Nutrition Knowledge, Nutritional Status and Lifestyle of Athletes in Ondo Town, Ondo State, Nigeria.

*Oluwasiji O. Olaitan and Onowan. M. Egbase

Nutrition & Dietetics Unit, Department of Food Science & Technology,
Wesley University, Ondo, Nigeria.

Corresponding Author: sijola2k3@gmail.com

ABSTRACT

Background: *Nutrition knowledge influences food choices and adequate nutrition promotes optimal performance of athletics.*

Objective: *To assess association between nutrition knowledge, nutritional status and lifestyle.*

Methods: *This cross sectional study was carried out among 280 Athletes training in Ondo Town, Nigeria. Respondents' socio-demographic characteristics, nutrition knowledge and lifestyle were determined by interviewer administered questionnaire. Nutritional status was assessed by anthropometry and dietary pattern. Body Mass Index (kg/m^2) and Body Fat (%) were calculated. Statistical Package for Social Science (SPSS) was used to analyse data. Association of variables was determined by chi-square having $p<0.05$.*

Results: *Respondents' mean age was 21 ± 3.9years. Males and females were 73.2% and 26.8% respectively. Majorities (83.9%) were undergraduates. Football (37.9%), volleyball (20.0%), basketball (12.9%) and track and field events (12.5%) were major athletics, 69.4% had good nutrition knowledge and 73.9% normal weight, 15.0% overweight, 2.5% obese and 54.7% had good/excellent body fat. Cereal (57.8%), fruits (52.3%), flesh meat (52.8%), sea foods (45.1%), eggs (42.1%) and dairy products (48.1%) were regularly consumed, 66.1% trained at evening, 54.3% trained 1-2 days per week, 83.9% skipped breakfast. Significant associations were found between athletes' nutrition knowledge and lifestyle practices such as skipping of breakfast, taking of water bottle along for training, frequency of water consumption during training and consumption of carbonated drinks rather than water while thirsty.*

Conclusion: *Many athletes have good nutrition knowledge. Overweight and obesity are prevalent; many skipped breakfast and consumed carbonated drinks instead of water while thirsty. Fruits vegetables and iron rich foods are not adequately consumed.*

Keywords: Nutrition, knowledge, status, lifestyle, athletes

Introduction

Nutrition is essential in athletic training and performance. An athlete needs adequate calorie for physical activity and other nutrients especially protein, vitamins and minerals for muscle building, recovery, maintenance of healthy life and optimal athletic performance (1, 2). Continuous practice without adequate nutrition can lead to low endurance, more injury, delayed physical maturation, amenorrhea in female athletes, development of eating disorders, potential permanent growth impairment, exposure to infections, changes in cardiovascular, endocrine, gastrointestinal, renal, and thermoregulatory systems, and depression among

athletes (3 4). Nutrition knowledge influences food choices, dietary habits and practices of an individual (5) and source of nutrition information among athletes determines their level of nutrition knowledge and dietary practices (6, 7). It is important for an athlete to replace calorie burnt during training and athletic exercise and eat nutritious foods every day in order to adjust to hormonal and metabolic functions as well as to promote optimal performance in the subsequent activities (8). Most times athletes travel to different places for sport activities and commonly live in an unfamiliar environment with different food supplies, and this affects their food selection and subsequently the quality of their diets especially during period of athletics and this results in having some of athletes eating fast foods which have low nutrient density to satisfy their momentous hunger (9). Lack of adequate nutrition knowledge is one of the main factors responsible for athlete's poor dietary practices (10).Various nutrition problems are also common in poor population who depend solely on starchy foods as staples (11). The role of quality diet is indispensable in living a healthy life and nutrition knowledge is essential in making healthy food choice. This study focuses on assessing association between nutrition knowledge, nutritional status and lifestyle of athletes in Ondo town, Ondo State, Nigeria.

MATERIALS AND METHODS

Study Design
This is a cross-sectional study

Study Area
The study was conducted among adult athletes at various sport training centers in Ondo town, Ondo state, Nigeria between December 2020 and February 2021. The training centers where study participants trained include; Adeyemi College of Education Sport Complex, University of Medical Sciences Sport training Ground, Wesley University field and Ondo Township Stadium. The choice of location was informed by availability of athletes at the training centers.

Study Population
A purposive sampling technique was used to select two hundred and eighty (280) adult athletes within 18-40 years of age who gave verbal informed consents to participate in the study.

Sample size calculation
Formula for calculating sample size was employed (12).Where n= sample size

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Z= statistics corresponding to level of confidence (1.96)

P= expected proportion in population based on previous studies or pilot studies, i.e. 0.582 was used in this study based on a previous study in Ibadan where 58.2% of athletes who had good nutrition knowledge was reported (13).

d= absolute error or precision i.e.

$$n = \frac{1.92^2 \times 0.582(1-0.582)}{0.05^2}$$

$$= \frac{1.96^2 \times 0.582 \times 0.418}{0.05^2}$$

$$= \frac{3.8416 \times 0.582 \times 0.418}{0.0025}$$

$$= \frac{0.9345690816}{0.0025}$$

$$= 373$$

(0.05)Availability and consent of participants limit the total sample size used for the study to two hundred and eighty (280). Athletes included in the study belong to following athletic groups; Football, Volleyball, Basketball, Combat sports, Racket games, Track and Field events.

Ethical Consideration
Ethical approval was obtained from Primary Health Care Authority, Ondo West Local Government, Ondo State, Nigeria.

Data Collection Procedures

Interviewer administered questionnaire was used to assess participants' socio-demographic characteristics, medical history and nutrition knowledge. Questions on nutrition knowledge were set based on literature review and likert scale questionnaire was developed. Nutrition knowledge score was calculated based on responses of participants. Participants scored 1, for every correct answer and 0 for every wrong answer. Those that chose agree and strongly agree were scored 1 while those who chose disagree and strongly disagree were scored 0 for correct nutrition question. The scores were rounded up to 15points in total. Those that scored less than 5 were classified as having poor nutrition knowledge; those that scored 6-10points were defined to have fair nutrition knowledge, while those that scored 11points and above were identified to have good nutrition knowledge.

Nutritional status was determined by measuring anthropometric parameters such as weight, height, skinfold thickness and dietary pattern of respondents over a week. Respondents' weight, height and skinfold thickness were measured by bathroom weighing scale, stadiometer and skinfold caliper respectively. Adapted Food frequency questionnaire was used to assess dietary pattern on foods consumed across 12 food groups over a week. Frequency of consumption was categorized into never (not consumption), rarely (once a week), occasionally (2 to 3 days), regularly (4-6 days) and daily (everyday). Economy plastic manual skinfold caliper was used to measure skinfold thickness at four sites; triceps, biceps, suprailiac and sub-scapular skinfolds. A vertical fold of skin plus the underlying fat was grasped using the thumb and the index finger at the appropriate site with the calipers held in the right hand. The skin fold was gently pulled away from the underlying muscle tissue. The skin-fold was elevated while the measurement is recorded. Two measurements of skin-fold thickness were taken and the mean was calculated. Formula compounded by Durnin and Womersley was used to estimate body fat percentage using skinfold test results as sum of 4 measurements of skinfold thickness was calculated (14). The measurement at four sites relative to age and sex for each respondent was compared to values of reference table designed by Durnin and Womersley (15).

Data Analysis

Statistical Package for Social Science (SPSS) version 21.0 was used to analyze data collected. Descriptive statistics performed include mean, standard deviation, range, percentages, frequencies. The reliability test was performed on nutrition knowledge questions and cronbach's alpha obtained was 0.504. Cross tabulation was done to categorise variables. Association of variables was determined by chi-sqaure. Level of significance was set at $p < 0.05$.

RESULTS

Socio-demographic Characteristics of Respondents

Table 1?? presents socio-demographic characteristics of respondents. Large proportions (73.2%) of respondents were males while only 26.8% were females. Their mean age was 21 ± 3.9years. Majority (84.6%) of them were young adults within age of 18 to 24 years. Large proportions (83.9%) were undergraduate students of tertiary institutions such as Wesley University (21.4%), Adeyemi College Education (27.5%) and University of Medical Sciences (32.9%) in Ondo. Very few (0.4%) did not have formal education. Most commonly performed athletics were football (37.9%), volleyball (20.0%), basketball (12.9%) and track and field events (12.5%). Few of them performed racket games (9.6%) and combat sports (7.1%). Less than half (33.9%) got above N20, 000 as average income in a month. Majority of them (97.5%) were not married and more than half (58.9%) stayed outside the campus.

Nutrition Knowledge of Respondents

Figure 1.0 shows level of nutrition knowledge of respondents. More than half (69.4%) of respondents had good nutrition knowledge, 29.9% had fair knowledge while only 0.4% had poor knowledge of nutrition.

Nutritional Status of Respondents

Nutritional status of respondents is defined by Body Mass Index (BMI), body fat percentage and dietary pattern presented on Tables 2.0 and 3.0 respectively. Large proportion (73.9%) of respondents had normal weight. Only 8.6% were underweight. Overweight and obesity account for 15.0% and 2.5% respectively. More than half (54.7%) had good and excellent body fat. Significant associations were observed between gender and body mass index ($p = 0.002$) and percentage body fat. ($p = 0.000$).

Respondents' dietary pattern shows most frequently consumed foods to be; cereal (57.8%), fruits (52.3%), flesh meat (52.8%), sea foods (45.1%), eggs (42.1%) and dairy products (48.1%). More than half of the respondents rarely and occasionally consumed root and tubers (68.1%), legumes (66.4%), nuts and seeds (66.4%) as well as green leafy vegetables (58.7%) and organ meats (60.8%).

Table 1.0- Socio-demographic Characteristics of Respondents

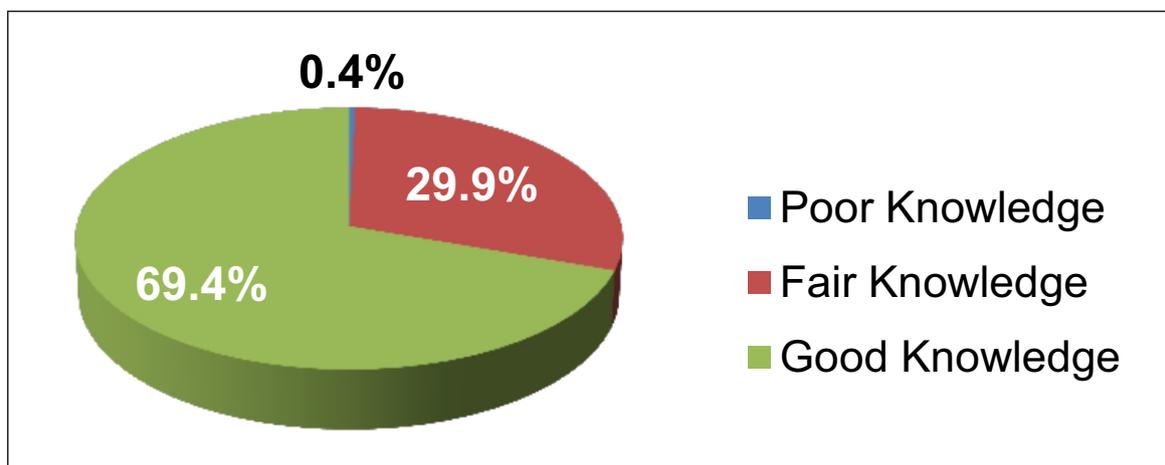| Variables	Male N(%)	Female N(%)
Age (years)		
Mean(SD): 21±3.9		68(24.3)
Range: 18-45years		6(2.1)
18-24 years	169(60.4)	1(0.4)
25-31 years	29(10.4)	0(0.0)
32-38 years	4(1.4)	
≥39 years	3(1.1)	
Level of Formal Education		
PLSCE	0(0.0)	1(0.4)
SSCE	11(3.9)	0(0.0)
B.Sc./undergraduate	167(59.6)	67(23.9)
Graduate	26(9.3)	7(2.5)
No formal Education	1(0.4)	0(0.0)
Respondents were students		
Yes	168(60.0)	67(23.9)
No	37(13.2)	09(2.9)
Major athletics performed by Respondents		
Football		
Volleyball	94(33.6)	12(4.3)
Basketball	31(11.1)	25(8.9)
Combat sports	25(8.9)	11(3.9)
Racket games	14(5.0)	06(2.1)
Track and Field events	20(7.1)	07(2.5)
	21(7.5)	14(5.0)
Occupation		
Yes	53(18.9)	22(7.9)
No	152(54.3)	53(18.9)
Average monthly income (₦)		
5,000 –10,000	37(13.2)	15(5.4)
10,100 –20,000	100(35.7)	33(11.8)
20,100-30,000	40(14.3)	15(5.4)
30,100-40,000	10(3.6)	07(2.5)
40,100-50,000	09(3.2)	02(0.7)
>50,000	09(3.2)	03(1.1)
Marital status		
Single	200(71.4)	73(26.1)
Married	05(1.8)	02(0.7)
Type of residence		
School residence	85(30.4)	30910.7)
Off-campus	120(42.9)	45(16.1)

Figure 1.0 Nutrition Knowledge Respondents

Table 2.0- Nutritional Status of Respondents

Variables	Male N(%)	Female N(%)	Total N(%)	X^2	P value
Body Mass Index					
Underweight	13(4.6)	11(3.9)	24(8.6)	15.160	0.002*
Normal weight	162(57.9)	45(16.1)	207(73.9)		
Overweight	28(10.0)	14(5.0)	42(15.0)		
Obese	2(0.7)	1(0.4)	7(2.5)		
Body Fat (%)					
Very poor	1(0.4)	4(1.4)	5(1.8)	85.456	0.000*
Poor	11(3.9)	33(11.8)	44(15.7)		
Fair	53(18.9)	24(8.6)	77(27.5)		
Good	109(38.9)	13(4.6)	122(43.6)		
Excellent	30(10.7)	1(0.4)	31(11.1)		
Very lean	1(0.4)	0(0.0)	1(0.4)		

* Level of significance at p<0.05

Lifestyle Practices of Respondents
Lifestyle practices of respondents are presented on table 4.0. It was observed that more than half of respondents usually trained in the evening (66.1%) and on one to two days in a week (54.3%). Majority (85.7%) spent 30 mins and above while training. About half (49.6%) received information on adequate nutrition from coach, social media, internet and friends. Majority (83.9%) skipped breakfast. More than half (61.1%) had water bottle but only 19.3% took it along every time to training. Large proportion (80.4%) of them did not drink alcohol and more than half (66. 4%) were not taking supplement. Some (78.2%) of them consumed carbonated drinks while thirsty rather than water.

There is significant association between gender and time spent on training (p=0.002), having water bottle for training (p=0.001), taking of water for training (p=0.001) and consumption of alcohol (p=0.009).

Association between Nutrition Knowledge and Lifestyle of Respondents
Significant association was observed between respondents' nutrition knowledge and how often they skip breakfast (p=0.001), respondents having bottle water for training (p= 0.004), how often they took water to training (p= 0.020), consumption of soda rather than water while thirsty (p= 0.001) (Table 5.0).

DISCUSSION

This study establishes that men engage in athletic activities more than their female counterparts in agreement with previous studies (13, 15, 16). However, proportion of male athletes in this study is higher than 42.7% male athletes reported in their cross-sectional study conducted among undergraduates in Ibadan, Nigeria (13). Mean age of athletes in this study is lower than 26.09 ± 4.77years which was reported among male athletes in Ibadan, Nigeria (17). Having majority of athletes in this study being students and undergraduates of various tertiary institutions can be traced to training centres where participants are selected and it also indicates that most of athletes are literate persons who know value of physical exercise. Football is the highly performed athletics among the participants. Study conducted among National Collegiate Athletic Association also found out that 47.0% of athletes who participated in the study were footballers (18) and this shows that football is highly performed athletic. On average, most of athletes in this study had their monthly income within N10, 100- 30,000. This is not a surprise since majority of them are students and unmarried. It can be a reason for having many of them staying outside campus (possibly with their parents) as they might not be able to afford school hostels.

Good nutrition knowledge was observed among more than half of athletes in this study. This can be attributed to high level of formal education found among the athletes. Level of nutrition knowledge in this study is more than 58.2% reported in Ibadan (13), and 43.8% reported in Australia (16). When athletes and non-athletes' nutrition knowledge was compared, improved nutrition knowledge was found to help athletes to achieve and maintain a proper dietary lifestyle (19). Evidences have shown that adequate nutrition knowledge play a crucial role in influencing daily eating habits of individuals especially the athletes (20). Nutrition education had also been found to significantly improve nutrition knowledge, self-efficacy, and overall number of positive dietary changes among female athletes (21).

Nutritional status of athletes in this study was determined by Body Mass Index (BMI) and Body Fat percentage. Large proportions of athletes had normal weight. Prevalence of overweight and obesity was 15.1% and 7% respectively. However, to cater for limitation of Body mass index which does not account for proportion of lean body mass and/or percentage body fat, influence of large muscle mass due to hypertrophy on BMI in athletes may misclassify athletes to overweight and obese. This justifies the use of percentage body fat in determining body weight gain among athletes (22). More than half of athletes in this study had healthy body fatness. Foods most frequently consumed among them were cereal, fruits, flesh meat, sea foods, eggs and dairy products. Roots and tubers, nuts and seeds, green leafy vegetables, organ meats and legumes were occasionally consumed. Individuals with greater nutrition knowledge have been previously reported to consume healthier foods, have better diet quality and normal blood pressure (23).

Findings show that more than half state the exact percentage of athletes in Ondo town, Nigeria usually train in evening and on 1-2 days in a week. The choice of period and number of days for training can be due to the fact that most of the athletes are undergraduates. They need to attend to their academic activities during the day. Majority of them spent 30 minutes and above while training. The major sources of athletes who had received nutrition education are; coach, social media, internet and friends. Arazi and Hosseini had earlier reported from their study among collegiate and non-collegiate athletes that nutrition knowledge can be gained through regular and wide-ranging educational programs as well as self-education (24). Similar experience is observed among athletes in this study that many of them did self-education in gaining nutrition knowledge.

Nowacka et al., (2016) evaluated intake of energy, basic nutrients and supplements with daily nutrition by professional Slalom canoeists without dietitians' control, before and after the nutritional education and found that nutrition education given by nutritionist dieticians improves eating habits (25). Athletes, coaches, athletic trainers, strength and conditioning specialists (SCSs) have busy schedules and gaining nutrition knowledge requires nutrition experts (26). Therefore, sport nutritionists who can develop a relationship with athletic staff and provide education and counseling about food and nutrition to athletes are needed in Nigeria.

Proportion of athletes who regularly skipped breakfast in this study is lower than what was reported in their study among male athletes in Ibadan (17). Athletes in this study showed that they know the relevance of hydration on physical wellbeing and athletic performance. This is evident in having more than half of them who regularly took drinking water along with them to training centers. Onowkakpor et al. (2018) had earlier expounded based on their findings that avoidance of tobacco abuse, reduced alcohol intake and physical activity characterized practice of healthy lifestyle (27). Majority of athletes in this study claimed that they don't drink alcohol neither

smoke cigarette. This can be due to their understanding of side effects of alcohol and smoking on health. Earlier studies had shown how athletes often follow poor dietary habits that can jeopardize their sporting performance and health (28). This study found less than half of athletes using dietary supplement during sport activities. This proportion is lower than 82.2% athletes reported to use supplements during their sport activities in study conducted among athletes in Serbia, Germany, Japan and Croatia (29). Significant association was observed between athletes' level of nutrition knowledge and skipping of breakfast as well as athletes' having water bottle for training, how often they took water to training and intake of soda rather than water while thirsty. Study conducted by Oladunni and Sanusi among male athletes in Ibadan also attests to fact that most athletes performed poorly in frequency of meals intake but did well in intake of fluids (30). This study affirms that majority of athletes like taking carbonated drinks while thirsty instead of drinking water. This habit though gives athletes calorie to perform their immediate athletic activities and quench their thirst for a period of time, frequent intake of carbonated drinks instead of eating adequate meal while hungry and drinking water when thirsty will place load on their pancreas and this can result to metabolic diseases such as overweight, obesity, risk of type 2 diabetes and dental erosion among athletes later in life if such habit is not curbed among Nigerian athletes (31).

CONCLUSION
This study found that though majority of athletes in Ondo town, Ondo State, Nigeria claim to have good nutrition knowledge but only few received nutrition information from nutrition experts. Some of them are overweight and obese. Many of them skipped breakfast, frequently consumed carbonated drinks rather than water while thirsty and did not consume fruits vegetables and iron rich foods on regular basis.

RECOMMENDATIONS
There is a need for Ministry of Youth and Sports in Nigeria to work with Nutrition Experts to guide Nigerian Athletes on adequate dietary intake which is specific to athletic activities in order to help athletes in making healthy food choice which promotes healthy lifestyle.

ACKNOWLEDGEMENT

Table 3.0 Dietary Pattern of Respondents

Food Groups	Never n(%)	Rarely n(%)	Occasionally n(%)	Regularly n(%)	Daily n(%)
Cereal	4(1.7)	20(8.5)	75(31.9)	99(42.1)	37(15.7)
Root & tuber	3(1.3)	49(20.9)	111(47.2)	63(26.8)	9(3.8)
Legumes	13(5.5)	59(25.1)	97(41.3)	57(24.3)	9(3.8)
Nuts & seeds	14(6.0)	52(22.1)	104(44.3)	61(26.0)	49(1.7)
Green leafy vegetables	23(9.8)	50(21.3)	88(37.4)	70(29.8)	4(1.7)
Other vegetables	5(2.1)	29(12.3)	102(43.4)	82(34.9)	17(7.2)
Fruits	2(0.9)	26(11.1)	82(34.9)	102(43.4)	23(9.9)
Organ meat	20(8.5)	41(17.4)	102(43.4)	63(26.8)	9(3.8)
Flesh meat	6(2.6)	27(11.5)	78(33.2)	86(36.6)	38(16.2)
Sea foods	10(4.3)	42(17.9)	77(32.8)	78(33.2)	28(11.9)
Eggs	7(2.5)	32(13.6)	97(41.3)	82(34.9)	17(7.2)
Dairy products	7(3.0)	41(17.4)	74(31.5)	81(34.5)	32(13.6)

Table 4.0- Lifestyle Practices of Respondents

Variables	Male N(%)	Female N(%)	Total N(%)	X²	P value
Training time					
Morning alone	68(24.3)	22(7.9)	90(32.1)	2.064	0.724
Evening alone	133(47.5)	52(18.6)	185(66.1)		
Morning & Evening	4(1.4)	1(0.4)	5(1.8)		
No of days for training in a week					
1 day	17(6.1)	10(3.6)	27(9.6)	2.056	0.561
2-3 days	112(40.0)	40(14.3)	152(54.3)		
4-6 days	34(12.1)	13(4.6)	47(16.8)		
Everyday	42(15.0)	12(4.3)	54(19.3)		
Time spent on Training					
Less than 30mins	22(7.9)	18(6.4)	40(14.3)	19.325	0.002*
30-60mins	40(14.3)	24(8.6)	64(22.9)		
90mins	36(12.9)	13(4.6)	49(17.5)		
2 hours	55(19.6)	13(4.6)	68(24.3)		
3 hours	51(18.2)	7(2.5)	58(20.7)		
More than 3 hours	1(0.4)	0(0.0)	1(0.4)		
Having received Nutrition Information					
Yes	103(36.8)	36(12.9)	139(49.6)	0.111	0.739
No	102(36.4)	39(13.9)	141(50.4)		
Source of Nutrition Information					
Coach	46(16.4)	19(6.8)	65(23.2)	2.085	0.720
Social Media (TV, radio)	22(7.9)	9(3.2)	31(11.1)		
Friends	6(2.1)	1(0.4)	7(2.5)		
Internet	29(10.4)	7(2.5)	36(12.9)		
None	102(36.4)	39(13.9)	141(50.4)		
How often respondents skip breakfast in a week					
1-2 days	81(28.9)	27(9.6)	108(38.6)	0.705	0.951
3-4 days	58(20.7)	23(8.2)	81(28.9)		
5-7 days	33(11.8)	13(4.6)	46(16.4)		
None	33(11.8)	12(4.3)	45(16.1)		
Having bottle water for training					
Yes	113(40.4)	58(20.7)	171(61.1)	11.395	0.001*
No	92(32.9)	17(6.1)	109(38.9)		
How often respondent took water for training					
Every time	37(13.2)	17(6.1)	54(19.3)	15.460	0.001*
Sometimes	53(18.9)	34(12.1)	87(31.1)		
Once a while	22(7.9)	8 (2.5)	30(10.7)		
None	93(33.2)	16(5.7)	109(38.9)		
Respondents taking supplement	65(23.2)	29(10.4)	94(33.6)	1.193	0.275
Yes	140(50.0)	46(16.4)	186(66.4)		
No					
Intake of Soda rather than water while thirsty					
Yes	157(56.1)	62(22.1)	219(78.2)	5.729	0.126
No	48(17.2)	13(4.6)	61(21.8)		

* Level of significance at p<0.05

Table 5.0 Association between Nutrition Knowledge and Lifestyle of Respondents

LIFESTYLES	POOR	KNOWLEDGE FAIR	GOOD	Total	X^2	P value
How often respondents skip breakfast						
1-2 days	0(0.0)	19(6.8)	89(31.8)	108(38.6)	21.509	0.001*
3-4 days	0(0.0)	29(10.4)	52(18.6)	81(28.9)		
5-7 days	0(0.0)	22(7.9)	24(8.6)	46(16.4)		
None	1(0.4)	14(5.0)	30(10.7)	45(16.1)		
Respondents having bottle water for training						
Yes	1(0.4)	39(13.9)	131(46.8)	171(61.1)	11.273	0.004*
No	0(0.0)	45(16.1)	64(22.9)	109(38.9)		
How often respondent took water for training						
Every time	0(0.0)	11(3.9)	43(15.4)	54(19.3)	15.046	0.020*
Sometimes	0(0.0)	21(7.5)	65(23.2)	87(31.1)		
Once a while	1(0.4)	6(2.1)	24(8.6)	30(10.7)		
None	0(0.0)	46(16.4)	63(22.5)	109(38.9)		
Respondents took soda rather than water while thirsty						
Yes	1(0.4)	54(19.3)	164(58.6)	219(78.2)	13.810	0.001*
No	0(0.0)	30(10.7)	31(11.1)	61(21.8)		
Nutritional Status						
Underweight	0(0.0)	10(3.6)	14(5.0)	24(8.0)	3.026	0.806
Normal weight	1(0.4)	62(22.1)	144(51.4)	207(73.9)		
Overweight	0(0.0)	11(3.9)	31(11.1)	42(15.0)		
Obesity	0(0.0)	1(0.4)	6(2.1)	7(2.5)		

* Level of significance at p<0.05

REFERENCES

1. Jayeoba, O. (2016). Determinants of dietary habits and nutrient intake among athletes in Oyo State, Nigeria. *Journal of Sports* 11; 31-40.

2. National Collegiate Athletic Association. (2013). *NCAA sports medicine handbook.* Available at http://www.ncaapublications.ccom/p-4328-2013-14-ncaa-sports-medicine-handbook.aspx.

3. Perriello, V. A. (2001). Aiming for healthy weight in wrestlers and other athletes. *Contemporary Pediatrics, 18* (19), 55 – 74.

4. Gabel, K. A. (2006). Special nutritional concerns for the female athlete. *Current sports medicine report, 5*(4), 187-191.

5. Sakamaki, R., Toyama, K., Amamoto, R., Liu, C.-J., & Shinfuku, N. (2005). Nutritional knowledge, food habits and health attitude of Chinese university students a cross sectional study. *Nutrition Journal, 4,* 4. http://dx.doi.org/10.1186/1475-2891-4-4.

6. Jessri, M., Rashidkhani, B., & Zinn, C. (2010). evaluation of Iranian college athletes ' sport nutrition knowledge. *International Journal of Sport Nutrition, Exercise and Metabolism. 20,* 257-263.

7. Grete, R.H., Carol, A.F., Jane, E.E., & Kimberli, P. (2011). Nutrition Knowledge, Practice, attitudes, and information sources of mid-American conference college softball players. *Food and Nutrition Sciences, 2011.*

8. Geyer, H. (2004). Analysis of non-hormonal nutritional supplements for anabolic-androgenic steroids—results of an international study. *International Journal of Sports Medicine. 25*: 124-129.

9. Pelly, F. E & Thurrecht, R. (2019). Evaluation of Athletes' food choices during competition with use of digital images. Food choice and nutrition. *Nutrients, 11* (7), 1627; https://doi.org/10.3390/nu11071627.

10. Spronk. I., Heaney, S. E., Prvan, T., & O'Connor, H. T., (2015). Relationship between general nutrition knowledge and dietary quality in elite athletes. *International Journal of Sport Nutrition and Exercise Metabolism, 25,* (3). 243-251.

11. Styen, N. P., Nel, J. H., Nantel, G., Kennedy, G., & Labadarios, D. (2006). Food variety and dietary diversity scores in children: Are they good indicators of dietary adequacy? *Public Health Nutrition 9* (5): 644-5050.

12. Daniel, W. W. (1999). *Biostatistics:* A foundation for analysis in the health sciences. 7th ed. New York: John Wiley & Sons.

13. Folasire, O. F., Akomolafe, A. A. & Sanusi, R. A. (2015). Nutrition Knowledge diet quality and hypertension in a working population. *Preventive Medical Reports, 2*: 105-113.

14. Durnin J.G.V.A. & Wommersley J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness. *British Journal of Nutrition.* 32: 77-97.

15. Alaunyte, I., Perry, J. L & Aubrey, T. (2015). Nutritional knowledge and eating habits of professional rugby league players; does knowledge translate into practice? *Journal of the International Society of Sports Nutrition.* 12-18. doi: 10:1186/s12970-015-0082.

16. Bird, S. P. & Rushton, B. D. (2020). Nutritional knowledge of youth academy athletes. *Biomedical center (BMC) Nutrition,* 6(35); 2-8.

17. Oladunni, M. O & Sanusi, R. A. (2013). Nutritional status and dietary pattern of male athletes in Ibadan. *Nigeria Journal of Physiology science.* 28: 165-171.

18. Rosenbloom, C. A., Jonnalagadda, S. S., & Skinner, R. (2002). Nutrition knowledge of collegiate athletes in a Division I National Collegiate Athletic Association institution. *Journal of American Dietetic Association. 103,* 418-421. http://dx.doi.org/10.1016/S0002-8223(02)90098-2.

19. Dragičević, I., Šatalić, Z. (2015). General nutrition knowledge among professional soccer players, *Croatian Journal Food Technology, Biotechnology and Nutrition. 10* (3-4), 101-108.

20. Devlin, B. L., Belski, R. (2015). Exploring general and sports nutrition and food knowledge in elite male Australian athletes, *International Journal of Sport Nutrition and Exercise Metabolism. 25* (3), 225-232.

21. Abood, D. A., Black, D.R., & Birnbaum, R.D. (2004). Nutrition education intervention for college female athletes. *Journal of nutrition education and behavior, 36(3), 135-139.*

22. Ode, J. J., Pivarnik, J. M., Reeves, M. J., & Jeremy, L. K. (2006). Body Mass Index as a Predictor of Percent Fat in College Athletes and Non- athletes. *Medicine and Science in Sports & Exercise 39* (3):403-409.

23. Geaney, Fitzgerald, Harrington, Kelly & Greiner, P. (2015). Nutrition knowledge diet quality and hypertension in a working

population. *Preventive Medical Reports, 2*: 679-687.

24. Arazi, H., Hosseini, R. (2012). A comparison of nutritional knowledge and food habits of collegiate and non-collegiate athletes, *Sport Logia. 8* (2), 100–107.

25. Nowacka, E., Leszczyńska, T., Kopeć, A., Hojka, D. (2016). Nutritional behavior of Polish canoeist's athletes: The interest of nutritional education. *Science sports* 31 (4), 79-91.

26. Burns, R. D., Schiller, M. R., Merrick, M. A., & Wolf, K. N. (2004). Intercollegiate student athlete use of nutritional supplements and the role of athletic trainers and dietitians in nutrition counseling. *Journal of the American Dietetic Association, 104*(2), 246-249. Accessed from http://dx.doi.org/10.1016/j.jada.2003.11.013.

27. Onowkakpor, Waterhouse, Buckely, Edwards & Relly (2018). Measurement of and some reasons for, differences in eating habits between night and day workers. *Chronobiology International. 20.* 1075-92.

28. Sorić, M., Mišigoj-Duraković, M., Pedišić, Ž. (2006). Dietary habits and prevalence of smoking in team sports athletes, Hrvat. *Športskomed. Vjesn. 21* (2), 84-90.

29. Jovanov, P., Višnja, D., Borislav, O., Otto, B., Lato, P., Aleksandar, M., and Marijana, S. (2019). *Journal of International Society of Sports Nutrition* https://doi.org/10.1186/s12970-019-0294-7.

30. Oladunni, M.O. and Sanusi, R.A. (2013). Nutritional Status and Dietary Pattern of Male Athletes in Ibadan South Western, Nigeria. *Nigerian Journal of Physiological Sciences; 28(2):165-171.*

31. Tahmassebi, J.F., and Banihani, A. (2020). Impact of soft drinks to health and economy: A critical review. *European archives of paediatric dentistry,* 21(1),109-117.