NUTRITIONAL AND DIETARY USE AND DIETARY PRACTICES AMONG PROFESSIONAL, COLLEGIATE, AND HIGH SCHOOL ATHLETES

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS		iii
LIST OF TABLES		vii
ABSTRACT		viii
Chapter		
I	INTRODUCTION	1
	Purpose of the Study	2
	Null Hypotheses	3
	Delimitations	4
	Significance of the Study	4
	Definition of Terms	5
II	REVIEW OF THE RELATED LITERATURE	7
	Importance of Proper Nutrition	8
	Daily Energy Requirements	9

Type of Supplements..... 11

Why Supplements May Be Beneficial?..... 19

Reason for Supplement Use..... 21

Who Uses Supplements?..... 21

Critique of Literature..... 22

Summary..... 24

III METHODS AND INSTRUMENTS/PROCEDURES..... 26

Subjects..... 26

Instruments/Procedures..... 26

Statistical Analysis..... 27

IV RESULTS..... 29

Hypothesis 1..... 30

Hypothesis 2..... 31

Hypothesis 3..... 34

Hypothesis 4..... 35

Hypothesis 5..... 37

V DISCUSSION, SUMMARY,& CONCLUSION..... 38

Discussion..... 39

Hypothesis 1..... 39

Hypothesis 2..... 40

Hypothesis 3..... 41

Hypothesis 4 and 5..... 43

Summary..... 45

Conclusion..... 46

REFERENCE LIST..... 50

APPENDIX A- Nutritional and Dietary Supplement Use questionnaire..... 57

LIST OF TABLES

Table: Page

1. Percentage of Supplement Use Between the Different Competitive Athletic Levels. 30

2. Reason for Supplement Use Among Athletes. 31

3. Frequency of Types of Supplements Taken by the Athletes. 32

4. Frequency of Meals Eaten in a Week by Athletes 35

5. Frequency of What Was Limited in the Diet of Athletes 36

ABSTRACT

NUTRITIONAL AND DIETARY SUPPLEMENT USE AND DIETARY PRACTICES AMONG PROFESSIONAL, COLLEGIATE, AND HIGH SCHOOL ATHLETES

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The purpose of this study was to quantify the percentage of nutritional and dietary supplement use among the different competitive athletic levels, types of supplements used, and perceived reasons for nutritional and dietary supplement use among professional, collegiate, and high school athletes during off-season and in-season training. This study also evaluated possible associations between daily dietary practices and supplement use. The subjects were asked to complete a questionnaire survey consisting of different types of supplements, reason for supplement use, and dietary practices. Subjects were 91 male athletes from different competitive levels.

There were 30 professional athletes (ages 22-32), 30 collegiate athletes (ages 18-22), and 31 high school athletes (ages 15-18). There were a total of 43 athletes that responded and said that they used supplements and 48 athletes that reported no use. A chi square test was used to determine the results of each null hypothesis. Results indicated that there was no difference in the percentage of supplement use among the different competitive athletic levels. There was a significant difference in the reason for supplement use. Professional and high school athletes wanted to increase muscle mass during the off-season and professional and college athletes wanted to feel stronger and lose body fat during the off-season. There was a significant difference in the types of supplements used among the different competitive athletic levels. Professional athletes used more types of supplements than college and high school athletes. There was also a significant difference in dietary practices among supplement users and non-users. Supplement users ate more meals than non-users during the week and limited protein and carbohydrates in their diet. These data may help coaches, athletic trainers, physical education teachers, health educators, and parents identify what type of athletes take supplements and if the type of supplement taken relates to the perceived reasons and dietary practices among their athletes.

CHAPTER I

INTRODUCTION

In today's society, the primary objective of an athletic competition is to be the best or to win the contest (1). An individual athletic performance is dependent primarily upon two factors: genetic characteristics and training habits, but the nutritional status of the athlete can also exert a significant impact upon athletic performance (10). An inadequate intake of certain nutrients can impair athletic performance. Therefore, athletes often look toward some type of nutritional ergogenic aid to supplement the inadequate intake of nutrients and to optimize physical performance (42).

Ergogenic aids can be defined as work-enhancing agents that are used in attempts to increase athletic or physical performance (41). Athletes have used ergogenic aids since ancient times (25). The use of nutritional ergogenic aids for improving athletic performance has been given prominent and controversial media attention in recent years. For example, a recent popular story that received widespread media attention was Mark McGwire's trouncing of the home run record while using Androstenedione,

which is considered a dietary supplement. The prevalence of nutritional and dietary supplement use as ergogenic aids, among professional athletes is unknown, as are possible correlates of such use, including the behaviors and dietary practices of athletes that take supplements. A study by Kohl and associates (23), quantified the prevalence of nutritional supplement use among Major League Baseball players and evaluated possible associations with dietary practices. Their data provided a baseline for frequency estimates of nutritional supplement use among professional athletes and suggested that dietary practices may not be limited to nutritional supplement use only. Sobel and Marquart (44) reviewed 51 studies reported in literature that provided quantitative data on supplement use. Supplements were used by 46% of the athletes in these studies and professional athletes had a greater prevalence of supplement use than college or high school.

Purpose of the study

The purpose of this study was to quantify the percentage of nutritional and dietary supplement use among the competitive levels, types of supplements used, and perceived reasons for nutritional supplement use among professional, collegiate, and high school athletes during in-season or off-season training. This study also evaluated possible associations between

daily dietary practices and supplement use. Examples of daily dietary practices include 1) number of meals consumed in a day, 2) if the athletes limit their fat consumption, 3) if the athlete limits carbohydrate, cholesterol, salt, or protein intake.

Null Hypotheses

It was hypothesized that:

1. There will be no significant difference in the percentage of nutritional and dietary supplement use among the levels of competitive athletes.
2. There will be no significant difference between the levels of competitive athletes and the specific reasons for nutritional and dietary supplement use during in-season or off-season training.
3. There will be no significant difference between the types of supplements taken by the different levels of competitive athletes during in-season or off-season training.
4. There will be no significant difference between nutritional and dietary supplement users and non-users and the number of meals consumed in a week.

5. There will be no significant difference between nutritional and dietary supplement users and non-users for limitations of fat, cholesterol, salt, carbohydrates, and protein.

Delimitations

This study was delimited to:

1. The honesty of the answers provided by the athletes for the survey.
2. The number of surveys (sample size) that were actually answered and returned.
3. The subjects recruited were from a selectively pooled group of athletes.

Significance of study

There are only a limited number of studies that have investigated the prevalence of, or the reasons for nutritional and dietary supplement use among different levels of athletic participation (1,7,25). There is a need for further research in order to describe the nutritional and dietary supplement use among high school, collegiate, and professional competitors. Athletes

need to be educated on the importance of maintaining a well balanced diet during an athletic participation as well as rationale, effectiveness, and potential adverse effects of nutritional and dietary supplements (41,42). Knowledge, sound advice, safety, and testing of nutritional and dietary supplements can help coaches, athletic trainers, physical education teachers, health educators, parents, and athletes know that supplements can help an individual, but supplements can also pose a health threat (25,41). Once the facts about nutritional and dietary supplements are established and known, athletes can be educated about the common misconceptions about nutritional and dietary supplements.

This study can be applied by coaches, athletic trainers, physical education teachers, health educators, and parents to help identify the percentage of nutritional and dietary supplement use, types of supplements used, and reason for use among professional, collegiate, and high school athletes. It can also provide insight for athletes in regard to their health and performance during and after training.

Definition of Terms

Ergogenic aids: Substances, strategies or treatments that are designed to improve physical performance above and beyond the effects of normal

training (1). They are used to enhance the athlete's physical power, mental strength, or mechanical edge (1,10,41).

Nutritional supplements: Nutrients and food products supplemented in the diet designed to promote some type of ergogenic property. These nutrients encompass a broad range of substances that include the six standard dietary constituents of the body: carbohydrate, fat, protein, vitamin, mineral, and water and dietary supplement (41).

Dietary supplements: Nutritional supplements that are atypical dietary constituents such as sodium bicarbonate and creatine, a combination of the standard and atypical dietary constituents, and nonessential substances such as ginseng and other herbal products (7,41).

CHAPTER II

REVIEW OF RELATED LITERATURE

Exercise and proper nutrition are often recommended for promoting a healthy lifestyle (26,44). An optimal diet is one in which the supply of required nutrients is adequate for tissue maintenance, repair, and growth. For athletes, the food they eat also provides the energy and nutrients they need for training and competition (42).

This study investigates the percentage of nutritional and dietary supplement use, types of supplements used, reasons for supplement use, and dietary practices among professional, collegiate, and high school athletes. This review will consider the importance of proper nutrition, and daily energy requirements. Primary considerations will be given to the types of nutritional supplements, those who are likely to use these supplements, and why supplements may be beneficial. Attention is also given to the reasons for nutritional supplement use.

Importance of proper nutrition

Adequate dietary intake of the essential nutrients, carbohydrates, essential fatty acids, protein, vitamins, minerals, and water are necessary to insure optimal physical performance (33). Deficiency of any essential nutrient associated with energy production may impair physiological or psychological functions during training and exercise (42). The nutritional requirements of training are of primary importance. Training sessions for some sports can extend for two hours or more a day. The time commitment for each training session may have implications on social lifestyle factors, including dietary practices. This could influence the success of the athlete in meeting the required nutrients the body needs (8).

Athletes train to reach their highest performance potential (44). Everyday nutrition guidelines of the athlete should encompass issues of general health as well as specific needs of training (8). The following are proposed guidelines for the nutritional requirements of athletes by Burk and Read (8):

1. To provide basic nutrient requirements, including meeting the needs that arise from a strenuous exercise program.
2. To incorporate nutritional practices that promotes long-term health, and avoids the chronic disease patterns of affluent Western countries.

3. To achieve and maintain an appropriate body mass and level of body fat.
4. To promote optimal return from training by providing a nutritional environment that allows for recovery between training sessions and for physiological adaptation.
5. To include experimentation with intended competition nutritional practices so that familiarization and acclimatization occurs.

Daily energy requirements

Dietary recommendations for athletes must consider the specific energy requirements for a particular sport (26). The nutritional energy requirement of an athlete depends on many factors, including age, gender, body composition, type of sport, and intensity and duration of exercise during competition (41,42). Ideally, in order to prevent weight gain or weight loss, energy intake should be balanced with energy expenditure (26,44). Energy intake is the energy associated with the food consumed in the diet and is influenced by hunger, appetite, and satiety. Energy expenditure is the energy converted to mechanical energy for muscle contraction and movement, and also the energy released by the body as heat and consists of three major components: basal metabolic rate, the thermic effect of food, and

energy expended in physical activity (44). When energy input falls short of energy output, then the outcome would be weight loss in the individual. When energy output falls short of energy input, then the outcome would be weight gain in the individual (26). Once an athlete reaches these nutritional energy requirements, they will be able to reach the level of physical activity that is desirable for their training (8).

Dietary energy intake fluctuates daily to reflect an individual's overall energy expenditure according to the intensity and duration of physical activity. Fueling the body becomes an important issue and critical component of a training regimen for the athlete. The way an athlete trains determines the amount of energy and nutrient requirements for that athlete (43).

Athletes sometimes restrict their dietary intake so they can lose weight or try to maintain a low body weight and lower percent fat. This can lead to an energy deficit and possibly eating disorders. (26). Without a proper understanding of sport nutrition, the athlete may choose supplementation over a prudent diet to balance their energy requirement (15).

Types of supplements

There are a variety of supplements marketed to the general public to improve health and enhance physical performance. Some of these supplements are labeled as nutritional and dietary, while some are labeled as pharmacological (41). This review is limited to nutritional and dietary supplements that are the most popular and have been proven the most effective. Most nutritional and dietary supplements fall into one of four categories; 1) a potential energy source, 2) an anabolic enhancer, 3) a cellular factor of metabolism, or 4) a recovery aid (10). Nutritional supplements encompass a broad range of substances that include standard dietary constituents such as carbohydrates and protein. Dietary supplements include a combination of these dietary constituents, herbs, and atypical dietary constituents (1).

Carbohydrates

Carbohydrate is the primary dietary energy source for high-intensity aerobic endurance exercise (42,43). The major function of carbohydrates in human metabolism is to supply energy; blood glucose is essential for optimal functioning of the nervous system, whereas muscle glycogen is essential for endurance exercise (41). The nutritional supplementation of carbohydrates may effectively elevate endogenous glycogen stores,

postponing fatigue and improving performance in long-distance competition such as a marathon (21). Carbohydrate supplementation has been found to boost muscle glycogen stores (1), delay fatigue (7), and enhance recovery (38).

Lipids

Lipids represent the primary energy source for mild-to-moderate intensity aerobic endurance exercise (42). Dietary lipids may be utilized as an energy source, stored in adipose tissue, or used as part of body-cell structure (41). Lipid dietary strategies or supplements attempt to increase free-fatty-acid oxidation and reduce reliance of endogenous carbohydrate stores, sparing muscle glycogen use, and delaying fatigue during prolonged exercise (34).

Proteins and amino acids

Proteins are broken up by the body to produce amino acids that are used to build new proteins. Proteins are the building blocks of muscle, enzymes, and some hormones (31). Protein supplements have been recommended to athletes to enhance nitrogen retention and increase lean body (muscle) mass, which in turn will optimize their body composition (1). Amino acid supplements have also been marketed to increase muscle mass, enhance aerobic endurance capacity (42), and increase strength (1). While studies by Fern (17) and Walberg (40) reported that an increase in the anabolic effects

of intense training was due to amino acid supplementation, it is still debatable as to whether amino acids are more effective than dietary protein. Scientific research has shown single amino acids may increase the level of hormones produced in the body and may effect some aspect of muscle physiology during exercise (44).

Vitamins

Vitamins are complex organic compounds that help regulate metabolic processes while others are antioxidants that protect cell membranes (41). Vitamin supplementation with several antioxidant vitamins (beta-carotene; vitamin C; vitamin E) has been theorized to prevent muscle damage during high intensity exercise and enhance sport performance (12). Vitamin supplementation is recommended for participants of various sports, especially those involving eye alertness and body stress, which improves performance. But, numerous studies have concluded that vitamin supplementation has little or no effect on physical performance (3). Vitamin supplementation may also be used to treat any existing nutritional deficiency (7).

Minerals

Minerals perform two major functions, the formation of several body tissues and the regulation of numerous physiological processes (41).

Mineral supplementation is used when there is a mineral deficiency among athletes. The most common mineral deficiency is iron deficiency, which occurs in body-weight-controlled sports, such as wrestling and rowing (33). Iron supplementation is used to return an athlete's performance to normal if an iron deficiency is present (42). Iron supplementation in iron-deficiency anemia has reportedly improved performance in athletes of weight controlled sports, such as wrestling, running, rowing, and gymnastics (44).

Chromium supplementation is theorized to increase lean muscle mass or decrease body fat similar to protein supplements (42). A study by Hallmark and associates (20) indicated that chromium supplementation does not promote a significant increase in strength and lean body mass.

Phosphorus supplementation is theorized to enhance physical performance (42). Under certain conditions, phosphate supplementation has reportedly enhanced aerobic endurance performance (44).

Dietary supplements

Creatine is a nitrogen-containing substance, found naturally in small amounts in animal food. Creatine is one of the most widely used dietary supplement (1). In studies by Balsom (4) and Greenhalf (18), they reported a positive ergogenic effect of creatine supplementation, particularly in repetitive, short-duration, high-intensity, short-recovery isokinetic and

isometric resistance tests or cycle ergometry protocols. Acute oral creatine supplementation also appears to increase body mass (16). With the popularity of this dietary supplement as an ergogenic aid, much more research is needed to determine the effective doses, maintenance doses, and possible detrimental long-term side effects (1).

Ginseng is an extract derived from the plant family Araliaceae, which contain numerous chemicals that may influence human physiology, the most important being the glycosides, or ginsenosides (13). Ginseng supplementation has been theorized to mitigate the stress of exercise and possess an ergogenic quality (42). A study by Dowling and associates (13), reported no significant ergogenic effects associated with ginseng supplementation on any of the metabolic, performance, or psychological parameters measured in both submaximal and maximal aerobic exercise task, including heart rate and VO_2.

L-carnitine is a vitamin-like compound found naturally in animal foods, particular meat (22). The major role of L-carnitine is to facilitate the entry of long-chain fatty acids into mitochondria for subsequent oxidation and energy production, and functions that theoretically could lead to a sparing of muscle glycogen during exercise (24). Recent reviews do not support the ergogenic effect of L-carnitine supplementation on fuel utilization during exercise,

anaerobic threshold, maximal oxygen uptake, or performance in either a marathon run or 20 kilometer run (22,39).

Coenzyme Q_{10} (Ubiquinone) is a lipid with characteristics common to a vitamin. Coenzyme Q_{10} supplementation has been used therapeutically for the treatment of cardiovascular disease because it may improve oxygen uptake in the mitochondria of the heart. This could lead to an improvement in aerobic endurance performance (31,40). However, a study by Snider and associates (35), reported no significant difference in performance between 11 elite triathletes taking coenzyme Q_{10} supplementation and 11 elite triathletes who did not.

HMB is an acronym for a compound called "beta-hydroxy beta-methylbuturate." It is a metabolite of an amino acid. HMB appears to up-regulate our ability to build muscle and burn fat in response to intense exercise (31). In several studies by Nissen and associates (29,30), they reported that athletes who supplement their diets with HMB had a significant increase in lean body mass and experienced an increase in strength during workout programs, such as lifting weights.

Phosphagen HP is a dietary supplement that includes creatine monohydrate and carbohydrates (31). In a recent study, athletes who used Phosphagen HP gained more lean mass, ran faster, jumped higher, and

gained more strength than athletes who used regular creatine (37). Another study revealed athletes who used Phosphagen HP boosted their anaerobic performance 30% more than the athletes who use regular creatine (36).

BetaGen dietary supplement is the first formula to combine HMB and Phosphagen HP (31). BetaGen was designed to increase lean mass and strength (14), suppress muscle protein breakdown following exercise (30), and enhance muscle energetics and recuperation (4). There have been studies that have shown HMB to suppress muscle breakdown, and Phosphagen HP to increase lean mass, strength, and enhance muscle recuperation (14,29).

Vanadyl sulfate, V2G, is commonly used by body builders to enhance muscle fullness. The main effect people are interested in is the ability of V2G to mimic the actions of insulin. Insulin is an anabolic hormone that speeds the movement of nutrients through the blood stream and into muscle growth (31). There have been a number of studies reporting that oral supplementation of vanadyl sulfate can help sensitize muscle and liver tissues in non-insulin dependent diabetics (19). One recent study offered evidence that supplemental vanadyl might even increase creatine uptake by muscle cells (32).

Conjugated Linoleic Acid, CLA, has been shown to be an anti-carcingen in several animal models, to reduce the adverse catabolic effects induced by immune stimulation, to enhance growth, and even to improve blood lipid profiles (6). Studies suggest that CLA supplementation burns fat and increases lean body mass in animals (11), but more research needs to be done on humans (31).

DHEA, dehydroepiandrosterone, is an androgenic hormone produced by the adrenal glands. DHEA is a substrate that serves a variety of purposes. A variety of positive influences from using DHEA have been reported, including increases in cellular energy production, fat metabolism, sexual maturation, to muscle growth. One study conducted, showed that subjects gained lean body mass and increased their muscle strength substantially (45). DHEA supplementation has only been available for a couple of years and little research about DHEA has been reported (31).

There are numerous nutritional and dietary supplements that athletes have reported using. However, limited data exist about the positive or negative effects of such usage. More research is needed to validate or refute claims contrived with the use of nutritional and dietary supplements.

Why supplements may be beneficial?

A supplement may be beneficial in three different ways. The first way a supplement may be beneficial is simply by making up for a deficiency (41). Vitamin and mineral supplements have been used for decades as a means of preventing serious or even fatal diseases, which are caused by nutrient deficiencies (5). Active individuals, like athletes who exercise intensely, have a greater demands for a number of nutrients, which makes it even that much more likely they will suffer deficiencies without supplementation. If an individual is deficient in one or more nutrients, it is quite possible their body may not be able to build muscle mass and burn fat properly (31). For example, it is well known that the trace mineral chromium is essential for insulin to exert its anabolic effects (27). It has also been shown that a great number of people may not consume the appropriate amount of chromium through their diets, thus leaving them in a deficient state. In this case, consuming supplements may help when training to increase muscle mass (28).

Another way supplements may be beneficial is by providing adequate levels of nutrients that a cell needs to perform at its best. A nutrient is required by an organism, like a muscle cell, and a specific concentration of

this nutrient results in "better-than-normal" cell function (31). An increase in a certain nutrient could cause an increase in energy for human metabolism, an increase in building and repairing body tissue, and an increase in regulating body metabolism (41). For example, taking carbohydrate liquid supplements could help athletes achieve an optimal level of energy during a performance. These carbohydrate supplements have been shown to increase the body's ability to replenish energy stores and improve performance (41).

A third way a supplement may be beneficial is when it produces a pharmacological or "drug like" effect on cellular process. The supplement can exert a positive effect on muscle metabolism and, or performance when it contains a compound which is normally not required by a cell but is capable of altering normal cell function (31). For example, the dietary supplement caffeine may alter muscle function and fat metabolism. Caffeine may cause free-fatty-acids to be readily oxidized (burned enabling energy production) in place of muscle glycogen. This would be of benefit to anyone attempting to lose weight or, more specifically fat mass because caffeine will enable an individual to run, swim, or bike for a longer period of time. This equates to more calories being burned as well as increased basal energy expenditure and numerous hormonal and physiologic benefits (26).

Reasons for supplement use

Generally, athletes advance three types of logic to support their supplement use: 1) to compensate for less than adequate diets or lifestyles; 2) to meet unusual nutrient demands induced by heavy exercise 3) or produce a direct, ergogenic effect on performance (7). The emphasis on winning and being the best has led some athletes to turn to nutritional ergogenic aids, or supplements to enhance their performance (1). Nutritional and dietary supplements are used to improve physical performance above and beyond the effects of normal training. Some supplements are used during training to enhance the training effect over time, while others are used just before or during the sport event to provide an immediate competitive edge (42).

Who uses supplements?

The majority of individuals, who use supplements, are professional, collegiate, and high school athletes (1,7,25). Athletes, from ancient times to the present day, have experimented with nutritional supplements in the belief that they will improve or optimize exercise performance (7). Back-of-the-pack runners and "weekend warriors" also quest for success at their own

levels and look for means of achieving success beyond their own abilities and efforts (1).

It appears that the average prevalence of supplement use by athletes is not much greater than that of the general public. Additionally, just as the national surveys report that population subgroups differ in their reported use of supplements, it is apparent that there are variations in supplementation practices between different sports (4). In a study by Burke and Read (9), weightlifters reported a higher prevalence of supplement use compared to variety of other sports, such as baseball players, male football players, swimmers, and hockey players. A large survey of Australian athletes reported the highest incidence of supplement use to be among swimmers, powerlifters, and cyclists, with more than 75% of each group using supplements. Participants in team sports, such as baseball, hockey, ice hockey, soccer and netball, reported the lowest numbers of supplement users, less than 32% (2).

Critique of the literature

Few experimental studies have been conducted solely on the percentage of nutritional and dietary supplement use, types of supplements used, and reasons for supplement use between different levels of competitive athletes.

(7). Research on nutrition in high school and college athletes indicates that (a) use of vitamin and mineral supplements is prevalent among high school and college athletes, (b) high school and college athletes are trying to achieve perceived benefits of anabolic steroids by using steroid alternatives, (c) and many high school athletes use protein supplements in an attempt to improve performance (25).

Athletes commonly use nutritional and dietary supplements of all kinds. Based on previous research, it appears that vitamin supplements are the most common supplements taken by athletes, but it also has been reported that a vast array of other nutrients have been taken by athletes in supplement form (7). Some studies have shown that supplement users ingest more of the essential nutrients the body needs, such as carbohydrates, fat, protein, vitamin and minerals, and water, than nonusers. This may indicate that supplement users exhibit healthier dietary practices (5,23).

More studies on nutritional and dietary supplementation are needed because researchers often fail to test for the following: the type of supplements used, the amounts taken, the rationale for their use, and the personal characteristics of the athletes who use supplements (7).

Summary

Nutritional supplements cannot be relied upon to unleash performance potential (42). Adequate dietary intake of carbohydrates, essential fatty acids, protein, vitamins, minerals, and water are necessary to insure optimal physical performance. Lack of these essential nutrients associated with energy production may impair physiological functions during exercise (26). In addition to minimal nutritional requirements, athletes commonly try to maximize their performance through training, and by using nutritional and dietary supplement (3). There will always be a search for the magic substance that will bestow a competitive edge for an athlete (7).

The advertisements seen on television, in magazines, or in stores sometimes exaggerate or misinterpret the research findings about nutritional and dietary supplements just to sell their products. Most athletes taking nutritional and dietary supplements only hear about the positive side effects of supplements, never the negative and harmful effects. There is not only a need to educate athletes on the knowledge and safety of nutritional and dietary supplements, but there is a need to educate the coaches, athletic trainers, physical education teachers, health educators, and parents who care or train these athletes. By determining the percentage of nutritional and dietary supplement use between elite, collegiate, or high school athletes, and

the reasons for such use, coaches, physical education teachers, athletic trainers, health educators and parents could identify which athletes are taking supplements, what type of supplements the athletes are taking, and if the athletes are taking them for the wrong reasons.

CHAPTER III

METHODS AND INSTRUMENTS/PROCEDURES

Subjects

A total of 91 male athletes respondent to the nutritional and dietary supplement use survey. There were a total of 31 high school baseball and football athletes from Seguin High School (ages 15-30), 30 college baseball and football athletes from Texas Lutheran University and Southwest Texas State University (ages 18-22), and 30 professional ice hockey athletes from the Austin Ice Bats and the Odessa Jackalopes (ages 22-32). The criterion for being included in the study was that each subject had to be on the team during in-season training and off-season training.

Instruments/Procedures

An anonymous nutritional supplement use questionnaire, which was designed by Kohl and associates (23), was modified and used for this study. The questionnaire listed nutritional and dietary supplements with the

indication of frequency of use, type of supplements used, reason for using supplements, and the athletes dietary practices. Some example questions asked on the questionnaire were: 1)"What nutritional supplements do you take during the regular season and off-season programs?" 2)"Why do you take these supplements?" 3)"What type of nutrient do you try to limit or watch in your diet?" (See appendix for copy of survey)

The questionnaires for the professional athletes were mailed to an athletic trainer and an exercise physiologist who distributed the surveys to the athletes. The questionnaires for the college and high school athletes were given to coaches and athletic trainers who distributed the surveys to the athletes. The coaches, athletic trainers, and the exercise physiologist were present while the survey was completed, to answer any questions that occurred.

Supplement use scores were computed by using a Likert-type value scale, raging form 0 to 1, for the frequency of use. A score of 0 was designated for the subject that had no response to the category and a score of 1 was designated if the subject had a response to the category.

Statistical Analysis

A descriptive statistical analysis was conducted on the findings consisting of Chi Squared coefficients that were calculated to determine the population difference between supplement use, reason for supplement use, types of supplements used, and dietary practices for competitive levels.

Contingency tables were constructed for each variable of interest. These tables converted raw scores into percents responding to each item.

CHAPTER IV

RESULTS

The purpose of this study was to quantify the percentage of supplement use among the different levels, types of supplements used, and the perceived reasons for nutritional and dietary supplement use between professional, collegiate, and high school athletes during in-season or off-season training. This study also evaluated possible associations between daily dietary practices and supplement use. The results of this study are presented in this chapter.

A sample of 91 athletes was recruited to complete a nutritional and dietary supplement use questionnaire. The sample of 91 included: 30 professional athletes (ages 22-32), 30 collegiate athletes (ages 18-22), and 31 high school athletes (ages 15-18). There were a total of 43 athletes that responded they used nutritional and dietary supplements and 48 athletes that reported they did not use supplements. Of the 43 athletes who used supplements, 17 were professional, 15 were collegiate, and 11 were high school athletes.

Table 1: Percentage of Supplement Use Between the Different Competitive Athletic Levels

	Professional (N=30)	Collegiate (N=30)	High School (N=31)	All Athletes (N=91)
Users	57%	50%	35%	47%
Non-Users	43%	50%	65%	53%

Note: There was no significant difference between the competitive levels($p > .05$)

Table 1 describes the percentages of nutritional and dietary supplement use between the different competitive athletic levels. The table also divides the different levels of competitive athletes as either being nutritional and dietary users or nutritional and dietary supplement non-users.

Hypothesis 1

Null hypothesis one proposed that there would be no significant difference in the percentage of nutritional and dietary supplement among the different competitive athletic levels. Hypothesis one was accepted because the chi square test resulted in a P-value > .05. This result indicates no difference between the percentage of supplement use between professional, collegiate, and high school athletes.

Table 2: Reason for Supplement Use Among Athletes

	Professional	Collegiate	High School	All Athletes
Trainer Advice	6% 0%	0% 0%	0% 0%	2% 0%
Increase Muscle Mass*	82% 35%	53% 47%	100% 27%	77% 37%
Feel Stronger*	59% 47%	80% 73%	27% 27%	58% 51%
Increase Endurance Performance	53% 53%	80% 60%	45% 27%	60% 49%
Lose Body Fat*	47% 12%	33% 20%	0% 0%	30% 12%
Replace Nutrient Lost	24% 53%	53% 47%	36% 45%	37% 49%
Other Reason	6% 0%	0% 7%	9% 0%	5% 2%

Note: Top # is Off-Season
Bottom # is In-Season- No significant difference found (P>.05)
* Only Shows significant difference among levels during Off-season (P< .05)

Table 2 summarizes the frequency of the specific reasons for supplement use. The table describes the specific reasons for use between the different competitive levels of athletes during off-season and in-season training.

Hypothesis 2

Null hypothesis two proposed that there would be no significant difference between the levels of competitive athletes and the specific reasons for nutritional and dietary supplement use during off-season or in-season

training. Hypothesis two was rejected because the chi square test revealed a P-value <.05. This result indicates that there was at least one specific reason for supplement use that was different between the levels of competitive athletes during off-season or in-season training. During the Off-season, the high school and professional athletes wanted to increase muscle mass more than collegiate athletes, while the professional athletes and collegiate athletes wanted to feel stronger and lose fat more than high school. There was no difference between specific reasons for nutritional and dietary supplement use among the different levels of competitive athletes during the in-season.

Table 3: Frequency of Types of Supplements Taken by the Athletes

	Professional	Collegiate	High School	All Athletes
Antioxidants **	71% 71%	60% 53%	45% 0%	60% 42%
Myoplex Bars and Drinks***	65% 65%	13% 13%	55% 9%	44% 29%
Betagen ***	100% 65%	40% 20%	55% 9%	67% 31%
Betagen (HMB + Phosphagen)	18% 12%	13% 13%	9% 0%	14% 8%
L-Carnitne	12% 6%	0% 0%	0% 0%	5% 2%
Chromium Picolinate	12% 6%	0% 0%	0% 0%	5% 2%

CLA	6% 0%	0% 0%	9% 0%	5% 0%
CoQ10 Formula	6% 0%	0% 0%	9% 0%	5% 0%
Creatine: Pro Performance	76% 65%	87% 67%	73% 39%	79% 56%
DHEA	18% 12%	0% 0%	9% 0%	9% 4%
Diet/Energy: Optibolic*	24% 6%	0% 0%	0% 0%	9% 2%
GKG: Glutamine	12% 6%	0% 0%	9% 0%	7% 2%
Glucosamine Sulfate	18% 6%	0% 0%	9% 0%	9% 2%
Herbs	35% 29%	13% 7%	9% 9%	21% 16%
HMB	18% 12%	0% 0%	9% 0%	9% 5%
Lipoic Acid	6% 6%	0% 0%	9% 0%	5% 2%
Mens Ginseng **	35% 35%	40% 0%	9% 0%	30% 14%
Mens Zinc	6% 6%	0% 0%	9% 9%	5% 5%
Multivitamin	65% 41%	53% 20%	73% 45%	63% 35%
Optibolic Mens Energy	6% 6%	0% 0%	0% 0%	2% 2%
Phosphogain	12% 24%	0% 0%	27% 9%	12% 12%
Amino Acid 1000 ***	24% 6%	7% 13%	64% 55%	26% 21%
Phosphomass	0% 0%	0% 0%	0% 0%	0% 0%
Pro Performance 2200Gold *	35% 24%	0% 0%	9% 9%	16% 12%

Specialty Formula	12% 12%	0% 0%	18% 9%	9% 7%
V2G-Vandyl Sulfate	6% 0%	0% 0%	0% 0%	2% 0%
Other	12% 0%	0% 0%	0% 0%	5% 0%

Note: Top # off-season
Bottom # in-season
* Shows significant difference in Off-season (P<.05)
**Shows significant difference in In-season (P<.05)
***Shows significant difference in both seasons (P<.05)

Table 3 describes the frequency of the types of supplements taken by the different levels of competitive athletes during off-season and in-season training.

Hypothesis 3

Null hypothesis three proposed that there would be no significant difference between the types of supplements taken by the different levels of competitive athletes during off-season or in-season training. Hypothesis three was rejected because the chi square test revealed a P value < .05, indicating that the different levels of competitive athletes took different types of supplements.

During the off-season, professional and high school athletes took Myoplex bars and drinks more than the collegiate athletes. High school athletes used Pro Performance Amino 1000 or general amino acid more than professional and collegiate athletes. Professional athletes used Betagen,

Optibolic (diet/energy) and Pro Performance 2200 Gold Weight Gainer more than collegiate and high school athletes.

During the in-season, professional athletes used Antioxidants (vitamin A, C, E, beta carotene) more than high school and collegiate athletes and collegiate athletes used them more than high school athletes. Professional athletes also used Myoplex bars and drinks, BetaGen, and Mens Ginseng Formula more than high school and collegiate athletes. High school athletes used Pro Performance Amino 1000 or general Amino Acids more than collegiate and professional athletes.

Table 4: Frequency of Meals Eaten in a Week by Athletes

# of Meals	Users	Non-Users
7 or less	5%	4%
8 to 14	7%	15%
15 to 21*	56%	71%
22 or more *	33%	10%

*Shows significant difference ($P < .05$)

Table 4 compares the frequency of meals eaten in one week between nutritional and dietary supplement users and non-users.

Hypothesis 4

Null hypothesis four proposed that there would be no significant difference between nutritional and dietary supplement users and non-users and the number of meals consumed in a week. Hypothesis four was rejected because the chi square test revealed a P value < .05. This result indicates a difference in the number of meals consumed during the week between supplement users and non-users. Nutritional and dietary supplement users were found to eat more meals during the week (21 or more) than non-supplement users.

Table 5: Frequency of What Was Limited in the Diet of Athletes

	Users	Non-Users
Fat	53%	58%
Cholesterol *	9%	31%
Salt	21%	31%
Carbohydrates *	40%	15%
Protein *	42%	19%

*Shows significant difference (P < .05)

Table 5 describes the frequency of fat, cholesterol, salt, carbohydrates, and protein limitations in the diet between nutritional and dietary supplement users and non-users.

Hypothesis 5

Null hypothesis five proposed that there would be no significant difference between nutritional and dietary supplement users and non-users for limitations of fat, cholesterol, salt, carbohydrates, and protein. Hypothesis five was rejected because the chi square test revealed a P-value < .05. This result indicates that there was a difference between what was limited in the diets between users and non-users. Nutritional and dietary supplement non-users limited cholesterol more in their diet (31%), while the users tended to limit carbohydrates (40%) and protein (42%) more in their diet than the non-users.

CHAPTER V

DISCUSSION, SUMMARY, & CONCLUSION

The purpose of this study was to quantify the percentage of supplement use among the competitive levels, types of supplements used, and perceived reasons for nutritional and dietary supplement use among professional, collegiate, and high school athletes during in-season and off-season training. This study also evaluated possible associations between daily dietary practices and supplement use. More specifically, the purpose of this study was to determine if there was:

1. Significant differences in the percentage of nutritional and dietary supplement use among the competitive athletic levels.
2. Significant differences between the level of competitive athletes and the specific reasons for supplement use during the in-season and off-season.
3. Significant differences between the level of competitive athletes and the types of supplements taken during the in-season and off-season.

4. Significant differences between supplement users and non-users and the number of meals consumed in a week.
5. Significant differences between supplement users and non-users and what their limitations are in their diet.

This chapter will discuss the results of the study, summarize other findings in the literature related to these issues, and provide conclusions based on those findings.

DISCUSSION

The nutritional and dietary supplement use questionnaire was designed to determine the percentage of supplement use, types of supplements used, specific reasons for using supplements, and dietary practices. The hypotheses were designed to gather information from the questionnaire. Data was collected on 91 subjects that included professional, college, and high school athletes.

Hypothesis 1

Hypothesis one proposed that there would be no significant difference between the percentage of nutritional and dietary supplement use among the competitive levels. Hypothesis one was accepted indicating no difference in

the percentage of supplement use among professionals (57%), collegiate (50%), and high school (35%) athletes.

In this sample, the reported percentage of supplement use among the different competitive levels confirmed the results of some previous studies. Bazzare and associates (5) found that 51% of college athletes in their study used supplements. Kohl and associates (23) found 51.2% of professional athletes to have reported some type of supplement use. Massad and associates (25) found 43% of high school athletes to have reported some type of supplement use.

Hypothesis 2

Hypothesis two proposed that there would be no significant difference between the levels of competitive athletes and the specific reasons for nutritional and dietary supplement use during in-season or off-season training. Hypothesis two was rejected, indicating that there was at least one specific reason for supplement use that was different between the levels of competitive athletes in the off-season. In this sample, the professional athletes (82%) and high school athletes (100%) wanted to increase muscle mass more than the collegiate athletes (53%). The professional athletes (59%) and collegiate athletes (80%) wanted to feel stronger more than the high school athletes (27%). The professional athletes (47%) and the

collegiate athletes (33%) also wanted to lose body fat more than the high school athletes (0%).

Previous research has confirmed that athletes take nutritional and dietary supplements for a variety of reasons (2,25). Athletes in various sports and at different levels choose to use nutritional and dietary supplements for various reasons. Generally, athletes report that they take supplements to compensate for poor dietary lifestyles, to meet unusual nutrient demands, and to gain ergogenic effects, such as increases in muscle mass and increase endurance performance (7). It is likely that different attitudes and beliefs underlie the specific reasons for supplementation practices of various athletic groups (2,7).

Hypothesis 3

Hypothesis three proposed that there would be no significant difference between the types of supplements taken by the different levels of competitive athletes during off-season or in-season training. Hypothesis three was rejected, indicating that the different levels of competitive athletes took different types of supplements.

Professional athletes reported to using Betagen (84%), Antioxidants (vitamin A, C, E, beta-carotene) (71%), Myoplex bars and drinks (65%), Mens Ginseng formula (35%), Pro Performance 2200 Gold Weight Gainer

(30%) and Optibolic (diet/energy) (15%) more than collegiate and high school athletes. They also reported a high use of Creatine: Pro Performance (71%). Kohl and associates (25) found professional athletes reported frequent use of vitamin and mineral supplements (31.9%), followed by fat burners/muscle builders, such as Betagen (26.8%), creatine monohydrate (18.7%), protein bars, such as Myoplex bars (18.4%), herbs/energy formulate (10.5%), and finally weight gainer powders (4.8%).

In the present study, high school athletes reported using Pro Performance Amino 1000 or general amino acid more than professional and collegiate athletes (60%), They also reported using Myoplex protein bars and drinks more than collegiate athletes (32%). The highest reported use for high school athletes was for Multivitamins (59%), Creatine: Pro Performance (56%) and Antioxidants (45%). Massad and associates (25) reported a 41.70% use rate for vitamin and mineral supplements, and a 21.70% use of protein/amino acid supplements in high school athletes.

Collegiate athletes did not use a specific type of supplement more than professional and high school athletes. The highest reported use of supplements in college athletes was for Creatine: Pro Performance (77%) and Antioxidants (57%). Bazzare and associates (5) reported that 51% of college athletes in their study sample used vitamin/mineral supplements.

For the total population reporting supplement use, Creatine was reported most frequently (68%), followed by Antioxidants (51%), Multivitamins (49%), and Betagen (49%). Most reports in literature indicate that vitamin/mineral supplements are the most common nutritional and dietary supplement taken by athletes (5,7,23,25). However, creatine has become an ever-popular supplement used by all levels of competitive athletes (1,31).

Athletes may take different types of supplements in hope that a special nutrient concoction will provide them with a slight competitive edge (41). Many athletes assume vitamins and minerals provide energy, which is an incorrect assumption, since vitamins and minerals are non-energy nutrients and cannot be used by the body as an energy source (25). These nutritional and dietary supplements are advertised in magazines, books, or on television which may give misleading facts about the different products. Athletes often only read and see the positive claims of supplements but ignore or see the negative claims (41).

Hypothesis 4 and 5

Hypothesis four and five were tested to compare different dietary practices among nutritional and dietary supplement users and non-users. Hypothesis four proposed that there would be no significant difference between nutritional and dietary supplement users and non-users and the

number of meals consumed in a week. Hypothesis four indicated that there were differences in the number of meals consumed during the week between users and non-users.

Nutritional and dietary supplement users consumed more meals in a week (22 or more) than non-supplement users. This result is consistent with the study conducted by Bazzare and associates (5). The authors found supplement users had a greater dietary intake of nutrients during a week than non-supplement users.

In relation to this hypothesis, an additional chi squared test was conducted on questions regarding dietary practices ("Does different food I eat affect the way I perform?"). Results indicated that supplement users strongly agreed and non-users disagreed ($p<.05$) that the food they eat affects the way they perform. This result is consistent with the study conducted by Kohl and associates (23). The authors reported supplement users showed significantly different attitudes toward the way food intake affects athletic performance compared to the non-supplement users.

These results may be due to the fact that athletes may want to live healthier lifestyles. Supplement users may think that the nutrients they get from the number of meals they consume in a week plus the nutrients from nutritional and dietary supplements will help them perform better (25,41).

Hypothesis five proposed that there would be no significant difference between nutritional and dietary supplement users and non-users for limitations of fat, cholesterol, salt, carbohydrates, and protein. Hypothesis five was rejected indicating a difference of what was limited in the diet. Nutritional and dietary supplement users limited carbohydrates (40%) and protein (42%) more than non-supplement users.

Similar findings have been reported by Williams (41) who showed that athletes limit certain nutrients in the body because they are taking nutritional and dietary supplements that contain these certain nutrients. Most nutritional and dietary supplements are used by athletes to increase the total dietary intake of some food substance (42). The use of nutritional and dietary supplements may provide a false sense of security to some individuals who may use supplements as a substitute for a healthy diet (41).

SUMMARY

This study examined the percentages of nutritional and dietary supplement use, specific reasons for supplement use, types of supplements used, and daily dietary practices on 91 male competitive athletes. The competitive athletes were categorized as professional, collegiate, and high school athletes.

The purpose of this study was to quantify the percentage of supplement use among the different competitive athletic levels, types of supplements used, and perceived reasons for nutritional and dietary supplement use among professional, collegiate, and high school athletes during in-season or off-season training. This study also evaluated possible associations between daily dietary practices and supplement use.

The results of this study indicated that there was no significant difference between the percentage of nutritional and dietary supplement use among the different levels of competitive athletes. There were significant differences in the specific reasons of nutritional and dietary supplement use among the different levels of competitive athletes, and types of supplements used among the different levels of athletes. There was also a significant difference in the number of meals consumed in a week among users and non-users, and limitations of fat, cholesterol, salt, carbohydrates, and fat among users and non-users.

CONCLUSION

Based on the findings of this study, the following conclusions can be made:

1. The percentage of nutritional and dietary supplement use is no different among the different levels of competitive athletes. These findings may help coaches, athletic trainers, parents, physical education teachers, and health educators understand that there is a chance that their athletes will take nutritional and dietary supplements, no matter what the level of competition they might be at.
2. Athletes from different competitive levels and from different sports may not use nutritional and dietary supplements for the same reasons. Participation in contact sports, such as football and hockey, may encourage athletes to take supplements to increase muscle mass so they can become stronger and bigger than the individuals they compete with. The age of the athlete may also affect the reason of supplement use. Professional and college athletes in the current study used supplements for different reasons than high school athletes, and their reason for feeling stronger may be due to the fact that their body has a hard time adjusting to everyday training programs. Coaches, athletic trainers, parents, physical education teachers, and health educators may use these findings to determine the reasons for supplement use among the athletes they work with.

3. At different competition levels, athletes have different pressures and rewards for successful in athletic performance. Participating at a higher competitive level encourages athletes to take more types of supplements in order to keep up with other competitors. Coaches, athletic trainers, parents, physical education teachers, and health educators may use these findings to understand and regulate the amount of supplements their athletes might use.
4. Nutritional and dietary supplement users demonstrate different dietary practices than supplement non-users. Users in this study consumed more meals during a week and felt the food they consume affected the way they performed. However, nutritional and dietary supplement users may restrict some of the nutrients from the food they consume, because they perceive that taking nutritional and dietary supplements replaces these nutrients. Coaches, athletic trainers, parents, physical education teachers, and health educators may need to educate athletes more about the fact that they should obtain the energy and nutrients they need by eating a well balanced diet.
5. In this study, there were significant differences among the specific reasons for supplement use, types of supplements, and dietary practices among the different levels of competitive athletes and supplement users

and non-users. Coaches, athletic trainers, physical education teachers, parents, and health educators should know age, race, gender, marital status, education, and training level may contribute to these differences.

6. Finally, these results can be used by coaches, physical education teachers, athletic trainers, health educators, and parents to help identify what type of athletes take supplements and if the type of supplement taken relates to the perceived reasons and dietary practices among their athletes. Coaches, physical education teachers, athletic trainers, health educators, and parents may then target particular categories of athletes for education programs aimed at optimal nutrition for athletic performance.

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APPENDIX A

Hockey

Dietary Behaviors and Nutritional Supplement Use

Off-season conditioning programs and the physical demands of a long season have resulted in professional athletes seeking *new ways* to improve their performance and gain an edge. Many players are now looking to various aspects of their diet as a way to improve performance.

A Southwest Texas State University graduate student is interested in the eating behaviors and dietary supplement use of hockey players so that he can provide the best advice for the health and performance of all athletes. Please take a few moments *right* now and complete the attached questionnaire. Most players find that the questionnaire takes less than 10 minutes to complete.

All responses will be anonymous so, please don't put your name on the questionnaire. Please answer all questions and return the completed questionnaire to the instructor. Thanks for helping out with this project that will benefit everyone.

Part I: In this section we are interested to know what kind of nutritional supplements you may take and how you think nutritional supplements may help you. A nutritional supplements is a product that you take in addition to your regular meals, but does NOT include any kind of steroids. Please indicate the appropriate answer to the following questions.

1. Do you regularly take any nutritional supplements?

   ☐ No (go to question 8)

   ☐ yes

2. **What nutritional supplements do you regularly take, *during Me off-season (Circle all that apply) Please also indicate for how long* you've been taking the supplement during the off-season.**

	For how long have you *taken this supplement in off* season					
	I've never taken it	Less than 1 Year	1- 2 Years	3 - 5 Years	6 - 8 Years	More than 8 Years
Andoxidants (Vitamin A. C, E, Beta *Carotene, selenium)*						
Bars or drinks **Myoplex** *Plus* Deluxe *Bar*						
BetaGen : Carbohydrates, Vitamins, Minerals, *Creatine,* L-Glutamine, Taurine						
Continued on Next Page						

	For how long have you *taken this supplement in off* season					
	I've never taken it	Less than 1 Year	1- 2 Years	3 - 5 Years	6 - 8 Years	More than 8 Years
Betagen (HMB+Phosphagen)						
L-Canitine						
Chromium Picolinate						
CLA						
CoQ10 Formula						
Creatine: Pro Performance Creatine, Phosphagen HP PhosphaGems						
DHEA						
Diet/Energy: Optibolic						
GKG (Glutamine)						
Glucosamine sulfate						
Herbs, like Saint Johnswort, Herbal Plus Saw Palmetto, Natures Fingerprint, SmartHerbs, Ginseng Gold, Bio Remedy						
HMB						
Lipoic Acid						
Men's Ginseng Formula						
Men's Zinc Formula						
Multivitamin (One A Day. for Example						
Optibolic Men's Energy						
Phosphagain Phosphagain 2						
Pro Performance Amino 1000 Or general Amino Acids						
Pro Performance PhosphoMASS™						
Pro Performance 2200 Gold Weight Gainer						
Specialty Formulas such as Preventive Nutrition. Ultra Mega, Men's Formula, Natures Brand						
V2G (vanadyl sulfate)						
Other						

3. *Why do* you take supplements during the off-season (Check all that apply)

- ❑ Team trainer advice
- ❑ Increase Muscle
- ❑ Feel stronger
- ❑ Increase endurance performance
- ❑ Lose body fat
- ❑ Replace *the* nutrient I lost during the sports activities
- ❑ Other reason, please indicate:_____

_____

_____

4. What nutritional Supplements do you regularly take during the season? (Circle all *that* apply)
Please also indicate for how long you've been taking the supplement **during the season.**

	For how long have you *taken this supplement during the* season					
	I've never taken it	Less than 1 Year	1-2 Years	3 - 5 Years	6 - 8 Years	More than 8 Years
Andoxidants (Vitamin A. C, E, Beta *Carotene, selenium)*						
Bars or drinks **Myoplex** *Plus* Deluxe *Bar*						
BetaGen : Carbohydrates, Vitamins, Minerals, *Creatine,* L-Glutamine, Taurine						
Betagen (HMB+Phosphagen)						
L-Canitine						
Chromium Picolinate						
CLA						
CoQ10 Formula						
Creatine: Pro Performance Creatine Phosphagen HP PhosphagGems						
DHEA						
Diet Energy: Optibolic						
GKG (Glutamine)						
Glucosamine sulfate						
Herbs, like Saint Johnswort Herbal Plus Saw Pametto, Natures Fingerprint, SmartHerbs, Ginseng Gold Bio Remedy						
Continued on Next Page...						

	For how long have you *taken this supplement during the* season					
	I've never taken it	Less than 1 Year	1- 2 Years	3 - 5 Years	6 - 8 Years	More than 8 Years
HMB						
Lipoic Acid						
Men's Ginseng Formula						
Men's Zinc Formula						
Multivitamin (One A Day. for Example						
Optibolic Men's Energy						
Phosphagain Phosphagain 2						
Pro Performance Amino 1000 or general Amino Acids						
Pro Performance PhosphoMASS™						
Pro Performance 2200 Gold Weight Gainer						
Specialty Formulas such as Preventive Nutrition. Ultra Mega, Men's Formula, Natures						
V2G (vanadyl sulfate)						
Other						

5. Why do you use supplements during the season? (Check all that apply).
   - ☐ Team trainer advice
   - ☐ Increase Muscle
   - ☐ Feel stronger
   - ☐ Increase endurance performance
   - ☐ Lose body fat
   - ☐ Replace *the* nutrient I lost during the sports activities
   - ☐ Other reason, please *indicate:*_____
     _____
     _____

6. How did you first find out about and develop an interest in nutritional supplements?
   - ❑ Magazines
   - ❑ Books/other readings
   - ❑ Television show/video
   - ❑ Team trainer (professional)
   - ❑ Team trainer (college)
   - ❑ Doctor
   - ❑ Personal trainer
   - ❑ Family member
   - ❑ Teammate(s)
   - ❑ Friends
   - ❑ Don't know

7. What is your source for (where do you get) the supplements you take?
   - ❑ Local store
   - ❑ Mail order
   - ❑ Team trainer
   - ❑ Doctor
   - ❑ Personal trainer
   - ❑ Family Member
   - ❑ Teammate(s)
   - ❑ Friends
   - ❑ Other please indicate:_____
     _____
     _____

Part II: Your Diet. Please circle the answer that most closely answers the question for you

Think back over the last 7 days.

8. How many meals did you have in the last 7 days?
   - ❑ 7 or fewer
   - ❑ between 8 and 14
   - ❑ 14-21
   - ❑ More than 21

9. Who is responsible for fixing most of the meals at your home?
   - ❑ I am
   - ❑ my wife or girlfriend
   - ❑ my roommate
   - ❑ Another family member

10. How many meals *will* you eat out at a restaurant in a typical week during the season?

- ❑ Less than 3
- ❑ 3 - 7
- ❑ 8 - 11
- ❑ 12 -14
- ❑ more than 14 per week

11. How many meals will you eat out at a restaurant during a typical week in the off season?

- ❑ Less than 3
- ❑ 3 - 7
- ❑ 8 - 11
- ❑ 12 -14
- ❑ more than 14 per week

12. Which of the following do you try to limit or watch in your diet? Check "Yes", If you limit or watch your intake or "No" if you don't bother to limit or watch it.

	Yes	Sometimes	No
Fat			
Cholesterol			
Salt			
Carbohydrates			
Protein			

13. About how many times in the last 7 days did you eat some kind of fish or seafood?

- ❑ None
- ❑ 1-3
- ❑ 4 - 7
- ❑ More than 7

14. How many timesin the last 7 days have you eaten some kind of red meat such as a hamburger or steak?

- ❑ None
- ❑ 1-3
- ❑ 4-7
- ❑ More than 7

15. Please list up to three foods or beverages you don't eat or drink: _____

_____

_____

_____

16. Please indicate the type and frequency of beverage intake you have in a usual day -

	Never	Once a day	Twice a day	Three times a day	More than 3 times a day
Water					
Coffee/Black Tea					
Regular Soft Drinks (Cola/ Sprite)					
Regular Diet Soft Drinks (Diet Cola/ Diet Sprite)					
Fruit Juice					
Sports Drinks (such as Gatorade)					
Alcohol					
Other					

17. For the following statements, please indicate Your agreement with each by checking the appropriate response:

	Agree Strongly	Agree	Disagree	Disagree Strongly	Don't Know
The food that I eat and drink affects how I perform on the ice.					
I would play better if I knew how to improve my eating/drinking habits					
The more red meat I eat, the stronger I will get.					
The more cereal and grains I eat, the stronger I will get.					
The more fruits and vegetables I eat, the stronger I will get.					

18. How many years have you been in professional hockey? _____ Years.

19. How many years have you spent in your current league? _____ Years.

VITA

Korey Shane Kirchner was born in Seguin, Texas, on July 4, 1975, the son of Connie Kirchner and Arlon Kirchner. After completing his work at Seguin High School, Seguin, Texas, in 1993, he entered Texas Lutheran University in Seguin, Texas. He received a Bachelor of Science from Texas Lutheran University in May, 1998. In the summer of 1998, he entered the Graduate School of Southwest Texas State University, San Marcos, Texas.

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