



## Nutritional Status of Vegetarian and Non-Vegetarian Female Adolescents in Ile - Ife, Osun State, Nigeria.

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**Abstract-**The study was carried out to assess the nutrients intake of vegetarian female adolescents compared with their omnivore counterparts. Forty-five healthy vegetarians and fifty non-vegetarian adolescents age 11 to 19 years were used. The subjects were randomly selected across Junior Secondary to Senior Secondary School. Anthropometrics measurements such as height, weight, and MUAC were taken to assess nutritional status, while nutrients intakes were assessed using a 3-day weighed intake method. Data were analyzed using SPSS (Version 23.0) and an inferential Statistical method was used to calculate the mean and standard deviation. Findings shows that there was a significant difference ( $p < 0.05$ ) between the mean weight and BMI of vegetarians and non-vegetarians. The mean daily energy (8.1MJ) intakes of vegetarians were lower than the recommended dietary allowance. The proteins and iron intake were adequate but intake of calcium, Sodium, vitamin B12, and zinc were lower than RDA. This can be concluded that current nutrition recommendations can be attained by vegetarians if diets are carefully planned or supply through the supplement. In this study energy, vitamin B12, or zinc deficiency may undergo supplements for possible enhancement of these nutrients among the vegetarians. The adequate intake of some nutrients can be achieved and maintained if vegetarian diets are well planned to meet the nutritional need of different age groups including adolescents.

**Keywords:** *Vegetarian, Nutrients intakes, RDA, Non- vegetarian, Adolescent*

### 1. Introduction

Adolescence is a developmental transition between childhood and adulthood (1). Adolescence is a time of intense growth, second only to infancy. This is the only period in an individual's life when growth velocity increases during which an individual can gain 15% of their weight. Adolescence has three stages: Early adolescence, occurring between the ages of 8 and 15, they are more concerned with their body size, shape, and body image as a result of the rapid growth and development that has occurred. Middle adolescence, occurring between the ages of 15 and 17 at this stage social, emotional, and financial independence becomes more pronounced, leading to increased independent decision making in anything related to foods and fluids intake. Late adolescence usually lasts from about 16 to 17 or 21 years, the stage that development of a core set of values and beliefs that guides moral, ethical, and health-related decisions (2).

Although young people adopt harmful eating behavior which determines their nutritional status and food habit in their later childhood (3). There are different types of the vegetarian diet: The most common type is a Lacto-Ovo vegetarian diet, which takes no meat, fish, and poultry but includes dairy and eggs. A fruitarian diet is a modified, more controlled version of the vegan diet that is primarily associated with the consumption of fruits either raw or dried, it is an uncommon type of all vegetarian diets consumed and this may likely lead to insufficient intake of essential nutrients (4-11). A vegan diet or strict vegetarian excludes all animal foods and animal products [1,2]. There is an increase in the number of young adults adopting vegetarian diets (4,12-14) especially women giving religious, ethical, health, and economic reasons for following the vegetarian diet (15,16).

The health benefit of vegetarianism has been reported in several publications has many people who choose to practice vegetarianism give the reason for adopting such behavior and many young women adopting vegetarianism as a means of attempting to control or lose weight (17). Studies (18-21) also reported that some individuals adopting a vegetarian diet for health, longevity and slow aging process, and compassion for animals. (22,23)

Vegetarian diets appear to offer some nutritional advantages for adolescents and weight benefits including a lower risk of developing breast cancer and obesity (24). Government agencies are incorporating research on the benefits of plant-based diets into the health message of the professional body of dietetics groups. Study on

vegetarianism in Osun State is scanty and minimal. Therefore, this study aims at comparing and assessing the nutritional status of vegetarian and non-vegetarian female adolescents in ile-ife, Osun State, Nigeria.

## 2. Materials and Methods

**Study Area:** Seventh-Day Adventist High School is faith-based established by Seventh -Day Adventist church, Nigeria. The school is located in Ile-ife, the metropolitan area of Osun State, Nigeria.

**Population Size:** 95 subjects who gave their consents were finally chosen for the study, forty-five of them who were practicing vegetarianism, and fifty were non-vegetarians

**Study design:** the cross-sectional study was carried out and the recruitment procedure was voluntary where 95 healthy female subjects were selected.

**Data selection:** Ninety-five vegetarian and non-vegetarian female adolescents which include those in JSS! To SS3 students who are not taking any supplementary diets and medications, consuming any form of alcohol dinks, nonsmoking was selected for the study.

The subjects were Lacto-ovo-vegetarian who consume no meat, fish but consuming milk and eggs twice per week and Non-vegetarians female subjects who consuming both plant and animal food products. The subject consent was taken to explain the detail of the study to them.

### Anthropometry measurement and nutrient intake

Weight of the subjects was taken with the subject wearing light clothing without putting on shoes, as well as the height using a stadiometer, Middle upper arm circumference was also taken using a tape measure and all the measurement was taken in duplicate.

**Nutrient intake:** 3- day weighed intakes of foods and fluids on the actual amount of food eating digital weighing scale of all portion size. A 3-day dietary intakes were taken one-week day and 2 weekend days. The mean intake for each adolescent was used to compare with recommended dietary allowances (RDA).

## 3. Statistical analysis

Data collected were analyzed using SPSS/PC version 23. Anthropometric characteristics of the vegetarians and non-vegetarian female adolescents were compared employing unpaired t-tests. The means nutrient intakes of vegetarian were calculated with the food composition table (25,26) and compared the result obtained with recommended dietary allowance; the results were considered significant at  $p < 0.05$ .

## 4. Results

Forty-five vegetarians and fifty non -vegetarians completed the study. In the interview conducted only two of the vegetarian subjects were vegan and 43 were Lacto-Ovo vegetarian, the reason-giving for adopting vegetarianism is on health reasons, such as weight control and longevity.

**Table 1: Mean S.D of age, anthropometric parameters of Vegetarian and non- vegetarian female adolescent**

	VEGETARIAN (n =45)	NON- VEGETARIAN (n=50)
Age (11-17)	15.1±3.2	13.9± 1.7
Height(m)	1.5±7.6	1.5±7.7
Weight(kg)	47.9±9.8	44.0±7.7

Institute of Medicine (1990): Body Mass index cut -off

**Table II. Result of anthropometric indices of vegetarian and non- vegetarian female adolescent**

	VEGETARIAN (n =45)	NON- VEGETARIAN (n=50)
Body Mass Index (kg/m <sup>2</sup> )	19.9± 2.9	19.0±2.5
Mid upper Arm Circumference(cm)	22.3±1.9	21.8± 2.3

In this study vegetarians weigh more than non-vegetarians. The mean BMI and MUAC values of vegetarians were not significantly different from the non-vegetarian.

**Table III. Mean energy and nutrients intake of adolescent female vegetarian**

Nutrients	Intake(n=45)	RDA/AI
Energy(kcal)	1937	1729 - 2336
Protein(g)	58.3	46
Fat(g)	28.6	30 – 35
Carbohydrate(g)	349.1	130
Calcium(mg)	450.8	1300
Iron (mg)	31.2	8-11
Sodium(mg)	833.9	1500
Zinc(mg)	46.0	8 – 9
Vitamin B-12(mg)	1.1	1.8 - 2.4

The carbohydrate intake was higher than RDA, protein intakes were higher and even exceeded RDA, fat was significantly lower than RDA. The mean intakes of minerals and vitamins of vegetarians were slightly lower than RDAs for Calcium, and Sodium but high in Zinc and Vitamin B- 12 was lower compared to RDA.

### 5. Discussion

The adolescent who participates in this study were so conscious of what they eat and as well as their health. Those that were using supplementary and those on the drug were not included. The vegetarian and non-vegetarian female adolescents used in this study were healthy.

There was a significant difference in the mean weight of the vegetarian subjects and non-vegetarian subjects. This may be due to moderate activities in which the vegetarian subjects always engaged as part of a healthy lifestyle.

The mean body mass index of vegetarian subjects and non-vegetarian subjects indicated a significant difference, the two groups fell between the normal range of BMI compared to a reference standard (27). Body Mass Index is used to get a general idea of knowing individuals of disease risk, it gives an idea

The mean nutrients intake reported in this study is similar to the study that has been carried out on the adolescent in some state in Nigeria and other countries (28)

The result of the study shows that vegetarianism does not represent a single dietary pattern and assumptions could be used about the nutrient intakes base on vegetarians' practices. The minimum recommended value of energy for a female adolescent was significantly higher than the mean energy value obtained in this study for adolescent girls- 1937.6kcal/day. Actually, during the period of study, many of the subjects were selective in eating which usually referred to as a disorder of eating behavior, and a lot of them skipping meals especially when beans or yam is being served at their cafeteria, this also affects their carbohydrate intake which exceeded the daily recommended allowance.

However, the energy needs of adolescents vary greatly depending on their current rate of growth, gender, body composition, and physical activity. Some of the subjects, their daily energy intake exceeded FAO/WHO recommended daily allowance (RDA) such as subject AO of weight 53kg consumed 2939kcal/day, and one of the subjects also nearly double the normal daily energy requirement (3887kcal/day). It may be that during the period of study the subject consumed more than the daily requirement.

The study found that higher numbers of the subject meet their RDA of protein and some they exceeded RDAs protein intake. This is to show that the lacto-ovo-vegetarian diet is similar to non-vegetarian diets. In a study, the protein intake is lower among the vegetarian than in non-vegetarian diet but meet the daily requirement of some people. (29) as long as varieties of plant sources are consumed (30). There were lower intakes of calcium, zinc, and vitamin B-12 than the recommended, the unavailability of calcium may be due to oxalates and phytates present in the plant that make calcium intakes is important concerning none health. The lower in zinc intake compare to RDA, the bioavailability from some plants is limited by their phytates and or fiber contents. The Lacto-ovo-vegetarian subjects included egg and milk in their diet. This study confirmed that two eggs per week were being given to each subject. Lacto-ovo-vegetarians can get adequate vitamin B-12 from dairy foods if they are consumed regularly. The supplementary of all these nutrients should be encouraged as well as consumption of fortified food products (31-34) because limited supply or deficiency may be dangerous

The mean value for iron consumption was very high in this study, iron deficiency anaemia is no longer common among vegetarians (86), food that contains an appreciable amount of vitamin C such as Tomatoes, or broccoli, etc that are known for an increase in the amount iron absorption.

## Conclusion

The study found that vegetarianism adoption was based on different reasons such as moral, religious, health, and many more. It was shown that the diet pattern of vegetarians cannot be based on assumptions and it is important to know the type of dietary pattern before taking any decision. RDA could be met if the diet is well planned. Various dietary patterns are being adopted because of health, ethical religion, and environmental reasons. Vegetarians need a lot of assistance or awareness about the nature of the dietary pattern before making assumptions, about nutrient intakes. There is a need for serious deliberation on how vitamin B12 will be available especially for vegans.

Vegetarians should be more conscious about the adequate nutrient requirements and with this, they can meet with current nutrition recommendations. Sodium intakes of subjects were less, zinc and iron intake were above RDA. Therefore, adequate intake of some nutrients can be achieved and maintained if vegetarian diets are well planned to meet the nutritional needs of different age groups including adolescents.

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