Patterns of Dietary Supplement Use and Their Source of Information in University Level Athletes in Sri Lanka

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Abstract: Background: Optimal athletic performance results from a combination of factors including training, body composition, and nutrition. The use of dietary supplements is a developing tradition by athletes not only in the developed countries nevertheless in the developing ones without knowing their effects on health and athletic performance.

Problem statement: "What are the usage patterns of dietary supplements (DS) and source of information among Sri Lankan university athletes?"
Objective: The main objective of the study was to identify the usage pattern of the DS of Sri Lankan university athletes and their information sources.

Subject: A single cross-sectional research design was employed to collect data through a self-administered questionnaire. The unit of analysis is the Sri Lankan university-level athletes representing a university sports team and a sample of 350 respondents will be selected based on stratified random sampling techniques.

Results: Interestingly 94% of male respondents and significantly all the female athletes were agreed they use DS. The highest number of both female (32%) and male (34%) athletes consumed supplements while all pre-, post-, and in-season. The majority of both male (41%) and female (42%) respondents reported they use DS over 02 years while the second-highest duration is less in 6 months 25% of males and 26% of females. Among athletes who are using DS (n= 315), 34% reported teammates as the first person who introduced DS, while 32% of respondents reported coach as their first person to introduce DS. The majority of athletes reported that they obtained information regarding supplements from Teammates (69%).
Conclusion: DS seems to be widely used in the sport with a considerable proportion of athletes consuming supplements.

Keywords: Dietary Supplements, University Athletes, Information Sources

1. Introduction

The physical demands of professional sports are so high that even the smallest advantage gained by an athlete can provide benefits during the competition (Schroder et al., 2002). Literature acknowledges that optimal athletic performance results from a combination of factors including training, body composition, and nutrition (Hinton, et al., 2004). When it comes to nutrition it is argued that some nutrient requirements could be higher for athletes than nonathletes (Hinton, et al., 2004). Munoz (2008) argues that when the athletic ability does not enable the athletes to perform their best many athletes are used to have dietary supplements to enhance their performance and Massad et al., (1995) claim nutritional diets have been regarded as a supplement for ergogenic purposes since ancient times. Nevertheless, the importance of dietary supplements cannot be undermined as scholars argue that optimal nutrition can enhance athletic performance (Jessri, 2010 et al.; Massad et al., 1995) and there is an increased interest among athletes in dietary supplements (Hinton, et al., 2004). This is partly due to the continual flow of athletes seeking a competitive edge. Froiland (2004) argues that the expansion in the dietary supplementary industry has an impact on this as athletes are continually seeking a competitive edge.

In developed countries, with the popularity of sports, the possibility of earning large amounts of money at the professional level, and heavy promotions are done DS companies have encouraged athletes to try-out dietary supplements (Munoz, 2008), even though excessive use and use of wrong supplements may have severe negative

results. In the Sri Lankan context, it can be observed that athletes especially at the national level are using dietary supplements.

The objectives of this study were to a) To assess the usage patterns of dietary supplements among university athletes, b) To identify the sources of information to university athletes regarding dietary supplements.

2. Literature review

A DS is defined 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: a 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 a concentrate, metabolite, constituent, extract, or combinations of these ingredients."(Dietary Supplement Health Education Act of UK 1994 quoted by Webb, 2009 and Mun oz, 2008). It is intended for ingestion in pill, capsule, tablet, or liquid form; is not represented for use as a conventional food or as the sole item of a meal or diet; and is labeled as a DS (Mun oz, 2008).The consumption of high-protein diets has a long history in sport and such diets were supposedly popular with athletes in the Olympics of ancient Greece. Protein requirements are increased by hard training and it is often recommended that the protein intake of strength athletes greater than sedentary counterparts. (Moughan et al; 2011 by citing Tarnopolsky, 2007).

The availability of carbohydrates in the muscle and central nervous system is essential in the performance of prolonged sessions, high-intensity exercises and it plays a most imperative role in the performance of high-intensity work.AS well as recommend CHO intake dosage is 5 to 7 g/kg/day for general training needs and 7 to 10 g/kg/day for the increased needs of endurance athletes.(Burke et al., 2001). According to Bishop, 2010 caffeine is the most popular and common DS of athletes all over the world. Found in coffee, tea, cola, chocolate, and various 'energy' drinks. The actions of caffeine throughout the body correlate positively with plasma caffeine levels, which are governed by absorption, metabolism, and excretion. 1 can of Red Bull (250mL) consists of 80mg of caffeine. Studies recommend that the primary effect of caffeine is to reduce the perception of fatigue or to enhance central drive by binding to adenosine receptors in the brain (Moughan et al; 2011 by citing Davis et al, 2003).

Most scholars have focused on DS use at the national level, school and elite athletes with only a few studies survey the university population. Furthermore, Sri Lankan national level athletes have used multivitamins, vitamin E, calcium, energy foods, and drinks as well as electrolyte-replacements drink. (de Silva et al., 2010). The most predominant DS consumed of elite Spanish athletes was proteins (41%; n = 137), followed by amino acids/BCAA-based supplements (37%; n = 124) (Mohsen Ali and El-Sayed, 2018).Marquez et al., 2009 citing 115 male and 88 female varsity university athletes 89% were using dietary supplements. The most frequently used supplements overall were energy drinks (73%), calorie replacement products of all types (61%), multivitamins (47%), creatine (37%), and vitamin C (32%). By surveying Dietary Supplement usage among Egyptian athletes Aguilar-Navarro *et al.*, 2020 found that the most frequently used supplements are Protein Supplements (67%), vitamin and minerals (54%). Mun oz, 2008 by citing NCAA research staff 1997 found approximately 76% of collegiate athletes used dietary supplements. By surveying Dietary supplements use among junior college athletes Mun oz, 2008 found within 130 subjects 55% used dietary supplements with the reason of improve athletic performance. Although Burns et al., (2004) found within 66% of intercollegiate responders 88% of responders use one DS and 58% of responders use one or more dietary supplements. The majority of university athletes were getting information from a certified athletic trainer.

Athletes were consuming dietary supplements for several reasons. However different scholars have identified several reasons. Froiland et al., (2004) found; four major reasons for using dietary supplements, respectively as for their health (43.5%), to improve strength and power (42.5%), to increase energy (42.5%), and for weight or muscle gain (41.5%). Moreover, they found differences in reasons for using dietary supplements between two gender groups. Accordingly more female athletes take supplements because of an inadequate diet or "for their health" while more males take supplements to improve speed and agility, strength and power, or for weight/ muscle gain (Froiland et al., .2004).De Silva et al., (2010) found; most Sri Lankan National level athletes are using dietary supplements with the most common reason of enhances performance (79.2%) and the second most common reason was to improve their general health status (19.8%). Moreover, they found there were no significant differences in social indicators, education, and sport, the nature of the product, or the number of supplements ingested between athletes.

Most athletes have obtained information about DS from the internet, coachers, and fellow athletes (Aguilar-Navarro *et al.*, 2020).Jessri et al., (2010) stated diverse sources that are communicating nutrition information to athletes as coaches, teammates, athletic trainers, fitness trainers, parents, supplement manufacturers, and the media. Further, they argue that "many of these sources are not suitable, and at times the information imparted is unreliable and only adds to the myths surrounding nutrition that may affect athletes' diet" (Jessri et al., 2010 by citing Barr et al., 1997). According to Froiland et al., (2004) found the majority of athletes obtained information regarding supplements from family members (32.4%) and fellow athletes (31.9%).

De Silva et al., (2010) found within 113 Sri Lankan national level athletes only 05 athletes obtained specialized advice from registered nutritionists and others received general advice from team coaches (48%) and sports doctors (45%). It is interestingly seen 7 athletes did not receive any dietary advice. The authors found 45% of athletes received advice on dietary supplements from sports doctors and 15% from friends and family. No athletes were getting information from print media, television, and the internet. Another interesting finding is that the authors have found that there is a difference between male and female athletes when it comes to the information sources also. Accordingly, males were significantly obtained information or recommendations from a store nutritionist, fellow athletes, friends, coach, television, or a magazine while Female athletes were significantly more likely to obtain information and recommendations from family members (Froiland et al., 2004). They further have found that there is a difference in information sources between different sports also. While founding information source regarding dietary supplements many scholars were found the first introduced person of dietary supplements. By surveying DS use among college athletes Mun□ oz, (2008) found the most common individual to first introduce about dietary supplements was family members (15.38%).

Schroder et al.,(2001) by surveying the type, amount, frequency, and timing of DS use by elite players found 58% of athletes were using dietary supplements and the majority of them are consumed daily (26%) and others consumed only once a week (18.8%). Most of the athletes were use multivitamins and Vitamins (50.9%). Commonly athletes use supplements before exercises more frequent than during or after exercises

By surveying 130 subjects who participate in 9 sports amongst junior college athletes (Mun□ oz, 2008) found majority of athletes were take supplements from 0-6 months (26%) and 13% of subjects were used dietary supplements for continued time of 2 years and over. In additionally least amount of subjects were consumed continuously for a period of 7 months to a year. Intestinally majority (24%) of athletes were using dietary supplements less during the season and secondly, 17% of athletes using more during the season, and others are reported they not using dietary supplements during the season.

3. Subjects and Methods

Unit of analysis is the Sri Lankan university level athlete representing a university sports team and a sample of 352 respondents will be selected based on stratified random sampling techniques. Based on convenience, seven outdoor sports were selected namely Cricket, Elle, Hockey, Rugby, Football, Netball, and volleyball. The lists of players who represented the university team for the year 2018 of each above-selected games were obtained from respective universities.
Elle, Volleyball, and Hockey included both males as well as female teams. Netball teams were female teams and Rugby, Cricket, and Football teams were male teams. Then from the above ten teams, 350 respondents were selected based on stratified random sampling. However valid completed questionnaires were received from only 328 respondents. To collect the data a self-administered questionnaire was used. The questionnaire consists of two sections. The first section focused on personal details of responders such as age, gender, weight, and height, exercise frequency. The second section consisted of information regarding DS use among responders such as the use frequency, duration of using, first introduced person, and information sources regarding dietary supplements. A pilot test was carried out using a selected group of athletes to assess the repeatability of the questionnaire. Data collection took about eight months. Data on DS use by the university athletes were analyzed using descriptive statistics and presented as; tables, percentages.

4. Results

Sample carries respondents representing seven sports and four national universities located in the western province in Sri Lanka.Sports represented in the data include the following: most of the respondent are representing Rugby

(17%) and secondly Football (12%) and both hockey male and female teams (11%), Cricket (10%), Elle boys (9%), Elle girls (8%) and Netball, Volleyball girls and boys (7%). Respondents were an average of 22 years of age. Most respondents are representing the first year (29%) and other respondents are in the second year (28%), third-year (22%), and final year (21%). When considering the body mass index of respondents, most of the athletes are in normal weight (49%), likewise underweight (09%), Overweight (20%), and obese (05%) significantly the highest number of responders are reported they engaging by exercise in weekly (47%). 24% of responders are engaging daily and 20% of respondents report engaging with exercise monthly and rarely engaging the lowest participation rate as they represented 9% of the sample.

Accordingly, sample 49% of the responder's played 1-20 numbers of matches in the last 04 years. The highest number of the respondent (96%) agreed that they have used DS and others didn't use DS as shown in Table 1.

Table 1: Demographic Characteristics of University Athletes

Characteristics		n	%
Gender	Male	216	66
	Female	112	34
Studying year	First Year	94	29
	Second Year	93	28
	Third Year	73	22
	Final Year	68	21
Age	20- 24	69	82
	25-27	59	18
Sport	Cricket	32	10
	Elle Boys	57	17
	Football	38	12
	Hockey	72	22
	Netball	24	07
	Rugby	57	17
	Volleyball	48	14
Frequency of engage in exercise	Daily	78	24
	Weekly	155	47
	Monthly	65	20
	Rarely	30	09
BMI	Underweight	30	09
	Normal Weight	160	49
	Over Weight	65	20
	Obese	18	05
	Not Given	55	17
Number of matches played in last 04 years	01-20	161	49
	21-40	51	16
	41-60	37	11
	61-80	12	04
	81-100	09	03
	100>	04	01
	Not given	54	16

Source: survey data, 2018

Most of the athletes are using DS in the Pre, Post, and In-seasons (30%) while 15% are using DS in the both Post and In-season. Most male (32%) and female (28%) respondents reported using DS in Pre, Post, and In season. Furthermore, male second highest (13%) usage frequency is both post and In- season while female second highest (19%) usage frequency seasons are in season and both post and In-seasons. Results indicate that a reasonable number of respondents consume dietary supplements in periods (Table 2).

Responses to the number of times athletes have used DS within supplement use respondents (n=315) include the most common period over 2 years (42%). The next highest period (26%) that has used dietary supplements is from less than 06 months and is followed by a time of less than 1 year and above 2 years (20%). The least amount of respondents (13%) who consumed dietary supplements has used above 6 months and less than 1 year. The majority of both male (41%) and female (42%) respondents reported they use DS over 02 years while the second-highest duration is less in 6 months 25% of males and 26% of females.

Both Female (82%) and male (79%) athletes reported they use supplements more during the competitive season and both gender respondents were reported they do not use DS during the competitive season. Furthermore, more female (82%) responders used supplements during competition than male athletes (79%)(Table 2).

Table 2: The Usage Patterns of Dietary Supplements among University Athletes

Frequency of Dietary Supplement Usage						
Season	Male		Female		Total	
	n	%	n	%	n	%
Pre-Season	24	12	10	9	34	11
Post season	18	9	10	9	28	09
In Season	23	11	21	19	44	14
Off season	5	2	2	2	07	02
Both pre-season and post season	11	5	2	2	13	04
Pre ,Post and In season	65	32	31	28	96	30
Post, In and Off season	2	1	1	1	03	01
Both Post Season and In Season	26	13	21	19	47	15
Both Pre Season and In Season	13	6	9	8	22	07
Pre, In and Off Season	7	3	2	2	09	03
All the 04 Seasons	9	4	1	1	10	03
Duration of Dietary Supplement use						
Duration						
Less in 6 months	52	25	29	26	81	26
Above 6 months less 01 year	28	14	14	13	42	13
Above	40	20	22	20	62	20
Over 2 years	84	41	47	42	131	42
Dietary Supplement Use during Competitive Season						
Don't use during competitive season	14	7	04	04	18	06
Less during competitive season	27	14	16	14	43	14
More during competitive season	162	79	92	82	254	80

Source: survey data, 2018

Among athletes who are using DS (n= 315) most of the male athletes reported teammates (35%) are the person who introduces the supplements first while females reported teammates (32%) as a second-highest rate. A majority (40%) of female athletes are reported coaches as a first introduce person while male athletes reported coach as a second-highest rate of a person with a percentage of 27%. In both genders, less than 10% reported first introduce person as a family member, physician, Television, and others such as a nutritionist, retail store, news report, magazines. (Table 3).

The majority of athletes reported that they obtained information regarding supplements from Teammates (66%). Secondly, Information is received from the coach (66%). 36% of athletes have received information from their friends and 22% of athletes get it from Television. Information is received from a family member, physician, as well as an athletic trainer, which is 17% each. 8% reported using a retail store as a source of information regarding supplements. Some of the responders are obtaining information from several sources as shown in Table 4.

The highest number of female athletes received information regarding dietary supplements from their coach (70%) as well as from teammates (70%). However, most of the male athletes are reported they receive information from their teammates with a percentage of 68% while male athletes' second-highest information source is the coach (63%) even though female athletes' second-highest information source is their friend (37%). Furthermore, both female and male athletes obtain information from Nutritionist, Retail store, News report, magazine, and other sources are less above 10%.

Table 3: First Introduced Person of Dietary supplements

Source	Male		Female		Total	
	n	%	n	%	n	%
Family Member	14	7	7	6	21	07
Friend	24	12	4	4	28	09
Team Mate	71	35	36	32	107	34
Coach	56	27	45	40	101	32
Athlete Trainer	13	6	6	5	19	06
Physician	9	4	5	4	14	04
Television	10	5	5	4	15	05
Other	7	4	4	5	11	03

Source: survey data, 2018

Table 4: Information Sources regarding Dietary Supplements

Source	Male		Female		Total	
	n	%	n	%	n	%
Family Member	23	11	29	26	52	17
Friend	72	35	41	37	113	36
Team mate	138	68	78	70	216	69
Coach	129	63	78	70	207	66
Athlete trainer	33	16	21	19	54	17
Physician	28	14	24	21	52	17
TV	39	19	30	27	69	22
Nutritionist	14	7	7	6	21	7
Retail Store	17	8	7	6	24	8
News report	6	3	4	4	10	3
Magazines	5	2	2	2	7	2
Other	2	1	6	5	8	3

Source: survey data, 2018

5. Discussion

The results of this study demonstrated that most university athletes used dietary supplements while engaging with sports. Again a part of this finding is consistent with the findings of Aguilar-Navarro *et al.*, 2020;Mohsen Ali and El-Sayed, 2018;Mun oz, 2008; de Silva et al., 2010; Jessri et al., 2010; Burns et al., and Froiland et al., 2004 who found most of the students-athletes use dietary supplements while engaging with sports. However, most athletes were consuming multiple supplements products while engaging with sports.

Regarding the duration of supplement usage, 41% of male athletes and 42% of female athletes reported they use supplements over 2 years. Various athletes (26%) also reported using dietary supplements for a consistent time of fewer than 6 months. Muñoz, 2008 reported most of the athletes (26%) used less in 6 months and 13% consume in over 2 years. However, Mun oz, 2008 recorded the highest number of athletes (24%) who use supplements lees

during the competitive season and 17% were using more during the competitive season. The present study found; most university athletes use more supplements during competitive season (80%) and less during the competitive season (14%).

Respondents who reported consuming dietary supplements (n=315) named teammates as a first introduce person. Most of the female athletes reported coach as a first introduce person while male athletes reported teammates. However, Mun oz, 2008 conveyed family members as the first introduce person an additional 10.7% named a friend and teammates who first introduce the supplements. Of the present exposed that teammates and coaches are the major sources of information. Again a part of this finding is inconsistent with the findings of Foiland et al., (2004), who argue fellow athletes and coaches as major sources of information reception. However, Foiland et al., (2004) found that family members are the major source of information to the athletes; the present study found family members are not being considered as an important source of information to University athletes. Besides, Foiland et al., (2004) found television is not considered an important source of information by athletes, where the present study also found it is not being considered as an important source of information by athletes. Furthermore; Mun oz, 2008 reported that 10.88% of athletes are named teammates as the main information source on DS along with 9.32% athletic trainer and 8.8% coaches. De Silva et al., 2010, suggested that athletes using dietary supplements also named team coach, sports doctor as a major information source.

6. Conclusion and Recommendations

According to the results, it is evident that all athletes in the sample are using dietary supplements. Further, it is evidenced that the majority of athletes used these products during the tournaments as well as both in practices and during the tournaments. Therefore it can be concluded that the usage of dietary supplements is considerably high among university athletes in Sri Lanka.

Moreover, fellow athletes are the major source of information for university athletes and the highest number of them seeks the recommendation of their coaches before they use the DS heard from other sources.

Accordingly following suggestions and recommendations can be provided to the relevant decision-making bodies and authorities. It is of high importance to improve the knowledge of DS and DS usage of athletes. The attention of proper authorizes relevant to sports should be given to increase the knowledge of dietary supplements. Their attention should first focus on identifying the need for dietary supplements (whether it is necessary to use dietary supplements in the first place), as they are using dietary supplements only to increase energy.

It would be important to identify whether these athletes need to use dietary supplements. If so, they have to make athletes knowledgeable on the areas such as what are the proper dietary supplements, when should they use them, how and the dosage of usage, how to select proper dietary supplements, where they can buy them, and side effects (if any) of each recommended product. Moreover, the athletes have to be informed of the functions of dietary supplements. Here they can inform the actual function of dietary supplements and clear the misconceptions on dietary supplements.

Next, the area of importance is the sources of information. Here also most of the athletes are getting to know about dietary supplements through fellow athletes. The risk of this is that these fellow athletes also do not have very good knowledge of these products. However, most of the athletes are reaching for the recommendation of another party before they use dietary supplements. Hence it is important to consider the knowledge on dietary supplements of the person who is giving the recommendation. According to the findings, most of the athletes are reaching for their coaches' recommendations, but the level of knowledge on dietary supplements of coaches has not been studied in this study. Here their knowledge will be very important and it is doubtful that coaches of all levels have adequate knowledge on DS usage.

Therefore, the researcher suggests conducting workshops and training programs aiming at athletes at all levels such as school level, university level, and national level through relevant authorities such as the Ministry of Spots, different sports federations, ministry of education and university authorizes. Moreover, training programs towards coaches also should be conducted as most of the athletes are following their recommendations before using a dietary supplement.

Abbreviations

DS: Dietary Supplements

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