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Assessment of Dietary Supplements Intake and Iron Status of Adolescent Athletes in Ogun State

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ABSTRACT

This study explores the nutritional challenges faced by adolescent athletes, emphasizing increased nutrient requirements due to changes in body composition, heightened activity levels, and factors like the menstrual cycle. Dietary supplements, particularly Multiple Micronutrient (MMN) supplements, are utilized to address nutritional imbalances. Global concerns of iron deficiency and anemia affecting physical and cognitive functions are highlighted, with an emphasis on insufficient iron intake, chronic blood loss, and intense exercise as contributing factors. Mineral deficiencies, notably calcium and iron, can impact athletes' health and performance, especially among women. Examining 270 respondents, categorized into older and younger adolescents, the study reveals a higher male representation among athletes. Seventy-six percent of athletes use dietary supplements, primarily for energy enhancement, with various forms such as energy drinks, herbal products, and multivitamins being consumed. Anemia is identified in 14.3% of respondents, predominantly females, while 85.7% exhibit sufficient iron levels. No severe cases of anemia, iron depletion, or deficiency were observed. Association analysis indicates a link between age and hemoglobin status, with gender differences influencing the likelihood of anemia. Serum hemoglobin and ferritin levels show no significant differences between supplement users and non-users. The findings underscore the necessity for regular nutritional assessments and medical checkups for athletes in Ogun state to proactively address potential health issues. Caution is advised against promoting the use of supplements like energy drinks and herbal products, particularly among younger athletes, and discouraging frequent use among older athletes.

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Introduction

The term "athlete" broadly describes individuals engaged in sports or physical activities. Adolescent athletes face a dual nutritional challenge due to increased nutrient requirements stemming from changes in body composition, heightened activity levels, and factors like the menstrual cycle in females [1].

Dietary supplements, which concentrate specific nutrients, aim to complement daily diets when balance is lacking. Multiple micronutrient (MMN) supplements encompass the provision of three or more micronutrients in various forms (capsules, tablets, drops, or syrup) [2].

Iron deficiency and anemia are widespread nutritional deficiencies globally, affecting physical performance and cognitive functions. Anemia results from low hemoglobin levels, often linked to insufficient iron intake, chronic blood loss, or intense exercise. Iron deficiency and anemia impact work capacity and increase susceptibility to infection.
Mineral deficiencies, notably calcium and iron, can affect athletes' health and performance, particularly among women [3,4].

Micronutrients are key to metabolic pathways and they cannot be substituted for each other like macronutrients, nor be synthesized within the body. Most individuals depend on supplying their bodies with essential micronutrients from diets, but factors like age, lifestyle, hormonal activities, exercise, bioavailability, and half – life of the micronutrients determine the micronutrient from diet fulfils the requirements. Micronutrients are essential component of the diet and are necessary for normal cellular and molecular function. Also state that micronutrients work to maintain and strengthen the immune system through their action on epithelial barriers, cellular immunity and antibody production. Micronutrients are only needed in small amounts, but their deficiency can result in wide range of negative health effects. Micronutrient deficiencies are especially a concern in developing countries, due to inadequate consumption of food, lack of dietary diversity, and poor absorption of nutrients due to infection, inflammation, and chronic illnesses [2,5,6].

Also, there is a misconception that athletes can fully regain bone mass and strength once they have retired from sport. There are potential performance consequences of poor bone health, such as the development of stress fracture injuries. These are important injuries for the athlete that can result in a significant loss of training time and reduce sport performance. In nutritional guidelines, the main focus for athletes is on the need for energy, macronutrients and fluid, but less importance is given to micronutrient. Adolescent athletes need special attention. There is need to prevent health problems related to nutritional deficiencies which may lead to loss of performance and poor growth and development [3,7].

Adolescence is a time of intense physiological, psychological and social changes. Individuals in this age group are often seen as healthier compared to those at other stages of the life cycle, irrespective of their social and economic status. In developed countries, health services are struggling with chronic diseases in elderly population while in developing countries, pre-school children and women of reproductive age are evaluated as requiring nutritional support. The adolescents are squeezed between the pediatric and adult groups, and are not shown the necessary care for some problems such as malnutrition and micronutrient deficits related to adolescent nutrition. This has led to assessing the supplement intake and iron status of the adolescent athletes [3].

Also, micronutrients are not direct sources of energy but facilitate energy production and utilization from carbohydrate, fat, and protein, transport oxygen and carbon dioxide, regulate fluid balance, protect against oxidative damage, antioxidants activity. There is need to assess nutrient intake of athletes in order to be able to advise them effectively on dietary strategies and supplement use. If an athlete keeps a well – balanced diet providing sufficient energy, it is very unlikely that they will be at risk of micronutrient deficiencies. However, many athletes restrict their calorie intake for different reasons. Mineral deficiency may occur in many athletes, especially in women, like calcium and iron. This may affect the athlete's health and/or performance [1].

Methodology

The study was a descriptive study and longitudinal survey. The study was conducted in Ogun State, Nigeria. The participants must be an adolescent [10 – 19 years]. The participants were actively involved in sporting activities and registered with a local, regional, or national sport federation. Stratified random sampling technique was used to select the participants [8].

Nutrient Supplements

Nutrient supplement questionnaire was used to assess supplement intake by the athletes, this was adapted from the dietary supplement questionnaire for athletes. Adapting the method used by. The questionnaire was based on supplements intake in the last 3months. How Often the participants use it was based on number of times in a week, reason for Use and source of information [9].

Blood Collection and Preparation

20% of the sample size (270) was the number of subjects' blood sample collected to make 54 blood samples. Fasting venous blood (5 mls) was collected in a blue litmus Heparin bottle and stored at −20°C until analyzed in the laboratory in Abeokuta for measurement of serum ferritin, hemoglobin, C – reacting Protein. All samples collected were transported to the laboratory for analysis.

Pretreatment of Some of the Laboratory Apparatus

All glassware and containers including the beaker, conical flask was well washed with non – ionic detergent solution to remove all dirt then rinsed with tap water to remove detergent. Then rinsed with distilled water and soaked in 10% nitric acid for 48 hours then rinsed again in distilled water and dried in oven at 800C before the commencement of the analysis, adopting method [10].

Separation of the Serum Sample from the Blood Sample

The blood samples were allowed to clot then centrifugated to remove the clotted blood and blood cells leave behind the serum. The serum obtained were then labeled and kept for further analysis.

Blood Sample Analysis

After the collection and labelling of the serum samples digestion was done. The wet digestion in a closed system was used adopting the method of. The acids used are concentrated hydrochloric acid (conc. HCl) and N – Butanol with no external heating [11].

Digestion Process

In a conical flask containing 500cL N – Butanol two drops of HCl was added covered and left for 10mins. 9ml of the prepared acid was pipetted into the digestion bottle in 54 places. 1ml of the serum was then added to a digestion bottle with similar label and covered up. The pipetted was rinsed off to take next serum to be added to another 9ml of the prepared acid concurrently. This makes 10ml solution in the digestion bottles.

The CRP Latex kit was used to detect C – Reactive Protein (CRP) in the serum samples. During analysis, agglutination was checked for. If agglutination occur then positive and if not, it is negative. For the no – agglutination (negative), it falls within the normal range of 1 – 6mg/L, while the agglutinated samples (positive) fall above 6mg/L depending on the time and rate of agglutination.

Procedure

The manufacturer's instructions were followed. The reagents and samples were allowed to reach room temperature to avoid reduced sensitivity of test due to low temperature. 50µL of the sample (one drop) was placed on each of the positive and negative control separate circles on a slide test. The CRP latex reagent was swirl thoroughly but gently before taking one drop (50µL) of it to the samples to be tested. The drops where mixed with stirrer and spread over the entire surface of each circle using different stirrers. The slide was then placed on a rotary shaker at 80 – 100r.p.m for 2mins. These was repeated for the 54 samples. This was done twice for each sample, giving two raw data for each sample and it's the same result.

Hemoglobin

Spectrophotometer was used adopting method. The serum samples for the hemoglobin analysis were set and allowed to reach room temperature. Before putting the samples into the spectrophotometer, a blank was put first to set the wavelength at 540nm. A commercial kit was used (Randox kit). The same procedure used for serum calcium concentration was also used but the wavelength was different. Also, the raw data gotten was converted to get the hemoglobin concentration using the same formula only the standard concentration changed and this concentration was gotten from the kit [12].

Ferritin

The serum ferritin is to indicate the iron store and this was determined using Eliza, DNM – 9602 Microplate Reader Bio – Inteco U.K adopting method [12].

Procedure

The desired number of coated wells in the holder was gotten. 29µl of standards specimens and controls were dispensed into appropriate wells. 100µl of enzymes conjugate reagent was dispensed into each well then mixed thoroughly for 30 seconds. It was then incubated at room temperature (20 - 220C) for 60 minutes. The incubator mixture was removed by flicking the plate content into a waste container. The microtiter wells were rinsed and flicked with washing buffer five times. The wells were then strike sharply into the absorbent paper towels to remove all residual water droplets. 100µl of TMB substrate was dispensed

into each well and gently mixed for 5 seconds then incubated for 20 minutes at room temperature in the dark. The reactions were stopped by adding 100µl of the stop solution to each well gently mixed for 30 seconds and ensured that all the blue color changed to yellow completely. The optical density was then read at 45nm with a microtiter reader within 15minutes. This was done twice for each sample.

Table 1: Cut – off Points of Serum Fe for Adolescents

	Biomarkers	Level	Indicate	
1.	hemoglobin level	< 12g/dl	Anemia	[13]
		< 8g/dl	Severe anemia	
2.	Serum ferritin	< 12 ug/l	Iron deficiency	
3.	hemoglobin & Serum ferritin	< 12g/dl & < 12ug/l	Iron deficiency anemia	[12]
4.	CRP		Control group	(Ece Karasu et al., 2018)

Results

A study involving 270 respondents, categorized into older and younger adolescents, revealed a higher male representation. Among the athletes, 76% use dietary supplements, primarily for energy enhancement. Of supplement users, 42.5% consume energy drinks, 4.3% herbal products, and 15.9% multivitamins and multimineral supplements. Notably, 30.9% take supplements to increase energy and combat fatigue. The study identified 14.3% of respondents with anemia, mostly females, while 85.7% had sufficient iron levels. No severe cases of anemia, iron depletion, or deficiency were found. Association analysis indicated a link between age and hemoglobin status, with gender differences influencing the likelihood of anemia. Serum hemoglobin and ferritin levels did not significantly differ between supplement users and non-users.

Table 2: Sports Participated in by the Respondents

Sporting activity	Male	Female	Total (N = 270)		
	Age (10 – 13 years) (n = 67)	Age (14 – 19 years) (n = 121)	Age (10 – 13 years) (n = 22)	Age (14 – 19 years) (n = 60)	
Gymnastics	0	3.3 (4)	3.3 (4)	0	1.5 (4)
Weight lifting	0	0	4.5 (1)	0	0.4 (1)
Track and field event	1.5 (1)	5.8 (7)	0	5.0 (3)	4.1 (11)
Combat sport	22.4 (15)	17.4 (21)	68.2 (15)	31.7 (19)	25.9 (70)
Ball game outdoor (football)	32.8 (22)	44.6 (54)	9.1 (2)	41.7 (25)	38.1 (103)
Ball game indoor (basketball)	11.9 (8)	17.4 (21)	0	11.7 (7)	13.3 (36)
Racket games	31.3 (21)	11.6 (14)	18.2 (4)	10.0 (6)	16.7 (45)

Table 3a: Socio – Demographic Characteristics of the Respondents

	Frequency	Percentage
Age		(15.35 ± 2.35)
10 – 14 years	89	33.0
15 – 19 years	181	67.0
Total	270	100.0
Gender		
Male	188	69.6
Female	82	30.4
Total	270	100.0
Level of education		
No education	2	.7
Primary education not completed	11	4.1
Primary education completed	17	6.3
Secondary education not completed	99	36.7
Secondary education completed	102	37.8
Tertiary institution	39	14.4
Total	270	100.0
Religion		

Islamic	77	28.5
Christianity	192	71.1
Traditional	1	0.4
Total	270	100.0
Tribe		
Yoruba	226	83.7
Hausa	5	1.9
Igbo	24	8.9
Others (Delta, Efik, Egede, Idoma, Nasarawa, Nupe, Rivers state, Tiv, Uhrobo)	15	5.5
Total	270	100.0

Table 3b: Socio – Demographic Characteristics of the Respondents (Continued)

	Frequency	Percentage
Mother's highest level of education		
No education	10	3.7
Primary education	27	10.0
Secondary education	136	50.4
Tertiary education	95	35.2
Others (Late)	2	0.8
Total	270	100.0
Father's highest level of education		
No education	10	3.8
Primary education	18	6.7
Secondary education	119	44.1
Tertiary education	120	44.4
Others (Late)	3	1.1
Total	270	100.0
Family type		
Nuclear family	164	60.7
Extended family	96	35.6
Single parenting	8	3.0
Others (living alone)	2	0.7
Total	270	100.0
Family size		
1	4	1.5
2 – 4	51	18.9
5 – 8	179	66.3
9 – 13	36	13.3
Total	270	100.0

Table 4: Socio – Economic Characteristics of the Respondents

	Frequency	Percentage
Mother's occupation		
Civil servant	60	22.2
Trader	157	58.2
Housewife	9	3.3
Artisan	30	11.1
5 Others (business woman, engineer, farmer, nurse, proprietress late)	14	5.2
Total	270	100.0

Father's occupation		
Civil servant	60	22.2
Trader	40	14.8
Businessman	127	47.0
Artisan	27	10.0
others (clergy man, engineer, farmer, horticulturist, retired, security, military man, pastor, late)	16	6.0
Total	270	100.0
Daily allowance		
No allowance	84	31.1
< N 100	37	13.7
N 100 – N 200	46	17.0
N 201 – N 300	29	10.7
N 301 – N 400	14	5.2
> N 400	60	22.2
Total	270	100.0

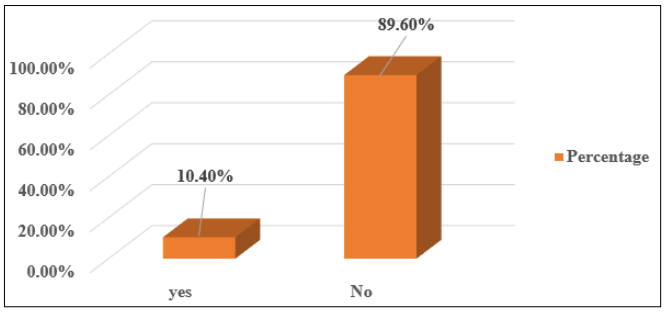

Figure 1: Number of Physically Challenged Athletes

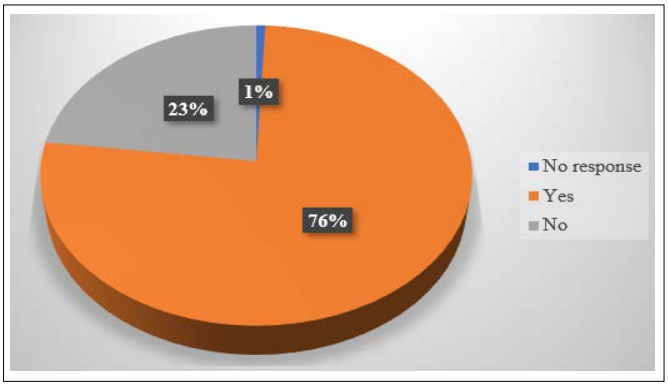

Figure 2: Percentage of Respondents Who Consume Supplement

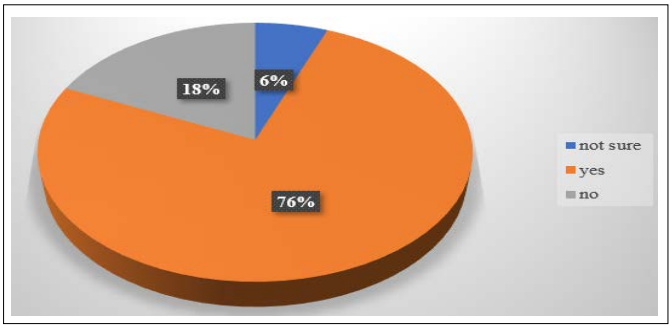

Figure 3: Percentage of Respondents who Think They Need Supplement

Table 5: Supplements Consumed by the Respondents (N = 207)

Supplements Consumed	Frequency	Percentage
Multimineral and multivitamins	33	15.9
Vitamins	17	8.2
Minerals	10	4.8
Proteins	5	2.4
Hormone activators	2	1.0
Herbs	9	4.3
Oil supplements	1	0.5
Carbohydrate	9	4.4
Energy drink	88	42.5
Sport drink	3	1.5
Multiple supplement use	30	14.5
Total	207	100

Table 6: Benefits Experienced from use of Supplements by the Respondents (N = 207)

Reasons for supplement use	Frequency	Percentage
Don't know	3	1.5
Medical and dietary need	32	15.5
Fitness	129	62.3
To improve diet and stay healthy	22	10.6
Someone told me to use it/otherers use it	12	5.8
Enjoy the taste/ convenient when thirsty or hungry	9	4.3
Total	207	100.0

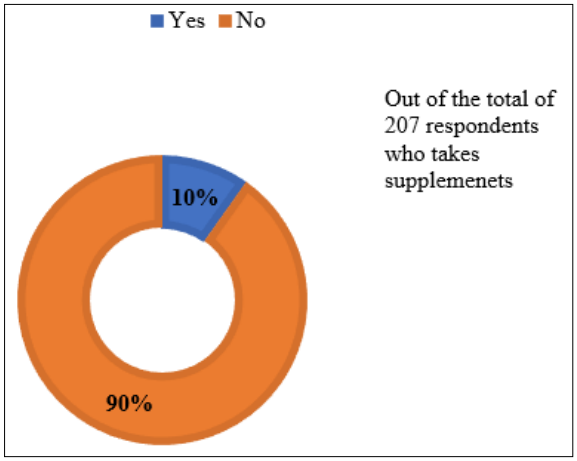

Figure 4: Percentage of Respondents who has had a Health Complication due to Use of Supplement

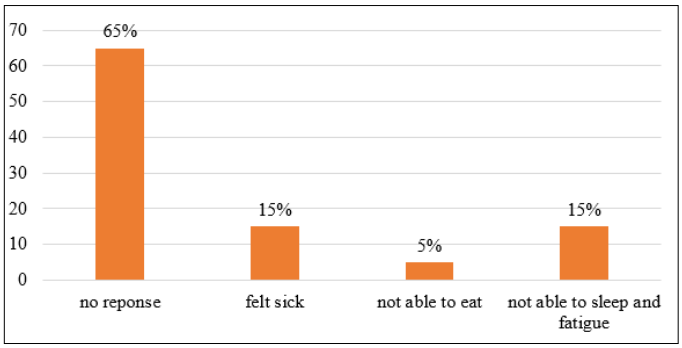

Figure 5: Health Complications due to use of Supplement

Table 7: Respondents' Source of Information for Supplement Use (N = 207)

	Frequency	Percentage
Sources of information on supplement use		
Social media	17	8.2
Television programs	11	5.3
Radio	13	6.3
Coaches	65	31.4
Internet	19	9.1
Family / friends	58	28.0
just decided myself	6	2.9
Others (medical, chemist)	11	5.3
Social media and television programs	1	0.5
Social media, internet, family and friends	1	0.5
Social media, family and friend	1	0.5
Coaches and the internet	2	1.0
Coaches, family and friends	1	0.5
Television programs, family and friends	1	0.5
Total	207	100.0

Table 8: The Biochemical Parameters of the Respondents (N = 54)

Characteristics	Mean serum concentration	Standard	% Within
C – reactive Protein	3.50 (2.70, 9.55)	< 6mg/L	75.9%
Serum ferritin	100.40 (59.03, 132.10)	15 - 170ug/L	79.6%
Hemoglobin			
Female (n = 10)	13.27 ± 1.88	14.0 - 17.5g/dl	50.0%
Male (n = 44)	14.38 ± 1.56	12.3 - 15.3g/dl)	61.4%

Table 9: Iron Status Classification

Condition	Indicator	Male (n = 28)	Female (n = 7)	Total (N = 35)
Anemia (excluding respondents with high CRP)	Hemoglobin < 12.0g/dl in male and female	0 (0)	5 (71.4)	5 (14.3)
Anemia (including respondents with high CRP)	Hemoglobin < 12.0g/dl in male and female	3 (6.8) (n = 44)	5 (50) (n = 10)	8 (14.8) (N = 54)
Severe Anemia	Hemoglobin <8 g/dl in both male and female	0 (0)	0 (0)	0 (0)
Iron depletion	Serum ferritin < 12.0µg/L	0 (0)	0 (0)	0 (0)
Iron depletion including respondents with high CRP	Serum ferritin < 12.0µg/L	2 (4.5)	0 (0)	2 (3.7)
Iron deficiency	Hemoglobin ≥ 12.0g/dl in male and female plus serum ferritin < 12µg/L	0 (0)	0 (0)	0 (0)
Iron deficiency including respondents with high CRP	Hemoglobin ≥ 12.0g/dl in male and female plus serum ferritin < 12µg/L	1 (2.3)	0 (0)	1 (1.9)

Iron deficiency anemia	Hemoglobin < 12.0g/dl in male and female plus serum ferritin < 12µg/L	0 (0)	0 (0)	0 (0)
Iron deficiency anemia including respondents with high CRP	Hemoglobin < 12.0g/dl in male and female plus serum ferritin < 12µg/L	1 (2.3)	0 (0)	1 (1.9)
Iron sufficiency	Hemoglobin ≥ 12.0g/dl in male and female plus serum ferritin ≥ 12µg/L	28 (100)	2 (28.6)	30 (85.7)

Table 10: Association between Hemoglobin Status and Socio Demographic and Economic Characteristics

Characteristics	Total (n)	Hemoglobin status Anemia (<12g/dl)	χ2	P – value	Odd ratio	95% CI
Age			7.425	0.024	1.216	1.062 – 1.393
10 – 14	9	0				
15 – 19	45	8				
Gender			13.615	0.001	13.667	2.482 – 75.268
Male	44	3				
Female	10	5				
Family size			0.819	0.845		
1	2	0				
2 – 4	14	3				
5 – 8	29	4				
9 – 13	7	1				
Level of mother's education			6.104	0.412	-	-
No education	5	1				
Primary education	5	0				
Secondary education	24	3				
Tertiary education	19	4				
Mother's occupation			9.640	0.291	-	-
Civil servant	12	0				
Trader	32	6				
Housewife	1	0				
Artisan	7	2				
Others (engineer, farmer, business woman, nurse, proprietress)	2	0				

Table 11: Association between Supplement Intake and Socio Demographic Characteristics

Characteristics	Total (n)	Do consume supplement	χ2	P – value	Odd ratio	95% CI
Gender			2.016	0.156	1.531	0.849 – 2.762
Male	188	148				
Female	82	58				
Age			0.076	0.783	0.920	0.509 – 1.664
10 – 14	89	67				
15 – 19	181	139				

Discussion

The number one popular sport participated in the world is football either played as 5 – a – side leagues or played for fun with friends in the community. It was estimated that there are 265 million people who play football with more than 5 million referees which is equivalent to 4% of the world population during the last global census done by sport governing body FIFA. The most popular sports in Nigeria are football, basketball, dambe (a combat sport played in the north), athletics and boxing. Also, from this study the highest percentage of respondents were the footballers with more of males than females, and older adolescents been more and this is similar with study who also had more male respondents than female [14].

Few of the athletes were physically challenged. A physically challenged individual also participates in sporting activities. This type of sport is called the para – sports, though the physically challenged participants involved were those that can stand upright for taking of the anthropometry parameters. Para – sport and Paralympic sports has become popular in the resent years and has been noticed that people with disabilities engaging in sports helps them to get engaging as sport does not only influences an individual's physical and mental health but also self-concept, self – esteem, self – perceived of physical appearance, general self – worth and life satisfaction. Report on disabilities in 2011 stated that about 15% of the world's population lives with some form of disability, with about 2 to 4% experiencing significant difficulties in functioning. The estimate of physically challenged individuals is increasing as people grow older and there's an increase in spread of chronic diseases [15,16].

Physically challenged individuals usually have poor appetite, lower educational achievements, fewer economic opportunities and higher rates of poverty than people without disabilities and this can be linked to reduced services available to them and the many obstacles they face in their everyday lives. It is stated that a person with disabilities should have access to all a normal healthy individual will have from home to community to prevent them from being isolated from in the community. Several studies have stated that Paralympic sports have a good influence directly or indirectly on the attitude of athletes with disabilities. Although there are other studies stating that Paralympics do not promote inclusion nor improve their quality of life and not even low self – esteem among student athletes with physical disabilities [15,17-24].

The first priority of any athlete is not to be healthy but to perform excellently well in any competition. The findings show there were more male athletes than the females of which many of them were older adolescents and this is similar to study who also found most of the respondents the be male and the mean age to be 15.50 ± 1.83 years. The educational level and age of the respondents is significant (p – value = 0.000). This is similar to study stating that athlete usually find it difficult for them to combine education with their sporting activities especially as they grow moving from one level to another and mostly success in one comes at the expense of the other [25-27].

As an athlete develop and increase in performance there is an increase in demands of the body in terms of nutrient need. An adolescent athlete has a double burden, a need as they are growing to become an adult and a need as an athlete as their physical activity range from high to very high. This can be a reason to why many of them use supplements. The supplements used mostly used by the athletes were energy drinks, multivitamins, calcium, herbal product, Lucozade boost, protein supplements, sport drinks and vitamin C. This is similar to study and study on Canadian athletes and study on Paralympics athletes, though energy drinks were not listed [9,28].

In addition, the major reason for the athletes' use of supplement is to increase energy and for endurance while few consumed it because they enjoy the taste especially the energy drinks. This can be linked back to the high consumption pattern of energy drinks among the athletes. The use of energy drinks to reduce tiredness among athletes is now a common attitude and this is in relation to Dariusz and Artur study, who also stated that consuming energy drinks is a common habit among the younger generation and it is majorly athletes who are in their early sporting career stage. There are limited studies on athletes in Nigeria. The athletes' aim is to improve their activity in tournaments not bordered about their health status, it is very rear except may be in the case of the national and international players who has more resources to employ a nutritionist or dietitian.

Some of these supplements have their side effects of which some of the athletes have experienced it before which include fatigue, insomnia, anorexia and general sickness. Dariusz and Artur findings also support this finding that some consume it for the taste, excess leading to anxiety, tachycardia, nervousness and irritability. Furthermore, this study reveals that the major source of information on supplement use to the athletes are their coached, family and friends. This is similar to study which shows that supplement use by athletes does not involve dieticians or physicians except for iron and who also stated coaches are the primary source of information on supplement use to the athletes [29-31].

Study revealed that some athletes use drugs for reducing weight, this is doping. Some of these drugs can cause damage to the body if not an immediate effect but later.

During this data collection process, most of the athletes were preparing for the national youth games known as the youth festival. The combat sports athletes are known to have target weight for their games, this is why many of them do deprive themselves from food to fight at certain weight during competitions [32].

Looking into the fact that the older adolescents put in more strength into their games and trains hard more than the younger ones, also in competitions older adolescent games are more intense than the younger ones just like the older male adolescent's tournaments are intense than the older female adolescents, this can also justify their training intensity differences. The female need for iron is higher has some are developing into the menarche stage, some are already having their monthly flow. Both the male and female needs iron which is an important part of the hemoglobin which is responsible for getting oxygen round the body. This affects the endurance level of an athlete [33].

In addition, the supplements consumed regularly are vitamin D, Omega 3s, Coffee, Protein powder, iron, citrulline, Sport probiotics, amino acids, animal pack, folic acid, multimineral, fish oil, whey protein, calcium with energy drinks having the highest rate of consumption followed by vitamin C, multivitamins, and herbal products. Other supplements consumed but by fewer people are amphetamine, narcotic analgesic, glutathione, cretin, Oyembe and Gatorade. Some supplements are ban from use by athletes

as they have doping effect and thus include Ostarine which is the trade mark for Selective Androgen Receptor Modulator (SARM), and is banned by the World Anti – Doping Agency (WADA) (USADA)Others are androgens, blood doping, peptide hormones, stimulants, diuretics, narcotics, and cannabinoids. Yohimbine is the chemical gotten from the bark of Yohimbe tree and it is traditionally used as an aphrodisiac. Oyembe (yohimbine) is use to increase blood flow and nerve impulse around the genital area, but athletes use it to boost mood for competition. Also, Amphetamine (Alpha – methylphenethylamine) is a central nervous system (CNS) stimulant that is used to treat attention deficit hyperactivity disorder (ADHD), narcolepsy, and obesity. It has been abused such that some people get addicted to it. Using Amphetamine to boost performance is illegal. It can be use illegally in form of pills, powder, paste, Crystal, liquid to be swallowed, tabbed into gums, inhaling, injecting through vein or smoking. Amphetamine is used by gymnasts, wrestlers and ballet dancers to decrease appetite for weight reduction, which is not accepted as athletes ate to compete fairly (National Institute on Drug Abuse, 2021). Some of these supplements are consumed more than once in a day by some of the respondents. This includes: energy drinks, herbal products, multivitamins, fish oil, Coffee, vitamin D, calcium vitamin B complex and folic acid. The consumption of supplement is to help provide the body with nutrients that are not consumed sufficiently in diet and as the requirement for athletes are higher. Though excess consumption needs to be avoided as it can lead to displacement of another nutrient, that is absorption of another nutrient can be affected. As supplements are in use it should be accompanied with regular eating. An example is use of zinc supplement, when in use it should not be used with calcium, copper, folic acid, iron and magnesium supplements as they reduce zinc absorption into the body [34,35].

In addition, Energy drinks are used to improve endurance and the quality of resistance in exercise workout but, athletes now use energy drinks mainly for its stimulatory effect, to enhance focus, alertness, and reaction time. Energy drinks contain substance of which when taken in excess has dangerous effect on health. If the amount of some of this substance in the body of an athlete is higher than the accepted level the athlete ends up been banished for years. Energy drinks contain caffeine, guarana which also contain caffeine can lead to heart rhythm disturbance, increase heart rate, high blood pressure, anxiety, sleep problems, digestive problems, and dehydration. Some also had it to alcohol which led to additional toxicity to the system. Energy drinks also contain sugar, taking excess can increase the sugar intake per day for the athlete [36].

Results of respondents with high C – reactive protein level were omitted as this will affect the result of the respondents. Many of the respondents had normal serum ferritin level but the cases of iron sufficiency in female was low indicating many of the females had anemic iron insufficiency. The males having normal hemoglobin level was more than the female, only halve of the female respondents had normal hemoglobin level. Anemia cases was found in 14.3% of the respondents of which the anemia cases were found among the female athletes but when including people with elevated CRP level, anemia cases were found among the men too. People with high c – reactive protein level are likely to have lower hemoglobin level compared with people with normal CPR level. Also found a negative correlation between hemoglobin and CRP level but in this study, there is no significant association between hemoglobin and CRP level. There was no case of severe anemia, iron depletion, iron deficiency and iron deficiency anemia after respondents with high creatine reactive protein were exempted. This is similar to study where they found high prevalence of anemia and high number of athletes with low serum ferritin level. Study also found 16.4% prevalence of anemia in their study on athletes. There was association between serum hemoglobin level and serum ferritin from their study also found that iron deficiency and muscle mass are relayed to bone density. Adolescents' anemia is a major nutritional problem of which iron deficiency anemia is the most common. Some factors that could lead to these are inadequate nutrient intake, increased body need due to their age and menstrual irregularities in female. Marc-Tudor called this sport anemia adding decrease absorption, increase in iron loss through sweat, hemauria, gastrointestinal bleeding, inflammation and hemolysis which athletes are prone to. The cause of anemia in athlete is multiply in nature. Findings also support this adding that, athletes who avoid red meat are more prone to anemia, this is common among the combat athletes. The ability of an athlete to maintain good nutritional status depends on healthy eating and diet diversity, either taking supplement or not there is need to eat adequately to meet up with their needs due to their age and activity. Also stated that adolescent athletes should met up with their nutrient needs through food rather than supplements, as more importance has been given to dietary supplement use rather than other training and dietary strategies [37-43].

Conclusion and Recommendation

In conclusion, the athletes were majorly male between age 15 to 19 years. The major supplements consumed by the respondents are dietary supplements multivitamins, multimineral, energy drinks and herbal products. An increase in age and difference in gender increases risk to anemia, being a female athlete can increase the risk of been anemic. Both the male and female needs iron which is an important part of the hemoglobin which is responsible for getting oxygen round the body. This affects the endurance level of an athlete. The findings emphasize the need for regular nutritional assessments and medical checkups for athletes in Ogun state to prevent unexpected health issues. Caution is advised against encouraging the use of supplements like energy drinks and herbal products, especially among younger athletes, and frequent use among older athletes should be discouraged. Nutritionist and dietitians should be assigned to sport centers. This will help athletes to make informed choices on what to eat and other strategies to enhance performance, refueling, and recovery from injury. It will also make easy to refer athletes to registered dietitian nutritionist for personalized nutrition plan.

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