on supplements and other issues from their coaches and trainers, while members of larger varsity teams (i.e., football) got advice from nutrition specialists.

The types of supplements taken by subjects in the present study were generally similar to those reported in previous studies. Subar and Block (18) reported that multivitamins were the most commonly taken supplements by the general population, followed by vitamin C and calcium. Stewart et al. (17) reported that vitamin C was the most commonly used supplement by the general population, followed by multivitamins. In the Sobal and Marquat review (16) of studies done on athletes, multivitamins were the most popular, followed by vitamin C, iron, B-complex, and vitamin E. Most published studies do not distinguish between multivitamins with minerals and multivitamins without minerals. Block et al. (3) also reported that in the general population a larger percentage of women consumed iron and calcium than men. Clark et al. (4) observed that iron supplements are frequently taken by women athletes. Males in the present study were significantly more likely than females to use vitamin \( B_{12} \) and vitamin A supplements. However, this finding could be questioned in that the total number of subjects using vitamin \( B_{12} \) was 12 and 10 for vitamin A.

Over half of the subjects in the present study took supplements. In most cases the vitamin/mineral supplementation habits of the varsity athletes in the present study were similar by gender, ethnicity, and sport. More differences in responses of the athletes were observed by gender, followed by sport, then ethnicity. This study provides information not previously available as to why a substantial percentage of athletes choose not to take supplements. The study also indicates there are differences by gender as to why athletes take or do not take supplements. Males were more likely than females to give “too expensive” as a reason for not taking supplements, and “improve athletic performance” and “build muscle” as reasons for taking supplements. The study also provides information not previously available on the supplementation habits of athletes by ethnic group, and essentially no ethnic differences were observed, though the number of nonCaucasian subjects was limited.

Ethnicity may not need to be taken into account when counseling athletes about their supplementation habits. Athletic personnel need to take the reasons why athletes take and do not take vitamin/mineral supplements into account when
counseling them on their nutritional needs. Some vitamin and mineral imbalances, based on biochemical analyses, have been reported among athletes (1). Athletes can and frequently do get substantial percentages of their intakes of essential micronutrients from vitamin/mineral supplements. Determining the nutritional status of athletes with regard to all micronutrients is not financially feasible, and information on vitamin/mineral supplementation is useful in counseling athletes regarding their nutritional needs. Athletes may also have higher intakes of some of the micronutrients than is needed. Most published literature indicates that the performance of athletes having adequate status of a vitamin or mineral is generally not improved upon supplementation with that vitamin or mineral (1, 21).

References


*Manuscript received: December 1, 1998*

*Accepted for publication: April 21, 1999*