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DETERMINATION OF BODY MASS INDEX (BMI) AND DIFFERENCES IN ACADEMIC PERFORMANCES AMONG STUDENTS OF ULUL-ALBAB SCIENCE SECONDARY SCHOOL, KATSINA METROPOLIS

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Abstract

This research work determined the body mass indexes and differences in academic performances in fives core science subjects among students of Ulul-Albab science secondary school. Five research objectives, and research hypotheses were formulated. Quantitative and descriptive researches were employed. Ninety (90) students are the total sample size used. Students' body mass indexes were measured and their terminal academic performances were collected and compared. Descriptive and inferential statistics: Mean and Anova were used to analyse and interpret data; and the alpha value 0.05 was also used to test all research hypotheses. The study discovered that, there is significant differences in academic performances among students with differences in body mass indexes. Normal weight students performed better in all science subjects than obese and underweight; and this may be due to their normal body physique, fitness and low health risks. It recommended that dietary counselling should be given to obese, underweight and overweight students to avoid health risks and for better academic performances and activities in or outside schools.

Keywords: Body Mass Index, Over-weight, Normal weight, Underweight, Obese, Academic Performance

Introduction

Despite economic challenges and increase in poverty rates in the year 2024 in Nigeria as reported Nigerian Economic Summit Group (NESG) and International Monetary Fund (IMF), yet, diet control is become necessary among individuals especially those from well-to-do families Nigeria particularly in Katsina state. Students are observed to be overweight, normal weight, underweight, and obese. It is known that protein foods are most needed and important especially to children as it biological boost their intelligence and learning capabilities. Ogden (2010) discovered that women have higher body dissatisfaction than men therefore differences in individuals' body physique cannot only be determined by the intake of diet, rather genetics and other factors such as environment, economic status, overeating and under-eating. Students at different levels of education with differences in body physique and Body Mass Index (BMI) might have differences in learning abilities and performance due to their. Students' academic performance may differ according to the nature of their body physique and BMI though some intervening variable might come in. Obesity surgery is offered when other forms of weight-loss intervention have failed. It brings with it the risks of any major operation and results in pains and discomfort, but is also generally regarded as the most effective form of treatment. It makes the stomach much smaller and how it works is not rocket science: it simply limit what you eat: it simply limit what you eat and therefore you lose weight. Ogden (2010) opined that there are two psychological ways of diet control which are 'overt control': eat your greens and you can have some cakes for pudding or eat less chocolate, eat more vegetables, be good and you can

have more cakes. 'covert control' will involve a parent or caregiver removing all the foods that child overeat.

Eating disorder has become widespread in western industrialised societies. This may be related to the over-abundance of food, but it is likely to be influenced by societal norms that link attractiveness to being thin (American Psychological Association APA, 1994). Indeed, the popular and scientific assumption is that the preoccupation with thinness and dieting rampant in western societies is a direct cause of eating disorders. However it is well established that eating disorders are multi-determined and that culture is only one of many factors that contribute to the development of eating disorders. Anorexia Nervosa (AN) (literally, 'nervous lack of appetite') usually begins in adolescence (16-17), after patient (90-95) percent of whom are females has become over-concerned about 'puppy fat' and has begun to diet. This dieting often masquerades as 'vegetarianism' (Lipsedge, 1997) and progress to a relentless attempt to achieve what is in fact an abnormally low body weight or Bulumia Nervosa (BN) (from bous meaning 'ox' and limos meaning 'hunger') was virtually unknown before the 1970. BN sufferers tend to be older, less likely to come from middle-or upper-class backgrounds, more likely to have been associated with overeating which eventually result in underweight.

Body Mass Index (BMI) Defined

According to National Health Institute (2018), body mass index is a person's weight in kilogram (kg) divided by his or her height in metres squared, it is also referred to as Quetelet index. The National Institute of Health (NIH) defined normal weight, overweight, and obesity according to BMI rather than the traditional height/weight charts. Overweight is a BMI of 27.3 or more for women and 27.8 or more for men. Obesity is of BMI of 30 or more for either sex (about 30 pounds overweight). A muscular person might have a high BMI without health risks. If your BMI is under 18.5 you are considered underweight. Finally normal or healthy BMI is between 18.5 and 24.9. So weight gain are taking in more calories than usual or reducing the amount of physical activity in your life. However, some people seem to gain weight even when they are eating and exercising the same as always.

Meanwhile, persons that control their weight within the recommended range throughout life have taken a very important step toward optimising their physiological and psychological well-being. Although the problem of underweight is less common than obesity, too low a weight can in relation to height may not be desirable for optimum health. Resistance to disease may be reduced by being underweight; incidence of tuberculosis is higher among the underweight than among those of normal or even excess weight. On other way excess fat is frequently a contributor to less than optimum physical and mental health. Just the fact that obesity is viewed as being unattractive in this country today is sufficient to make many people feel uncomfortable about their rotund appearance. Obese is of most annoying and sometimes hazardous complications of overweight is the difficulty in breathing. Obese people experience difficulty in exercising, due both to their awkward bodies and the building of carbon dioxide in the blood resulting from decreased respiratory capacity. Obese adults run a greater risk of developing diabetes, gall bladder disorders, and appendicitis. In fact, the frequency of most diseases is higher in obese than non-obese people, and the mortality rate from other disease is also higher in the obese.

Obesity Defined: Its causes and effects

Obesity is a medical condition characterised by excess body fat, which can negatively impact health (World Health Organisation WHO, 1995). Bansal (1999), asserted that obesity can be classified into Grade 1, BMI of more than 25 Grade II, of BMI between 30 and 39.9; and Grade III, of BMI above 40. The following are the causes of obesity.

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Sedentary life i.e. (living in one place regularly)

Lack of adequate physical labour.

Genetic factors when father or mother is obese, there 50% chances that their child will be obese.

Eating habit: overeating, eating faster, taking less time for chewing, thereby consuming more food, taking snacks in between the meals.

Endocrine factors: hypothyroidism, hypogonadism, Cushing's syndrome- Accumulation of fat over the central nervous part of the body manifested by moon-face, buffalo hump (around the neck and shoulders) and pendulous abdomen. Others includes; puberty, pregnancy, menopause,

Other causes includes: excess alcohol intake, taking contraceptive pills regularly, mental depression associated with overeating, injury to hypothalamus.

Effects of Obesity

Bansal (1999), Obesity may cause the following conditions such as: Diabetes mellitus, hypertension, coronary heart disease as angina pectoris and coronary thrombosis or myocardial infarction, congestive heart failure, atherosclerosis, osteoarthritis of the weight-bearing joints, varicose veins, abdominal hernia, formation of gall stones, intertrigo (an erythematous eruption occurring on the opposite surfaces of the skin from friction or rubbing); and infection at the skin flexures and under the breast of the obese woman, low in life expectancy, obstetrical risk, fertility is lowered, psychological disturbance, prone to accidents, and death. The management of obesity may include dietary control, exercise, drug therapy, and psychotherapy.

Underweight Defined: Its causes and effects

Underweight is also medical health condition characterised by less fat, thinness and BMI of or below 18.5 (WHO, 1995). The causes of underweight according to Bansal (1999), may include:

Imbalanced diet

Diseases in general

Excessive fasting

Starvation

Consumption of food in lesser quantity

Aversion of eating and lack of interest in food

Alteration of taste

Inability to ingest food

Psychological factors such as anorexia nervosa

Marasmus in children

Effects of Underweight

Bansal (1999), asserted that the effects of underweight may include: loss of weight, stunted growth, body cells malfunction, loss of energy, prone to some certain diseases such as tuberculosis, psychological imbalances, nausea, fatigue, and general body organs malfunctions. The remedy of underweight may include: intake of adequate desirable protein, energy giving and fatty foods, improving appetite, general dietary counselling and psychotherapy.

Body Physique

According to Bansal (1999), body physique is a term used to describe human body structure, shape, and size. There are three types of body physique which are: ectomorph, endomorph, mesomorph. Each has their own typical characteristics that can help you determine which body type you have.

Mesomorphs are middle of the body types, lean and muscular simultaneously, naturally athletics build with well-defined muscles. Ectomorphs are thin, lean build,, small bone structure. The characteristics of endomorph is that they have soft, curvy and round physique display. They are featured with being relaxed, tolerant, comfortable, and sociable. Psychologically, they are fun-loving, good-humoured, even-tempered, and they love food and affection. Endomorphs are muscular and well-built, curvy, rounded build, large bone structure, with a slow metabolism and responsive muscle cells. They are adventurous, assertive, competitive, and fearless. They are curious and enjoy trying new things, but can also be obnoxious and aggressive, They tend to have wider hips than shoulder, creating a pear-shaped physique (Bansal, 1999).

Statement of the Problem

Body physiques and body mass indexes are terms used to describe the nature of human body. Being fatty, thin, slim, plump, tall, or dwarf doesn't determine your BMI (underweight, normal weight, overweight or obese). BMI determines your body statuses and types. It can be agreed or disagreed that nature of human body status determines one's academic performance and the match of the choice of course of study in secondary school or institution of higher learning. For example a dwarf teacher in Nigeria may be mocked or scorned by students, a fatty doctor may also be mocked, feared and ridiculed by client or students in the school or classroom. Differences in body physique among individuals is a matter needed to be discussed in an academic environment. For example fatty people as observed are characterised with sluggishness, soft voice, slowness and fatigue as well as eating disorder (overeating) to some extent; likewise other forms body physiques have their unique characters and mode of behaviours, appearance and presentation in school and society at large. BMI is a factor that determines where one shall be placed in job and academic discipline as well in the career choices. For example giant men shall be soldiers and farmers, slim people shall be doctors, nurses etc. With this point of view body physique may positively or negatively affect one's academic performance in the society which aroused the interest of researcher to select the variables as Body Mass Index and academic performance and to assess whether differences in academic performances can be determined according to student differences in the body mass indexes. Even though genetics and chromosomal abnormalities, and other physiological and environmental factors can cause differences in BMI not just as a result of nutritional in-take (high, normal or low). One's profession and academic discipline/activities shall always correspond with his body statuses and personality as teachers, doctors, engineers and lawyers and security officers among others as perceived. Therefore the researcher decided to select and take the variables under study so as to investigate the BMI and academic performances among secondary school students.

Objectives of the Study

1. To determine the differences in English Language academic performance of Ulul-Albab science students with different Body Mass Indexes.
2. To determine the differences in Mathematics academic performance of Ulul-Albab science students with different Body Mass Indexes.
3. To determine the differences in Biology academic performance of Ulul-Albab science students with different Body Mass Indexes.
4. To determine the differences in Chemistry academic performance of Ulul-Albab science students with different Body Mass Index.
5. To determine the differences in Physics academic performances of Ulul-Albab science students

with different Body Mass Index.

Research Hypotheses

1.There is no significant difference in English Language academic performance among Ulul-Albab science students with different Body Mass Indexes.

2.There is no significant difference in mathematics academic performance among Ulul-Albab science students with different Body Mass Indexes.

3.There is no significant difference in Biology academic performance among Ulul-Albab science students with different Body Mass Indexes.

4.There is no significant difference in Chemistry academic performance among Ulul-Albab science students with different Body Mass Indexes.

5.There is no significant difference in Physics academic performance among Ulul-Albab science students with different Body Mass Indexes.

Methodology

Survey research was employed where Ulul-Albab science students' body weights and heights were taken to measure their body mass indexes. The weight of the students is measured in kilograms and height is measured in metres; and the Body Mass Indexes (BMI) can be calculated by using the BMI formula i.e. human height in metres is divided by weight in kilogram and then multiplied all by hundred as: (BMI = H÷W × 100). The BMI statuses of the students (underweight, overweight, normal weight and obese) were taken and compared with their terminal academic performances. Ulul-Albab boarding science secondary school was selected because the students are almost from well-to-do families that is they have almost equal nutritional and dietary status, and in order to take care of any other extraneous variables such as socio-economic status of the students, poor parenting, poor environment, general eating disorders et cetera. Three (3) core, general and compulsory subjects of first term 2024 academic session results: English Language, Mathematics, Biology, chemistry and physics academic results were used to determine and compare their academic/outcomes performances with their BMI. Descriptive statistical (Mean), and inferential statistics (T-test independent test analysis) were also used.

Data Presentation and Analysis

H01 There is no significant difference in English Language academic performance among Ulul-Albab science students with different Body Mass Indexes.

Table 1: Differences in English Language academic performance of Ulul-Albab science students with different Body Mass Indexes using ANOVA.

SN	BMI	Performance Mean	N	df	Ref.
1	Underweight	59	16		
2	Normal	76	47		
3	Overweight	55	189		
4	Obese	51	89		.023
	TOTAL	**60.25**	90		

Table 1 has shown that the normal weight students performed better in English language and the

obese performed least. And the table has also shown that the p value .023 is less than alpha 0.05, therefore the null hypothesis is rejected and consequently alternate hypothesis is accepted which says there is significant difference in English academic performance among Ulul-Albab students with differences in body mass index.

HO2 There is no significant difference in mathematics academic performance among Ulul-Albab science students with different Body Mass Indexes.

Table 2: Differences in mathematics academic performance of Ulul-Albab science students with different Body Mass Indexes using ANOVA.

SN	BMI	Mean Performance	N	df	Ref.
1	Underweight	52	16		
2	Normal	78	47		
3	Overweight	52	18	89	.010
4	Obese	51	9		
	Total	**58.25**	90		

Table 2 has shown that the normal weight students performed better in English language and the obese performed least. And the table has also shown that the p value .010 is less than alpha 0.05, therefore the null hypothesis is rejected and consequently alternate hypothesis is accepted which says there is significant difference in mathematics academic performance among Ulul-Albab students with differences in body math index.

HO3 There is no significant difference in biology academic performance among Ulul-Albab science students with different Body Mass Indexes.

Table 3: Differences in biology academic performance of Ulul-Albab science students with different Body Mass Indexes using Anova.

SN	BMI	Mean Performance	N	df	Ref.
1	Underweight	66	16	89	
2	Normal	88	47		
3	Overweight	52	18		
4	Obese	50	9		. 022
	Total	**64**	90		

Table 3 has shown that the normal weight students performed better in English language and the obese performed least. And the table has also shown that the p value .022 is less than alpha 0.05, therefore the null hypothesis is rejected and consequently alternate hypothesis is accepted which says there is significant difference in biology academic performance among Ulul-Albab students with differences in body math index.

HO4 There is no significant difference in chemistry academic performance among Ulul-Albab science students with different Body Mass Indexes.

Table 4: Differences in chemistry academic performance among Ulul-Albab students with different body mass indexes using Anova.

SN	BMI	Mean Performance	N	df	Ref.
1	Underweight	56	16	89	
2	Normal	78	47		.011
3	Overweight	57	18		
4	Obese	50	9		
Total		**60.25**	**90**		

Table 4 has shown that the normal weight students performed better in English language and the obese performed least. And the table has also shown that the p value .011 is less than alpha 0.05, therefore the null hypothesis is rejected and consequently alternate hypothesis is accepted which says there is significant difference in chemistry academic performance among Ulul-Albab students with differences in body math index.

HO5 There is no significant difference in physics academic performance among Ulul-Albab science students with different Body Mass Indexes.

Table 5: Differences in physics academic performance among Ulul-Albab students with different body mass indexes using Anova.

SN	**BMI**	**Mean Performances**	**N**	**df**	**Ref.**
1	Underweight	66	16	89	.030
2	Normal	76	47		
3	Overweight	50	18		
4	Obese	49	9		
Total		**66.25**	**90**		

Table 5 above has shown that the normal weight students performed better in English language and the obese performed least. And the table has also shown that the p value .030 is less than alpha 0.05, therefore the null hypothesis is rejected and consequently alternate hypothesis is accepted which says there is significant difference in physics academic performance among Ulul-Albab students with differences in body math index.

Summary of the Findings

The research findings showed significant differences in five (5) general science subjects (English, Mathematics, Biology, Chemistry and Physics) academic performance among students with different body math indexes in Ulul-Albab science secondary school. Considering their Mean differences, and the alpha value 0.05 is greater than level of significance .000 using Anova inferences. The findings revealed that normal weight students performed better in all five selected core science subjects, than the obese students, and the obese students performed least in all science subjects than underweight and normal weight students. This may be due to their unhealthy psychological and physiological conditions obese and underweight may suffer in their lives and in the school. It has also revealed that

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normal weight outnumbered underweight, obese, and overweight.

Conclusion

In all science subjects: English Mathematics, Biology, Chemistry and Physics; normal weight students performed better than obese, underweight and overweight students in Ulul-Albab science secondary school. Therefore, the Body Mass Index determines and negatively affects the students' academic performances and general academic activities including extracurricular activities though intervening variable might come-in, such as genetic and environment factors.

Recommendations

Dietary counselling should be given to obese, underweight and overweight students by dietary and school counsellors as well teachers to avoid health risks among students.

Counsellors, teachers and parents should put students' BMI into consideration by observing at their body physiques time to time.

Eating disorders should be controlled by parents and teachers especially to boarding students.

Regular physical exercise should be encouraged to obese and overweight students.

Body physiques and BMI should serve as a parameter or criteria in selecting the courses of study that fits the students in secondary and post- secondary school levels of education.

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