



Gender-Based Assessment of Haematological Parameters of Obese Individuals in Omisanjana Area of Ado Ekiti, Ekiti State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Obesity is a serious health problem, it increases heart-related diseases and its prevalence continues to increase due to genetic and lifestyle influences. This study aims to evaluate the hematological parameters of obese individuals based on gender in the Omisanjana region of Ado Ekiti, Ekiti state, Nigeria.

Materials and Methods: The research is based on a cross-sectional study of obese and non-

obese individuals in hospitals. The study was carried out in the Omisanjana area of Ado Ekiti, Ekiti state. Fifty (50) obese individuals and fifty (50) apparently non-obese individuals were recruited as controls and participated in the study. The data are shown in the table and are expressed as mean \pm standard deviation, and are analyzed using the Student's t test of the statistical software package for social sciences (SPSS, version 20.0), and the level of significance is established at $p \leq 0.05$.

Results: The results showed no significant difference in PCV ($p=0.3783$), WBC ($p=0.501$), LYM ($p=0.149$), GRAN ($p=0.336$), MID ($p=0.242$), RBC ($p=0.243$), HGB ($p=0.086$), HCT ($p=0.323$), MCV ($p=0.943$), MCH ($p=0.097$), MCHC ($p=0.922$), PLT ($p=0.941$), when compared between obese individuals and non-obese individuals based on sex respectively.

Conclusion: The study showed no statistically significant changes, and it may be because there are no significant changes in the physiological factors and the growth factors of the precursor cells in the bone marrow, so the body mass index (BMI) has no effect on hematological parameters.

Keywords: Haematological parameters; obese individuals; gender; heart diseases.

1. INTRODUCTION

Obesity is a chronic disease that has spread globally and threatens global public health [1]. Obesity is defined as a body mass index (BMI) of 30 kg/m², and values greater than 40 kg/m² are considered extreme or morbid obesity [2]. Obesity has attracted the attention of scientific communities, organizations and governments around the world because it has a negative impact on people's lives and has excessive financial impact on all health systems [3]. As we all know, obesity is very widespread worldwide. According to the 2005 World Health Organization report, there are about 400 million obese adults and 1.6 billion overweight people in the world [4]. More than 1.1 billion adults are overweight, of which 312 million are obese. According to estimates by the International Obesity Task Force, 1.7 billion people face weight-related health risks, and increasing body mass index (BMI) causes more than 2.5 million deaths each year, which is expected to double by 2030 [5].

Obesity is a chronic disease. It can cause a variety of adverse health effects, involving different organ systems [1,6]. Obesity is a major risk factor for high blood pressure (hypertension), coronary heart disease (which causes a heart attack), and cerebrovascular disease (which causes a stroke). It is related to dyslipidemia (such as increased low-density lipoprotein cholesterol, triglycerides, very low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol), which leads to atherosclerotic changes in the wall of blood vessels. Atherosclerosis is the basic pathology of hypertension and coronary heart disease, and it is also a considerable proportion of cerebrovascular diseases [6]. Some cases are mainly caused by genes, endocrine disorders,

drugs or mental disorders. The view that obese people eat less but gain weight due to slow metabolism is generally not supported. On average, the energy expenditure of obese people is higher than that of normal people due to the energy required to maintain weight gain [7].

Obesity has been described as a low-grade inflammatory state [2], in which white blood cells play an important role. This study aims to evaluate the hematological parameters of obese individuals based on gender in the Omisanjana region of Ado Ekiti, Ekiti state, Nigeria.

2. MATERIALS AND METHODS

2.1 Research Design

The study is a hospital based cross-sectional study among obese individual and non-obese individuals. The subjects were selected using a well-structured questionnaire who were age and sex matched.

2.2 Study Area

This study was carried out at Omisanjana area of Ado Ekiti, Ekiti State.

2.3 Target Population

This study was conducted at Omisanjana area of Ado Ekiti, Ekiti State. Fifty (50) obese individuals and fifty (50) apparently non-obese individuals were recruited as controls and enrolled in this study.

2.4 Blood Collection

Five (5ml) of venous blood was collected from each participant into an Ethylenediaminetetraacetic acid (EDTA) bottle

which was then used for the determination of FBC.

2.5 Body Weight

Body weight was measured while the subject minimally clothed and without shoes, standing steady on a weighing scale and it was recorded to the nearest 0.1kg.

2.6 Height

Height was measured to the nearest 0.1 cm while the subject was standing barefoot in erect position with a wall-mounted stadiometer.15 5.

2.7 Body Mass Index

BMI was measured by weight in kilograms divided by square of height in meters (kg/m²). (BMI in the range of 18.50 to 24.99 kg/m² is considered to be normal

2.8 Method of Test

This was carried out using an automated analyser; KX-2IN (Sysmex Corporation, Kobe, Japan) Haematology analyser.

2.9 Method of Data Analysis

The data were presented in tables and were presented as mean ± standard deviation and analyzed using statistical packages for social sciences (SPSS, Version 20.0) and level of significance set at as p≤ 0.05.

3. RESULTS

The Table above showed no significant difference in PCV (37.36 ± 5.72%, 36.08 ±

4.24%, p=0.3783), WBC (5.91 ± 2.65×10⁹/L, 6.38 ± 2.27×10⁹/L, p=0.501), LYM (37.63 ± 10.02%, 32.81 ± 13.01%, p=0.149), GRAN (49.78 ± 19.60%, 54.99 ± 18.31%, p=0.336), MID (12.61 ± 15.44%, 8.63 ± 6.60%, p=0.242), , RBC (4.66 ± 0.91×10⁹/L, 4.38 ± 0.73×10⁹/L, p=0.243), HGB (11.92 ± 2.38g/dl, 10.37 ± 3.73g/dl, p=0.086), HCT (37.38 ± 5.77%, 35.95 ± 4.24%, p=0.323), MCV (79.24 ± 8.37fL, 79.03 ± 12.23fL, p=0.943), MCH (27.56 ± 4.60Pg, 25.74 ± 2.78Pg, p=0.097), MCHC (32.17 ± 2.38g/dl, 32.23 ± 1.57g/dl, p=0.922), PLT (172.75 ± 66.20×10⁹/L, 174.28 ± 77.54×10⁹/L, p=0.941), when compared between obese individuals and non-obese individuals based on sex respectively.

4. DISCUSSION

Hematological parameters have been proven to be good indicators of health and disease status [8,9]. The study did not show that the hematology parameters studied vary with gender differences. Through the receptors in the bone marrow attached to the precursor cells, there are not many physiological changes and growth factors have little effect on hematological parameters. These are in sharp contrast with Mei-Chu et al. [10] Shows that red blood cell count and haematocrit are positively correlated with obesity. In addition, previous literature has tracked the increase in PCV in obese patients as one of the risk factors for cardiovascular and other diseases. Also, PCV is the most important indicator for determining blood viscosity. The viscosity of the blood is an indicator of vascular risk. An increase in BMI is known to increase blood viscosity [11]. A lower value may indicate that the subject is not at risk for cardiovascular disease.

Table 1. Background Characteristics (n=50)

Demographic profile	Frequency (Percentages)
Gender	
Male	50(50%)
Female	50(50%)
Age in Years	
18-30	50(50%)
31-65	50(50%)
Education Qualification	
Primary	4 (8%)
Secondary	21(42%)
Tertiary	25(50%)

Table 2. Mean \pm standard deviation of haematological parameters of obese patient based on sex

Parameter	Male	Female	T-value	P -value
PVC(%)	37.36 \pm 5.72	36.08 \pm 4.24	0.899	0.373
WBC($10^9/L$)	5.91 \pm 2.65	6.38 \pm 2.27	-0.678	0.501
LYM(%)	37.63 \pm 10.02	32.81 \pm 13.01	1.466	0.149
GRAN(%)	49.78 \pm 19.60	54.99 \pm 18.31	-0.971	0.336
MID(%)	12.61 \pm 15.44	8.63 \pm 6.60	1.185	0.242
RBC($10^9/L$)	4.66 \pm 0.91	4.38 \pm 0.73	1.183	0.243
HGB(g/dl)	11.92 \pm 2.38	10.37 \pm 3.73	1.752	0.086
HCT(%)	37.38 \pm 5.77	35.95 \pm 4.24	0.999	0.323
MCV(fL)	79.24 \pm 8.37	79.03 \pm 12.23	0.072	0.943
MCH(Pg)	27.56 \pm 4.60	25.74 \pm 2.78	1.690	0.097
MCHC(g/dL)	32.17 \pm 2.38	32.23 \pm 1.57	-0.098	0.922
PLT($10^9/L$)	172.75 \pm 66.20	174.28 \pm 77.54	-0.074	0.941

Leukocytosis is often associated with atherosclerotic disease and is also considered a risk factor for cardiovascular disease (CVD) [12]. But studies have shown no changes in white blood cells. The association between the white blood cell count and the risk of atherosclerotic disease is reasonable because white blood cells make a significant contribution to the rheological properties of the blood. This is achieved by changing its own adhesive properties under pressure and participating in endothelial damage. However, there is no significant difference in WBC between obese individuals and non-obese individuals, while there are significant differences in other parameters [1,13].

5. CONCLUSION

The study did not show a statistically significant change. It may be that the body mass index (BMI) has no effect on hematological parameters, because the physiological factors and growth factors in the bone marrow precursor cells did not change significantly.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

Informed consent was obtained from the subjects who participated in the study; the purpose of the study was explained to all participants. Participation in the study was entirely voluntary. Anonymity and confidentiality was ensured and maintained. As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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