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THE RELATIONSHIP BETWEEN DIETARY SUPPLEMENT AND MUSCLES ENDURANCE AND BALANCE AMONG ATHLETES IN CROSS RIVER STATE NIGERIA

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ABSTRACT

This study examined the relationship between dietary supplement and, muscular endurance and balance among athletes in Cross River State. Two research objectives were formulated to guide and direct the study. The objectives investigated the relationship between dietary supplement and muscular endurance and the relationship between dietary supplement and balance among athletics in Cross River State, Nigeria. Relevant literature related to the study was reviewed. Survey research design was considered appropriate for the study. Stratified random sampling technique was adopted in selecting the sporting facilities while systematic random sampling technique was adopted in selecting the two hundred and thirty-five respondents used for the study. A well validated structured questionnaire was used for data collection. Pearson product moment correlation statistical tool was used for data analysis. The result obtained revealed that; dietary supplement significantly relates with muscular endurance among athletes and there is no significant relationship between dietary supplement and body balance among athletes. The study recommended that athletes should be regularly sensitized on the need to take relevant dietary supplement, when necessary, in order to boost their level of muscular endurance while performing sports

KEYWORDS: dietary supplement, muscle endurance, balance, athletes

INTRODUCTION

Sport has become a culture having the status of a social institution as it has its aim, discipline or fellowship, code of conducts and an influence on government policies and the behavioural pattern of the citizenry of all nations. Every nation has its own national sports, which is a unifying factor in national identity and prestige (Olorunsola & Aderenmu, 2017).

Sport has been regarded as an integral part of the society. Saga (2016) asserted that sports can also be described as activities involving physical exertion and skill in which an individual or team compete against another or for the purpose of entertainment. Sports may have the tendency if well organized to change the entire human personality (Whole-man) through active and passive participation.

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Such components of personality that sports are capable of transforming includes physical, social awareness, moral, mortal, psychological, and emotional (Agbomi, 2015). Sports can be learned as well as an organized and institutionalized physical activity with structured programmes governed with rules and regulations (Edim, 2011).

In other words, Odigbo (2013) views sport as a form of education that improves endurance, fitness, optimal speed, body composition, and flexibility in order to meet with the maximum physical, social, mental, moral, and emotional development of the whole person.

This means that achieving peak athletic performance requires the growth of a well-rounded person with a sound mind in a healthy body, who is also socially sound, and who lives within the prescribed dietary supplement. Physical fitness is a psychological state of well-being that lays the groundwork for daily tasks, offers some defense against chronic illnesses, and serves as a prerequisite for engaging in sport. In essence, physical fitness describes a sort of attributes relating to how well one performs physical activity. For an individual or athlete to continually improve their physical activity or fitness, there must be a gradual progressive overload in the number of physical activities. Hence, regular physical activity is one of the most important thing one can do for his or her health.

Physical fitness is a general state of health and well-being and, more specifically, the ability to perform aspects of sports, occupations and daily activities physical activities are generally achieved through proper nutrition, moderate vigorous physical exercise, physical activity and sufficient rest (Tremblay, Colley, Saunders, Heally and Owen, 2010). Physical fitness is a condition of health and well-being that is related to one's ability to engage in physical exercise. Physical fitness entails the efficiency and efficacy of the body's systems, optimal performance, endurance, and strength in daily activities, and the treatment of disease, weariness, stress, and sedentary behavior. Physical fitness is a state of physiologic well-being attained via a combination of a healthy diet, frequent physical activity, and other health-promoting habits. It is important to make the distinction between health-related physical fitness and athletic performance physical fitness. Health related physical fitness refers specifically to these components of physical fitness associated with some aspect of good health, disease and not necessarily sports performance (Malina, 2015).

Athletic performance refers to an athlete's execution of specified physical routines or acts while participating in a sport or activity. It is a complicated trait impacted by both genetic and environmental influences. Athletic performance is impacted by physiological and psychological elements in addition to movement. Performance in an athletic environment has a widespread connotation of symbolizing the quest of excellence, when athletes measure their performance as an advancement towards excellence or achievements (NIH,2021).

The sports encyclopedia (2023) submitted that athletic performance is separate from many broader topics in sports science, such as health, fitness, and longevity. Athletic performance refers to an athlete's efforts over a period of time to achieve specified performance goals. The level of performance will be influenced by the athlete's innate talent or fitness; ultimately, all athletes judge performance by their own criteria. As opposed to a single or isolated activity, performance is usually seen as an accumulation of individual results, such as performance across a month or a season of competition.

The American Council on Exercise (ACE) described the term muscular endurance to mean how long muscles can continue to work out. Enhancing muscle endurance can aid improve fitness and general health. Muscular endurance is the capacity to continue contracting a muscle, or group of muscles, against resistance over time. This resistance might take the form of weights or your own body weight. The ability to contract and resist these forces is increased by improving the performance of these muscles. The benefits of muscle endurance include; helping maintain good posture and stability for longer periods enhancing muscular aerobic ability; enhancing the capacity to perform daily functional tasks, including lifting big objects and boosting physical prowess in endurance-based sports (NIH,2021). On the other hand, Athletic balance is the ability to stay upright or stay in control of body movements and coordination is the ability to move two or more parts under control, smoothly and efficiently. Balance can be static or dynamic. Dynamic balance is the maintenance of equilibrium when moving, whereas static balance is the maintenance of equilibrium when stationary.

A nutritionally suitable diet and enough fluid intake are essential for anyone to physically perform at their best. All people should follow this eating strategy, according to the Dietary Guidelines for Americans. In order to maintain blood glucose levels and replenish muscle glycogen, athletes need to consume enough calories, water, and carbohydrates each day (Thomas, Erdman, Burke, MacKillop, 2016).

Dietary supplement refers to any "product" intended to supplement diet that contains one or more dietary ingredient such as: vitamins, minerals, herbs, meal supplements, sport nutrition products, natural food supplements, and other related products used to boost the nutritional content of a diet (Burke, Cort and Cox, 2016). The human daily meal are not enough to boost our strength in intense sporting activities. Sports supplements can provide an easy way to improve health and build or maintain muscle mass, endurance, and power. Injury prevention and enhanced recovery are important benefits of using sports nutrition supplements (Dickson, 2015). On the other hand, athletic performance physical fitness is that portion of physical fitness directed towards optimizing performance in a certain sport. Each sport will require a balance of different facts of fitness for optimal performance. For example, gymnastic requires a high degree of agility and flexibility, whereas competitive long distance swimming requires a high degree of acrobic fitness. The adaptation within the body as a result of training for specific sports well almost always confer significant health benefits also on the athletes concerned (Juhn, 2013).

Many athletes use different dietary supplements for a variety of reasons especially to boost optimum performance. Among the most popular products are cryogenic aids, such as sports drinks, minerals, caffeine, co-enzyme Qio, and creative to enhance physical performance and to tolerate rain. (Nayler, Ceardner, and Zaichkowsky, 2016). Optimizing training through the provision of well timed nutrition, and the use of various effective nutritional guides can help optimize performances and training adaptation characterized with good alertness, excellent natural personality, a well-developed body, with normal weight for sporting performance.

Dietary supplement used by athletes to achieve optimum performance in sport are something added to the diet, mainly vitamins, minerals, amino acids, herbs or botanicals, and metabolites/constituents/ extracts, or combination of any of these ingredients. In addition to actual food products targeted to athletes and physically active individuals, numerous companies have marketed dietary supplements to athletes, with the claim that sports performance may be enhanced (Geyer, 2014). Other specific uses of dietary supplements as touching performance in sports, include direct performance enhancement of the indirect benefits that arises from the provision or support for hard training, the manipulation of physique, the alleviation of musculoskeletal pain, rapid recovery from injuries, and enhancement of mood. However, these had been attributed to anxiety of athletes and the need for optimal performance as proportion of these athletes and sports administrators effectiveness is depended on an improved dieting and anxiety (Odok, Dan & Akpong, 2017). Use of dietary supplements requires the support, advice and counselling of the athletes by trained health personnel. The state of health of the athlete would to a larger extent determine the variety, adequacy or otherwise of the dietary supplements required by the athletes. Therefore, health appraisal and counselling services for students/athletes and relevant screening test for the athlete state of health becomes important, (Dan, Edet and Lale,2019).

Objectives of the study

The primary purpose of the study was to investigate whether athletes nutrition has any relationship with their performances. Specifically the objectives of the study include:

i) examine the connections between dietary supplements and muscular endurance among athletes in Cross River State;

ii) determine whether dietary supplements play any role in achieving athletic balance among athletes in Cross River State, Nigeria.

Statement of hypotheses

The following hypotheses were formulated to guide this research study;

1) There is no significant relationship between dietary supplement and endurance among athletes.

2) There is no significant relationship between dietary supplement and balance among athletes

LITERATURE REVIEW

Dietary supplement and endurance among athletes

Jeffrey and David (2020) opined that endurance training leads to variety of adaptation at the cellular and systemic levels that serve to minimize disruptions in whole-body homeostasis caused by exercise. These adaptations are deferentially affected by training volume, training intensity and training status, as well as the nutritional choices that can enhance or impair the response to training. A variety of supplements have been studied in the context of acute performance enhancement, but the effect of contentious/ continually supplementation concurrent to endurance training programmes are less well characterized. For example, supplements such as sodium bicarbonate and botanlanic can improve endurance performance in sports and possibly training adaptations during endurance training by affecting buttering capacity and allowing an increased training intensity, while antioxidants such as vitamin C and E may impair training adaptations by blunting cellular signaling but appear to have letter effect on performance outcome.

Cohen (2018) agreed that for athletes, the main purpose for dietary supplement is to ensure the compensation of increased energy consumption and the need for nutrients in the athletes' body, thereby enabling maximum adaptation to physical load. Endurance or aerobic activities increase breathing and heart rate. These activities help the athletes' health, improve fitness, and task needed to do everyday activities as an athlete. Endurance activities improve the health of heart, lungs and digestive system. They also delay and prevent many diseases that are common in older individuals or adults such as diabetes, colon, breast cancers, heart diseases and other physical activities that build endurance includes: Brisk walking, Yard work (Mending, raking) dancing, walking, pegging, swimming, biking, climbing stairs of hills, playing tennis and basketball.

One view of exercise –including fatigue is that it occurs when the rate of ATP (Adenosine emphosphate) hydrolysis in the active muscles exceeds the rate at which ATP can be regenerated. It follows that the onset of fatigue can be delayed and exercise performance improved at a higher rate of ATP re-synthesis can be maintained. Supplements that are claimed to improve performance by increasing energy supply and delaying fatigue includes bicarbonate, Caffeine, carnitive, creative, guarana, hernet juice, iton, magnesium, pyruvate and ribose (Spriet and Gibala, 2014).

Supplement use is widespread in sport, even though, most supplements used are probably ineffective. There has been much interest recently among athletes in vitamins C and E, which has been shown to have anti-oxidant properties, and which may be involved in protecting cells, especially muscle cells, from the harmful effects of the highly reactive from radicals that are produced when the rate of oxygen consumption is increased during exercise to enhance endurance (Kantar, 2017).

Huelster (2015) reported that prolonged endurance training season include substantial metabolic perturbations (a change from normal state) in skeletal muscles, including the depletion of endogenous fields and damage or disruption to muscle and body proteins. Therefore, increasing nutrient availability (ie protein and carbohydrate) in the pest-recovery period is important to replenish substrates skills and facilitate repair and remodeling of skeletal muscle. To date, however, little attention has focused on the ability of dietary protein to enhance skeletal muscle remodeling and stimulate adaptations that promote an endurance phenotype to strenuous endurance base training among athletes.

Dietary supplement and balance among athletes

Balance exercises with the support of dietary supplement helps to prevent Fall, a common problem among athletes and other adults when ageing begins to set in. Many lower body strength exercises also will improve athletes balance in sporting activities. Exercise to improve an athlete balance includes; standing on one foot and heel –to-see walk.

The food and dietary supplement an athlete chooses can make the difference between success and failure in his performance. A varied diet occurs in an amount sufficient to meet the energy needs of the athlete in training should provide all the essential nutrients in adequate amount.

Perko (2016) affirmed that reasons for dietary supplement use include; to compensate for an adequate diet, to meet abnormal demands of hard training of frequent competition, provide balance and improve the performance of the athlete as well as to keep up with team-mates or opponents. Odigbo, (2013) opined that dietary supplement to enhance balance and athletes' performance come in a variety of forms, including tablets, capsules, liquids, powder and bars. Many of this product contain numerous ingredients in varied combinations and amounts. For any individual to be physically at his or her best, a nutritionally adequate diet or dietary supplement and sufficient hydration are critical. A few dietary supplements might enhance performance and balance only when they add to, but do not substitute for, this dietary foundation.

Athletes engaging in endurance activities lasting more than an hour or performed in extreme environments (e.g, hot temperature or high attitude) might need to replace lost feuds and electrolytes and consume additional carbohydrate supplement for energy and balance. Even with proper nutritional preparation, the results of taking any dietary supplement(s) for exercise and athletic performance vary by level of training; the nature, intensity, and duration of the activity and the environmental conditions (Wason, 2016). Vitamins and minerals were used to cure deficiency diseases. Supplements nowadays are used with the aim of reducing the risk of chronic disease among athletes of which the origins are complex.

Schoor (2020) asserted that dietary supplements are concentrated sources of vitamins, minerals or other ingredients that are used to supplement a normal diet. Dietary supplements are usually taken orally and are commercially available in many forms such as capsules, powder, pills and syrups. Studies have shown that majority of athletes that make use of this products are healthy and do not need to supplement their diets, in spite of this, supplements can be extremely valuable to those who need them athletes not excluded. Responses to dietary supplements can vary substantially between individuals, and therefore the ingestion of any supplement must be assessed in training before being used in competition. It is recommended that dietary supplements are only used based on the advice of a qualified sports nutrition professional (Hospel, 2016).

METHODOLOGY

The survey research design was considered most appropriate for this study. According to Schatt (2012), survey design involves the collection of information from a sample of individuals through their responses to questions. The population of the study was made up of seven hundred and eighty-two (782) registered athletes in Cross River State which formed the study area. A sample of 235 respondents were selected using stratified random sampling technique. The instrument used for data collection was a well validated self-structured questionnaire titled Dietary Supplements and Performance in Sporting Activities Questionnaire (DSPSAQ). Collected data was analyzed using Pearson product moment correlation coefficient.

Data analysis and Discussion of findings

Data analysis

Hypothesis one

There is no significant relationship between dietary supplements and endurance among athletes. The independent variable in this hypothesis is dietary supplements while the dependent variable is endurance among athletes. Pearson product moment correlation statistical tool was used for data analysis. The result of this analysis is presented in Table 1.

Table 1: Pearson product moment correlation analysis of the relationship between dietary supplements and muscular endurance among athletes in Calabar Municipality, Cross River State (N = 235)

Variables	Σx Σy	$Σx^2$ $Σy^2$	Σxy	Cal-r	P.value
Dietary supplement	6927	8749	6139	*3.924	0.000
Muscular endurance among athletes	3228	4364			

*Significant at 0.05; df = 233

The result of analysis presented in Table 4 showed that the calculated r-value of 3.924 is higher than the p.value of 0.000 at 0.05 level of significance with 233 degree of freedom. This implied that the null hypothesis was rejected. Therefore, there is a significant relationship between dietary supplements and muscular endurance among athletes in Calabar Municipality of Cross River State.

Hypothesis two

Dietary supplement does not significantly relate with body balance among athletes. The independent variable in this hypothesis is dietary supplement while the dependent variable is body balance. Pearson product moment correlation statistical tool was used for data analysis. The result of this analysis is presented in Table 2.

Table 2: Pearson product moment correlation analysis of the relationship between dietary supplements and body balance among athletes in Calabar Municipality, Cross River State (N = 235)

Variables	Σx Σy	$Σx^2$ $Σy^2$	Σxy	Cal-r	P.value
Dietary supplement	6927	8749	6614	*4.232	0.000
Body balance among athletes	3441	4864			

*Significant at 0.05; df = 233

The result of analysis presented in Table 2 showed that the calculated r-value of 4.232 is higher than the p.value of 0.000 at 0.05 level of significance with 233 degree of freedom. This implied that the null hypothesis was rejected. Therefore, there is a significant relationship between dietary supplements and body balance among athletes in Calabar Municipality of Cross River State.

DISCUSSION OF FINDINGS

Dietary supplements and endurance among athletes

The finding obtained from analysis of data and testing of hypothesis two in the study revealed that the null hypothesis was rejected. This implied that there was a significant relationship between dietary supplement and muscular endurance among athletes in Cross River State. The finding could be traced to the fact that the ability to perform a task continuously without getting tired is paramount in the performance of sports among athletes.

Sport performance is usually an activity that last for a relative long duration and requires the ability to carry out such an activity to the end. In some cases, athletes have engaged in the use of dietary supplement to boost their endurance level, which has enhanced their participation and performance in sports.

This finding is in agreement with that of Jeffrey and David (2020) who opined that endurance training leads to variety of adaptation at the cellular and systemic levels that serve to minimize disruptions in whole-body homeostasis caused by exercise. These adaptations are deferentially affected by training volume, training intensity and training status, as well as the nutritional choices that can enhance or impair the response to training. A variety of supplements have been studied in the context of acute performance enhancement, but the effect of contentious/ continually supplementation concurrent to endurance training programmes are less well characterized.

For example, supplements such as sodium bicarbonate and botanlanic can improve endurance performance in sports and possibly training adaptations during endurance training by affecting buttering capacity and/or allowing an increased training intensity, while antioxidants such as vitamin C and E may impair training adaptations by blunting cellular signaling but appear to have letter effect on performance outcome.

The finding of this study also supported that of Cohen (2018) who reported that for athletes, the main purpose for dietary supplement is to ensure the compensation of increased energy consumption and the need for nutrients in the athletes' body, thereby enabling maximum adaptation to physical load. Endurance or aerobic activities increase breathing and heart rate. These activities help the athletes' health, improve fitness, and task needed to do everyday activities as an athlete. Endurance activities improve the health of heart, lungs and digestive system. They also delay and prevent many diseases that are common in older individuals or adults such as diabetes, colon and breast cancers, heart diseases and other physical activities that build endurance includes: Brisk walking, Yard work (Mending, raking) dancing, walking, pegging, swimming, biking, climbing stairs of hills, playing tennis and basketball.

Dietary supplements and balance among athletes

The finding obtained from analysis of data and testing of hypothesis three in the study revealed that the null hypothesis was rejected. This implied that there was a significant relationship between dietary supplement and body balance among athletes in Cross River State. The reason for this finding could be that body balance is recognized as a basic requirement for effective sports performance among athletes. The ability to have balance is expressed in various ways including being able to lift heavy objects, sitting and getting up without holding a chair. It also includes the ability to do sit up, pick pin among others without staggering. The use of dietary supplements have been seen to help maintain and improve balance among athletes.

This finding is in agreement with that of Perko (2016) who reported that reasons for dietary supplement use include; to compensate for an adequate diet, to meet abnormal demands of hard training of frequent competition, provide balance and improve the performance of the athlete as well as to keep up with team-mates or opponents. Odigbo, (2013) opined that dietary supplement to enhance balance and athletes' performance come in a variety of forms, including tablets, capsules, liquids, powder and bars. Many of this product contain numerous ingredients in varied combinations and amounts. For any individual to physically at his or her best, a nutritionally adequate diet or dietary supplement and sufficient hydration are critical. A few dietary supplements might enhance performance and balance only when they add to, but do not substitute for, this dietary foundation.

The finding of this study also supported that of Schoor (2020) who asserted that dietary supplements are concentrated sources of vitamins, minerals or other ingredients that are used to supplement a normal diet. Dietary supplements are usually taken orally and are commercially available in many forms such as capsules, powder, pills and syrups. Studies have shown that majority of athletes that make use of this products are healthy and do not need to supplement their diets, in spite of this, supplements can be extremely valuable to these who need them athletes not excluded. Responses to dietary supplements can vary substantially between individuals, and therefore the ingestion of any supplement must be assessed in training before being used in competition. It is recommended that dietary supplements are only used based on the advice of a qualified sports nutrition professional.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Summary of the study

This study examined the influence of dietary supplement on muscular endurance and balance among athletes in Cross River State. Survey research design was considered appropriate for the study. Stratified random sampling technique was adopted in selecting the sporting facilities while systematic random sampling technique was adopted in selecting the two hundred and thirty-five respondents used for the study. A well validated structured questionnaire was used for data collection. Pearson product moment correlation statistical tool was used for data analysis. The result obtained revealed that;

i. Dietary supplement significantly relates with muscular endurance among athletes
ii. There is no significant relationship between dietary supplement and body balance among athletes

RECOMMENDATIONS

From the findings obtained in the study, the researcher recommended that;
i. Athletes should be regularly sensitized on the need to take relevant dietary supplement, when necessary, in order to boost their level of muscular endurance while performing sports
ii. Athletes should be provided with necessary dietary supplements that would boost their immune system and subsequent body balance required to effectively carry out sporting activities

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