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A Study of Solid Liquid on Nutritional Status and Sport Performance of Athletes

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Abstract – The importance of nutrition in sports performance has been recognized since the dawn of civilization. Along with Sumerians, Egyptians, the Chinese, and other ancient cultures, the Indian people were among the first to pursue a nutritious diet and a meaningful lifestyle in the face of environmental obstacles. Sports nutrition is a specialization within the field of nutrition that partners closely with the study of the human body and exercise science. Sports nutrition can be defined as the application of nutrition knowledge to a practical daily eating plan focused on providing the fuel for physical actively. Facilitating the repair and rebuilding process following hard physical work, and optimizing athletic performance in competitive events, while also promoting overall health wellness. and the study which discussed about Importance of Proper Nutrition in Sportsmen, Prerequisites of High Level Sports Performance, Sports Performance, Profile of functional indicators of nutritional status, Heart rate, Effect of liquid supplementation on performance indicators.

Keyword – Nutrition, Athletes

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INTRODUCTION

Sports nutrition has gotten a lot of attention in the last few decades, and it's only going to gain more attention in the future since it's so critical to an athlete's performance, and it may even be life or death. Many processes in the body are affected by diet, including energy generation and recuperation after activity. Supplements and their impact on human health and performance are a fascinating topic in sports nutrition. The adequate intake of calories, carbohydrate, and protein may be achieved with the use of dietary supplements. Supplements to the diet, rather than substitutes for a healthy one, there is some evidence to suggest that some nutrients and/or dietary supplements may aid athletes' training and/or performance, although this is not true for the vast majority of the supplements now offered to athletes.

Adequate caloric intake, macronutrients, and micronutrients are required for athletes undergoing performance-enhancing training in order to protect the athlete's health and well-being as well. Teen athletes in particular may need more nutrients to satisfy their training demands and also to support their growth and development. Growing tissues, such as skeletal muscle, need energy, which is a nutrient requirement. Muscle growth throughout childhood and adolescence needs more energy and protein to replenish losses from exercise, maintain a net protein balance, and promote normal growth and development, in addition to the stimulation of sports training. Carbohydrate intake may need to be increased to satisfy the energy needs of training and repair muscle glycogen reserves between training sessions depending on the amount of exercise training. Athletes in their teens should consume anywhere from 5 to 7 grammes of protein per kilo-gramme of body weight per day, depending on their exercise volume. It has become critical to teach young athletes about these fundamental requirements and the conflicting pressures of sports and personal development.

Dietary intake of energy, as well as macronutrient and micronutrient consumption capacity and body composition manipulation, are critical components of an athlete's diet. There are several ways to determine how much energy an athlete consumes from their diet: food records, food frequency surveys, and multi-pass 24 hour meal recalls. All of these approaches have significant drawbacks, with a predisposition toward underreporting intakes. Recording intakes may be improved by providing extensive education on the objective and processes of documenting intakes. There are a number of factors that affect an athlete's energy needs throughout the year, such as the amount of time they spend training and how intense their

workouts are. The effects of cold or heat, anxiety, stress, high altitude, certain physical injuries, particular medicines or prescriptions (e.g. caffeine, nicotine), increases in fat-free mass, and potentially the lacteal phase of the menstrual cycle may all raise energy requirements over the typical baseline. The follicular phase of the menstrual cycle, age, and the loss of fat-free mass (FFM) all reduce energy needs

Sports Performance

Today, sports are huge cultural phenomena all across the globe. Sport has never been more popular, well-organized, or significant as it is now. Numerous federations conduct annual sports contests at different levels and provide technical and material resources to promote participation in sports. Competitions in high-performance sports are a way for athletes to prove their value by doing well in the competition. This has resulted in intense rivalry in the fields of sports psychology, physiology, training and nutrition as well as sports medicine. Competitive sports have brought a variety of methods for improving and reaching peak performance to the forefront of the public's attention. Everywhere, new research labs are being established in an attempt to discover methods and means to get access to and enhance human athletic performance. Performance in sports is a measure of a person's psychomotor ability, as well as of a country or society as a whole. Better political, social, and cultural circumstances are essential for creating global champions in nations with more Olympic medals.

Prerequisites of High Level Sports Performance

Many writers have made various attempts to determine the variables that contribute to high-level athletic performance. Highly competitive sports nowadays require a highly targeted field of players, better training methods, sophisticated tactics, contemporary equipment, a friendly atmosphere, and a well-balanced nutritional plan. The use of sports technology to improve performance has come a long way in the sports world. Science and technology have made the world a better place, and their use in sports is no exception. Athletes who are believed to be machines have every centimeter, fraction of a second, and ounce of energy coaxed out by scientific techniques in order to achieve victory.

Performing well in sports requires a variety of essential preconditions. aerobic capacity, the ability to use anaerobic reserves and a host of other physiological and psychological factors are just a few examples. Others include agility, mobility, balance and a host of other attributes. Still others include tactics and intelligence as well as eye sight and peripheral vision. Still others include motivation and concentration.

Importance of Proper Nutrition in Sportsmen

As strength, speed, and endurance vary with nutritional state, success may be ascribed mainly to exceptional athletes training under adaptable and thoughtful long-term regimens that emphasize proper nutrition. Protein, lipids, and carbs all have a similar proportion of energy content when it comes to the relative nutritional requirements of athletes in general. It's not clear if diet affects physical performance, though. For Indian athletes to perform at their best, they must have a clear understanding of their dietary and nutritional needs.

In sports nutrition, nutritional concepts are used such that the athlete's performance is improved. When an athlete has optimum nutrition, they are able to train and compete for longer or recover quicker between training sessions, which reduces their vulnerability to illness and injury. According to Grand jean et. al. It aids in the attainment of 13 and the maintenance of good health. Instead of consuming too many calories and becoming obese, optimal nutrition refers to the amount of nutrients a person needs to be in peak physical condition for activities like athletics or other types of performance. Each of our body's six main nutrients has a specific function. It's a mixture of water-soluble carbs, proteins, fats, vitamins, and trace elements. Daily activities need the consumption of 17 vitamins and 24 mineral elements by the human body. 60% to 62 percent of the human body is made of water; 17% is proteins; 14% is fat; 6% are minerals; and 1% is carbs. Compared to adults, babies have a higher water percentage. Women have somewhat less water and slightly more fat than males. As we get older, we accumulate more body fat.

LITERATURE REVIEW

Danielle M. Logue, Laura Mahony (2013) if you have little energy, your body will adjust in ways that are harmful to your health. There is a paucity of data on how people perceive dietary recommendations to consume more food in order to be healthy and perform better. The study's goal was to learn how athletes and coaches viewed nutritionists' advice to consume more food than they are already eating, and how nutritionists could convey it. Methods: Audio recordings and verbatim transcriptions of semi-structured interviews (about 20 minutes in length) were made utilizing internet communication technologies. During the interview, participants discussed their thoughts on the dietary guidance they received; how it affected their health and performance, and the difficulties they had while trying to consume a higher caloric intake. An inductive thematic approach was used to analyze the data in NVIVO 1.2. Semi-structured interviews were conducted with nine top athletes (six women, three men) and nine high-

performance coaches (three women, six men) as part of this study. When athletes consume enough energy and minerals to fulfill their requirements, they report better training consistency, fewer injuries and illnesses, and improved resilience. Fueling was tough due to a lack of time and problems with meal preparation. It's crucial to motivate, enable, and encourage athletes to alter their behavior in order to raise their self-awareness and make long-term nutritional adjustments, even if they're not conscious they're under-fueling.

Marni E. Shoemaker, Zachary M. Gillen, (2014) The study's goal was to see whether an online sports nutrition course had any impact on high school players' physical performance and iron levels. Using a repeated-measures approach, we looked at the differences between men and women in the sample size of 43 (n=18). Before and after an eight-week online sports nutrition course, participants' athletic performance and biomarkers of iron status were compared. For example, there were tests to see how far a person could leap vertically, how fast they could jump vertically, how fast they could jump vertically, how fast they could jump horizontally, and how fast they could jump horizontally (PPUF and PPUPP, respectively). Capillary blood samples were used to measure ferritin, STFR, and haemoglobin concentrations. Males generally ate within recommended ranges, while females had intakes of calories, carbohydrate, protein, and iron that were below the recommended levels. High school-aged female athletes may benefit from nutrition education to promote diets that are within suggested limits, despite the fact that it did not directly improve athletic performance or iron status in the study mentioned above.

Bilal Ahmad Bhat, Intizar Ahmad (2016) This research aims to find out whether collegiate athletes do better academically than their non-athletic counterparts. A well-designed three-point liker scale questionnaire was used to gather data from 400 respondents (250 males and 150 girl's kids) using stratified random sampling to learn about students' attitudes about sports. Kashmir is of all ages used to participate in activities and sports to make the most of their free time. Most individuals believe that taking part in these activities improves both one's physical and mental skills. According to the study's findings, traditional Kashmiri games are being lost among the younger generations, but the elder generations still remember them fondly. In addition, our study's findings show that involvement in sports and academic achievement are linked, and athletic activity enhances academic success. Sports activities are very beneficial and helpful for improving universities' academic missions, as this research clearly shows.

H. Striege, P. Simon (2016) Master athletes' usage of nutritional supplements was examined by looking at where they got their knowledge and where they got their supplements. An anonymous survey of 1560 athletes competing in the World Masters Athletics Indoor Championships 2004 was sent out to those who completed it. These questions covered a wide range of topics, including biometrics, social indicators, training, illegal substances, and dietary supplements. It was shown that the consumption of nutritional supplements was associated with such factors as age, gender, family status, children's educational attainment and years of training as well as the usage of illegal drugs and performance-enhancing substances. The history of their supplement usage was described in detail as well. Sixty-five percent of those polled said they had used nutritional supplements in the last month. In terms of fundamental information, we observed no significant differences between nutritional supplement users and non-users. Vitamins and minerals made up the majority of the ingredients (29.9 percent).

D. Travis Thomas (2016) Academy of Dietary and Dietetics, Dietitians of Canada, and American College of Sports Medicine all agree that good nutrition practices improve athletic performance and recovery. In order to maintain optimum health and performance in various training and competitive sport situations, these organizations offer recommendations for the proper intakes of food, drinks, and supplements. For the members of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine, as well as other professional organizations, government agencies, industry, and the general public this position paper was produced. Accurate information on dietary variables that have been shown to affect athletic performance as well as developing trends is provided by the Academy, DC, and ACSM in this report. A certified dietitian/nutritionist should be recommended to athletes for a customized nutrition plan. The Certified Specialist in Sports Dietetics (CSSD) is a certified sports nutrition specialist in the United States and Canada.

Monica Sousa A, Maria J. Fernandes (2015) Athletes often use nutritional supplements (NS). The connection between dietary adequacy and the use of NS is, however, poorly understood. The study's objectives were to assess NS use and compare dietary intake and the prevalence of micronutrient insufficiency (PMI) among NS users and non-users. The results showed that NS users were more likely to have PMI. Methods: A questionnaire on NS use and a semi-quantitative food-frequency questionnaire evaluating data from the preceding 12 months were completed by Portuguese athletes from 13 different sports. The PMI was calculated using the estimated average required cut-point technique. The dietary intake and NS use were compared using general linear models. We used chi-squared analysis and logistic regression to look for links and correlations

between the use of PMI and the use of NS. Results: 64% of the 244 athletes (mostly men, aged 13e37) admitted to using NS. For at least one gender, for energy, and for seven out of the 17 nutrients examined after correction, NS users had greater food consumption (p 0.05). Among the nutrients with the greatest PMI were vitamins D and E, calcium, folate, and magnesium. Users of NS, both men and women, had reduced calcium-PMI after correction (OR 0.28, 95% CI 0.12, 0.65), with female NS users experiencing lower magnesium-PMI (OR 0.06, 95 percent CI 0.00, 0.98). As a result, athletes who used NS had greater food intake and lower PMI levels for a variety of nutrients. Participants in the NS study were presumably those who would be least helped by it.

O. Molinero and S. Márquez (2009) many amateur and professional athletes try to improve their performance by using nutritional supplements. Ergogenic aids may be both expensive and dangerous, and the claimed benefits are often based on shaky science. Since there is no oversight in the dietary supplement business, there are many supplements on the market with questionable contents and quality. Many dietary supplement products include ingredients that are either banned in sports or have been linked to severe health risks. It has been shown that athletes lack understanding or are misinformed despite the availability of many sources of information, and more research is needed to understand the reasons for and consequences of unsupervised and unrestricted supplement usage. Nutritional education and scientifically sound advice for athletes are just as important as proper regulation of dietary supplements. Adolescents should be the focus of intervention and preventive initiatives.

RESEARCH METHODOLOGY

The current research was started with the primary goal of examining the impact of dietary supplements, both solid and liquid, on athletes' nutritional status and athletic performance. One study were tested the effectiveness of a solid supplement (spirulina and commercial antioxidants), while the other looked at the impact of a liquid supplement (sugarcane juice and sports drink) on athletes' performance. This study was going into depth on the materials and techniques that will be utilized.

Selection of the Sample

The study's aim and experimental procedure will be explained to the participants, and they signed a permission form to participate. Ninety male athletes between the ages of 15 and 21 were enlisted as the study I's participants. The study's participants was a group of 15 male athletes aged 18 to 25. Subjects were made aware that they had the option of withdrawing from the experiment at any time. However, no one left the experiment before the conclusion.

The study gathered ninety male athletes between the ages of 15 and 21 to be study participants. These included 45 athletes who cycled or ran in the aerobic exercise group (AEG) and 45 hockey players in the mixed aerobic exercise group (MEG) (MEG). In the aerobic and mixed exercise groups, 15 individuals were divided into three subgroups: Controls, Experimental I, and Experimental I1. Sex, age, and anthropometry will be all monitored in this study.

Tools for Data Collection

Appropriate timetables for data collection and recording were devised.

i. General information

ii. Anthropometric measurements record

iii. Diet Record

iv. Bio chemical assessment

v. Record of physiological transients.

DATA ANALYSIS

PROFILE OF FUNCTIONAL INDICATORS OF NUTRITIONAL STATUS

Functional indicators of nutritional status are diagnostic tests to determine the sufficiency of host nutriture to permit cells, tissues, organs, anatomical systems to perform optimally in the intended nutrient dependent biological system.

Sub maximal exercise test is useful as an adjunct to biochemical and anthropometric measures in the assessment of nutritional status. In the present context sub maximal exercise test was performed on a bi cycle ergometer to elicit the functional indices viz., heart rate (HR), maximum oxygen uptake (V02max), total exercise time and peak lactate. The data pertaining to heart rate is presented in table and V02max, total exercise time and peak lactate is presented in table.

Heart Rate

Heart rate is defined as the rate of cardiac muscle contractions in one minute and this indicates the load given to the heart, HR is increased immediately after an exercise starts and the increment is consistent with work rate, The mean PHR of MEG and AEG was 87.76 and 81.67 bpm. The mean Max HR (at the point of exhaustion) of MEG and AEG was 191 bpm and 192.3 bprn respectively, The PHR of MEG was significantly higher (pO<O,05)than AEG, TI\e maximum heart rate recorded by AEG and MEG did not differ significantly, The recovery heart rates (Rec HR) were recorded at 60, 120, 180 seconds to observe the recovery pattern of the

subjects, The mean Rec HR of MEG at 60, 120, 180 seconds were 166,11,143.87 and 128,27 bpm respectively while the AEG recorded 152,58,130,89 and 119.49 bpm respectively at the specified time points" The AEG recovery was significantly faster (p<O,05) than that of MEG,

Table 1: Heart Rate Responses of the Subjects in Pre and Post Exercise and Recovery Conditions

Heart Rate (bpm)	Mean ±SE		't' Value
	MEG	AEG	
Pre exercise HP (PHR)	87.76±0.852	81.67±1.372	3.769*
Post exercise HR (Max HR)	191±1.264	192.31±0.913	0.188*
Recovery HR 60 sec (rec HR)	166.1±1.153	152.58±1.750	5.789*
Recovery HR 120sec	143.87±1.527	130.89±1.866	6.059*
Recovery HR 180 sec	128.27±1.245	119.49±1.803	2.315*

*Significant at p<Q,05
Maximum Oxygen Uptake (VOzmax)

EFFECT OF LIQUID SUPPLEMENTATION ON PERFORMANCE INDICATORS

The subjects performed bicycle ergometric test till exhaustion with each liquid viz., PW, SO and SCJ with a stabilization period of one week between the trials. The heart rate, total exercise time, blood glucose and blood lactate were selected as pointers of performance indicators.

Heart Rate

Subjects' mean pre-exercise heart rates (PHR) before trials with PW, SO, and SCJ were 76.6, 77.86, and 76.6 bpm, respectively, showing no significant differences between trials. The pulse rate was monitored every five minutes for up to 90 minutes throughout each session. As the amount of time spent exercising increased, so did heart rates (p0.05). During the trials with PW, SO, and SCJ, there was no significant change in heart rate measured during exercise. Fig. 25 shows the current trend.

There were 15-minute intervals used to measure post-exercise recovery heart rate for each session. PW, SO, and SCJ trials all indicated no significant differences in heart rates (p>0.05) as recovery time increased.

Table 2: Heart Rate Responses of the Subjects before and during Exercise with Select Drinks

Exercise Time (min)	Heart Rate (bpm) (Mean ± SE)			ANOVA Value
	Plain water	Sports Drink	Sugarcane Juice	
PHR	76.60±2.66	77.86±3.790	76.60±2.95	
5	141.60±4.07	148.47±3.09	145.07±2.77	
10	151.33±4.00	153.47±3.55	151.87±3.32	
15	154.33±3.30	156.47±3.41	156.73±3.277	
20	157.20±3.15	158.20±3.32	159.47±2.91	
25	159.67±2.99	161.40±3.27	163.33±2.88	
30	163.13±3.15	161.21±3.08	164.79±2.50	
35	163.92±3.51	162.50±3.45	164.85.2.23	$F_{Duration}$=92.695
40	163.33±2.97	161.08±2.70	166.67±2.34	p-value: 0.00*
45	165.58±2.94	164.33±2.94	168.6±2.82	
50	168.64±3.14	164.50±2.36	170.6±2.75	F_{Trials}=0.43
55	168.27±3.74	167.80±2.33	172.6±2.90	p-value:0.73^{NS}
60	174.0±2.91	172.22±2.87	176.0±3.19	
65	178.22±2.86	175.12±1.42	179.0±1.85	
70	186.57±2.13	178.71±1.65	184.4±2.14	
75	190.0±3.017	182.20±2.33	188.0±2.0	
80	196.5±2.53	186.00±2.48	195.0±2.12	
85	200.67±0.66	18.75±2.09	196.75±2.35	
90	204±0	193.50±5.50	204.0±0	

* Significant at p < 0.05
NS Not significant

CONCLUSION

A total of two separate studies were used to conduct the current research, titled "Effect of selected dietary supplements (liquid/solid) on nutritional status and sports performance of the athletes." There will be two studies, one to see whether a liquid supplement (sugarcane juice and sports drinks) can boost athletic performance while the other will assess the effectiveness of spirulina and commercial antioxidant supplements. Athletes must have important nutrition information in order to maintain appropriate nutritional status and improve performance. It is necessary to create meals that include foods high in iron and low in bulk cereals for athletes on a regular basis. The energy requirements of Indian athletes and sportspeople were calculated using the traditional method of direct calorimetric; however, the intake of other nutrients was set arbitrarily at 2-3 times the normal requirements, in light of their expected higher nutrient requirements for good performance. There have been no systematic human metabolic investigations to determine more precise nutritional needs other than energy. Systematic studies using the methods outlined above are desperately needed to discover the appropriate nutritional needs for persons participating in sports and athletic activities. AEG and MEG's performance levels did not meet international requirements. The individuals were younger, with fewer years of training and involvement than top athletes, making it more difficult for them to adjust to the physical demands of their activity. There is a need to improve nutritional care, as well as education and training facilities, in order to promote international standards. During activity in a comfortable (3°C) setting, sugarcane juice may be as beneficial as a sports drink or plain water. However, further research into the usefulness of sugarcane juice in hot environments is required Sugarcane juice may be more effective in maintenance of blood glucose levels during exercise than plain water and sports drink.

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