Complete Blood Count Constituents as an Unbiased Indicators for Healthiness in Obese Men: An 6-years Intervals don't worthy for Obese –Control study

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Abstract
The present study aimed to use the complete blood count test (CBC) as a marker for healthiness for obese in addition to control subjects . The study samples included 60 men as obese groups (These groups were divided into overweight (BMI 25- 29.9) , obesity class I (BMI 30- 34.9) and obesity class II (BMI 35- 39.9) and 60 men as control. Both the subjects and controls underwent questioning where the same criteria are used. The present study demonstrated a not significant differences in most blood parameters in obese groups compared with control groups in different age groups. The results of present study recommended to use the blood parameters which did not show significant differences as indicator for healthiness in obese subjects after questionnaire filter.
Keywords: obesity , complete blood count , healthiness , years intervals .

الخلاصة
هدفت الدراسة الحالية الى استخدام فحص عد الدم الكلي كدليل لصحة الاشخاص الذين يعانون من السمنة بالإضافة الى عينات السيطرة. تضمنت عينات الدراسة 60 رجلا كمجاميع سمنة (قسمت هذه المجاميع الى اصحاب الوزن الزائد مؤشر كتلة الجسم لهم 25-29.9 ومجموعة السمنة الصنف الاول مؤشر كتلة الجسم لهم 30-34.9 ومجموعة السمنة الصنف الثاني مؤشر كتلة الجسم لهم 35-39.9) و 60 رجلا لمجموعة السيطرة . كل من مجاميع السمنة والسيطرة خضعوا للاستبانة حيث استخدمت نفس المعايير. أظهرت الدراسة الحالية بأنه لا توجد فروقات معنوية في معظم معايير الدم في مجاميع السمنة مقارنة بمجموعة السيطرة في مختلف الفئات العمرية. نتائج هذه الدراسة توصي باستخدام معلمات الدم التي لم تظهر فروق معنوية كمؤشر للصحة العامة في مجاميع السمنة بعد الاستبيان.
الكلمات المفتاحية : السمنة , عد الدم الكلي , الصحة العامة , الفارق العمري.

Introduction
Obesity is the accumulation of an excess body fat , the normal levels of the body fat in adult males 12-20 % of the body weight and 20-30 % in females ,when the levels higher than 25 % of the body weight in males and more than 33% of the body weight in females can be considered obese (Pi-Sunyer ,2000) .Overweight and obesity also caused chronic diseases such as hypertension, coronary heart disease, hyperlipidemia, diabetes type-II, insulin resistance, stroke, cancers, sleep disorders and others (Qureshi *et al.*, 2006). Obesity considered an increasing public health challenge which has reached epidemic . In 2008 , body mass index of Male and female are the highest in some Oceania countries which reached to 33·9 kg/m² for men and 35·0 kg/m² for women in Nauru , While in Bangladesh Female BMI is lowest 20·5 kg/m² and BMI in Democratic Republic of the Congo is 19·9 kg/m² for male (Finucane *et al*.,2011).

The increasing prevalence of obesity may be resulted from two reasons: food was more available for everyone and physical activity of people was reduced with increasing urbanization and economically growth. When energy intake excellence energy consumption , the excess energy was stored as lipid in the form of triglycerides in the body, However when the storage energy exceeds the efforts energy for a long period of time, risk of obesity increased (AL-Hamad ,1999).

According to the evaluation of the World Health Organization (WHO), in 2005 the prevalence of obese individuals all over the world was estimated at 9.8% , and with a subsequent increase. An urgent preventive action has been deemed necessary (Ejima *et al.*,2013).

Obesity over recent years increased which is mainly attributed to the environment and lifestyle effects rather than genetic determinants (Rathnayake *et al* .,2014).

Adipose tissue considered an active endocrine that releases a large numbers of cytokines and bioactive mediators such as leptin , adiponectin, interleukin-6 (IL-6) and tumour necrosis factor-α (TNF-α), which effected not only body weight but also insulin resistance, diabetic , lipid levels , coagulation, fibrinolysis, inflammation and atherosclerosis (Van Gaal ,2006). Obesity in diabetic individuals considered the largest epidemic in the world, so that the fifth leading can be caused of deaths and killing 2.8 million people every year, In the present time , the prevalence of obesity ranges from less than 5% in rural China, Japan and some African countries to levels as high as 75% in an adult population of urban Samoa , while 68% adults of U.S.A are overweight or obese. (Chauhan *et al.*,2012).

Body mass index has a direct effect on heart rate at rest ,during exercise and during fasting in healthy subject (Sauer *et al*.,2014). The individuals with obesity and aging show increased sympathetic nervous system activity , while the weight loss has a positive effect on the sympathetic nervous system balance (De-Jonge *et al*.,2010).

The relationship between hematological parameters , insulin resistance and obesity was unclear. The absent of evidence on the influence of obesity on the hematological parameters and on the participation of the hematological parameters in obesity related to insulin resistance . RBC , hemoglobin and hematocrit can be used to indicate insulin resistance in non-obese persons and these parameters showed a significant association with BMI which is dependent on the fat distribution and obesity is not associated with hematological parameters changes (Barazzoni *et al* .,2014).

Many epidemiological studies showed a significant correlated between WBC cells count which consider a nonspecific inflammatory marker which is increased in the obesity and diabetes type II (Twig *et al*., 2013).

This study aimed to use the complete blood count test (CBC) as a marker for healthiness for obese in addition to control subjects.

Materials and Methods

Control group

This study included 60 samples from blood for control groups. An interviewer managed questionnaire was used to collect the information from the individuals for excluded the subjects with inherited diseases , diabetes and other disorders. Weight and height were obtained , the body mass index(BMI) was calculated. The individuals with normal body mass index between 18 – 24.9 Kg/m^2 were selected as controls.

Subjects

The present study included 60 samples blood for obese groups. Subjects included three groups were divided according to the body mass index (BMI). Body mass index was calculated using the formula BMI= weight (kg)/ $height^2(m)^2$. These groups were classified into overweight (BMI 25- 29.9) , obesity class I (BMI 30- 34.9) and obesity class II (BMI 35- 39.9). Subjects with history of chronic medication use, history of chronic and inherited diseases , diabetes , use drugs and other disorders were excluded from this study.

Age group

Men subjects and control groups were divided into four age groups as follow : group (1) 20-26 years , group (2) 27-32 years , group (3) 33-39 years and group (4) 40-45 years .

Blood collection

Blood were collected by venipuncture at 8-10 am after overnight fast. Separated into 3 ml untreated gel tube for serum and 2 ml EDTA treated tube for plasma. The serum and plasma were frozen at -20C in two replicate until thawed for assay.

Ethics

Control and subjects were told about the importance, and other details of research and explain the aim of this study and the protocol of ethics . Many of subjects refused to give the serum samples.

Complete blood count (CBC)

The hematology analysis test for all control and subjects achieved by using automatically hematology analyzer (Mythic 18 , Orphee , France) which give results for 19 parameters.

Erythrocyte Sedimentation Rate (ESR)

ESR was determined by using automated analyzer(HumanSed25 ,Germany) where the blood sample put in the specific tube and set the instrument to mix the sample for 3 minutes and the result was given after 15 minutes.

Statistical Analysis

The statistical analysis package for social science (SPSS) were used for our results and data were given in mean and standard deviation were read out and comparative statistics were performed to show significant differences between our data at level $p < 0.05$.

Results

Eighteen blood parameter were measured for blood samples of obese men control and groups. The statistical analysis showed no significant differences ($P > 0.05$) in WBC count between the overweight , obesity class I , obesity class II and control groups in aging groups 20-26 year and 27-32 year , in age groups 33-39 year the WBC count in obesity class I and obesity class II a significant increase ($P < 0.05$) compared to control group , while in age group 40-45 year, It was noticed a significant increase ($P < 0.05$) in overweight compared to other BMI groups and control as in the figure (1).

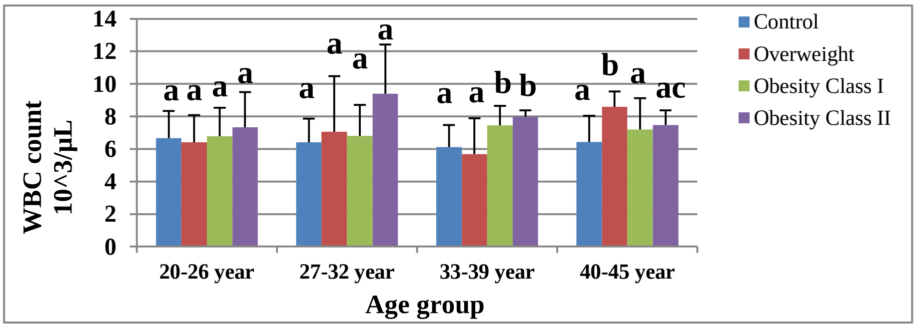

Figure (1): WBC (mean ± SD) count in the control , overweight , obesity class I and obesity class II groups in 10^3/µL.

***Different letters mean a significant differences between groups**

Figure (2) revealed no significant differences (P > 0.05) in LYM count between high BMI groups and control group in age groups 20-26 year and 40-45 year , while in age group 27-32 year a significant increase (p < 0.05)in LYM count obesity class II compared with other groups , also it was showed a significant decrease (P < 0.05) in overweight men compared with control and obesity groups. Also it was demonstrated a significant increase (P < 0.05) in obesity class I and obesity class II compared to control and overweight groups in age group 33-39 year.

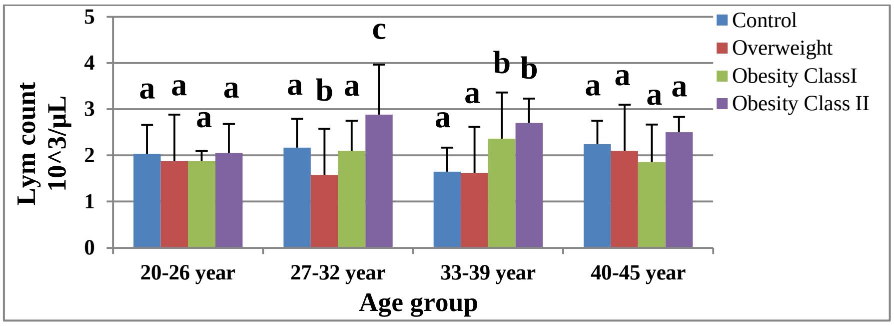

Figure (2) : LYM count (mean ± SD) in the control , overweight , obesity class I and obesity class II group in 10^3/µL.

MON showed no significant differences (P > 0.05) between control group and other high BMI groups in age groups 20-26 year and 33-39 year , while in the age group 27-32 year a significant increase (p < 0.05) in obesity class II compared with control , overweight and obesity class I , also it was revealed a significant increase (P < 0.05) in obesity class I compared with control and other high BMI groups in age groups 40-45 year as in the figure (3).

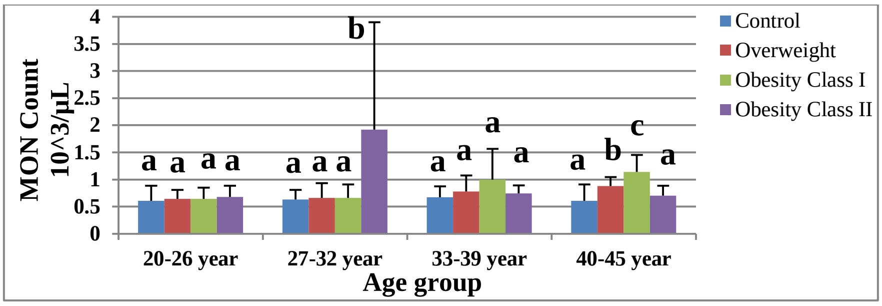

Figure (3): MON count (mean ± SD) in the control , overweight , obesity class I and obesity class II groups .

Statistical analysis showed no significant differences between control group and high BMI groups (p > 0.05) in GRA count in age groups 20-26 year , 27-32 year and 33-39 year, while a significant increase (P < 0.05) in overweight group compared with control and obesity groups in age group 40-45 year as in the figure (4). LYM% showed no significant differences (p > 0.05) between control group and high BMI groups in age groups 20-26 year , 27-32 year and 33-39 year , while in age group 40-45 year , LYM% was showed a significant decrease (P <0.05) in overweight and obesity class I compared with control and obesity class II as in the figure (5). figure (6) showed no significant differences (P> 0.05) in MON% between control group , overweight , obesity class I and obesity class II in age groups 20-26 year , 27-32 year and 33-39 year , while in age group 40-45year a significant increase (P<0.05) in obesity class I compared with control and other high BMI groups .

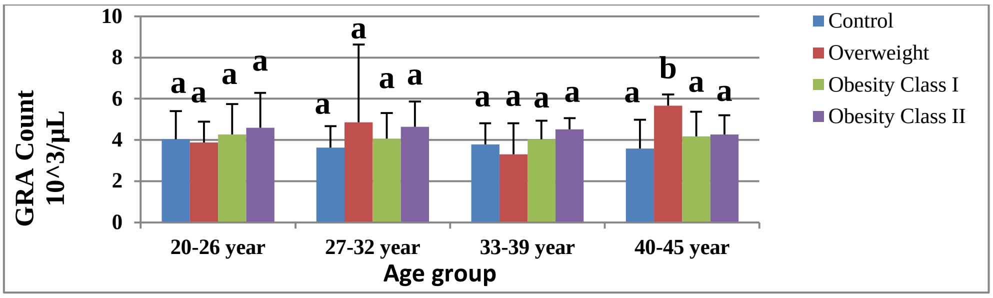

Figure (4): GRA count (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in 10^3/μL .

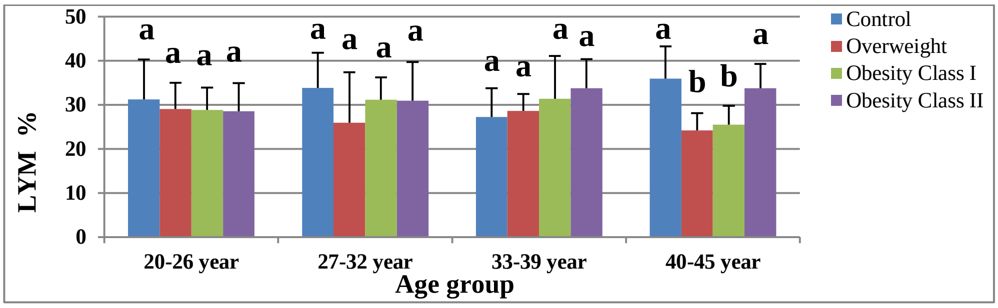

Figure (5): LYM% (mean ± SD) in the control , overweight , obesity class I and obesity class II groups .

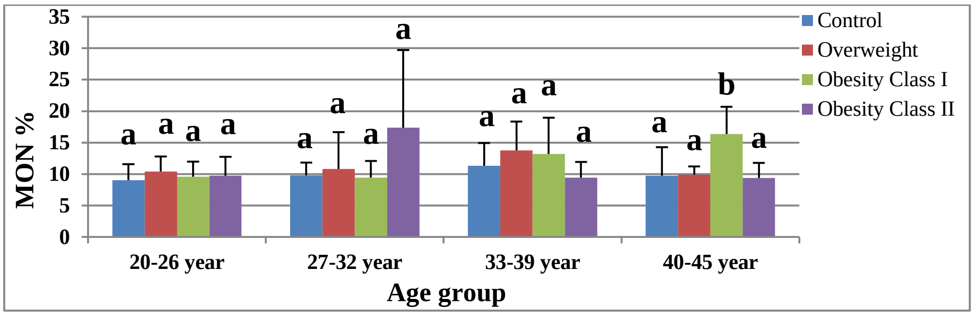

Figure (6): MON% (mean ± SD) in the control , overweight , obesity class I and obesity class II group.

Figure (7) revealed no significant differences (P > 0.05) in GRA% between control and obesity groups in all age groups .

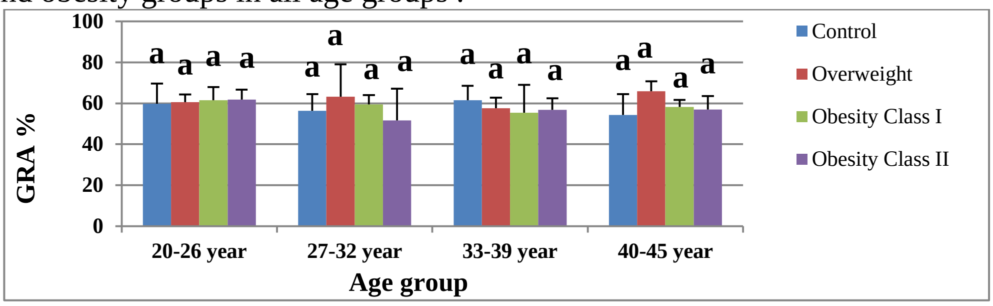

Figure (7): GRA % (mean ± SD) in the control, overweight, obesity class I and obesity class II groups.

Figure (8) demonstrated no significant differences ($P > 0.05$) in RBC count between control and obesity groups in all age groups .

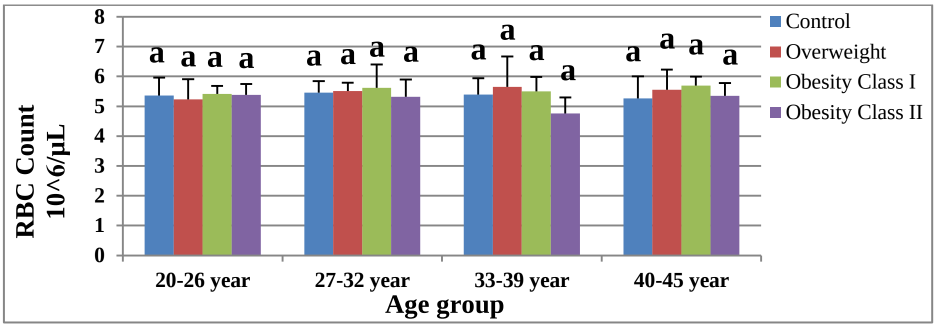

Figure (8): RBC count (mean ± SD) in the control , overweight , obesity class I and obesity class II in 10^6/μL.

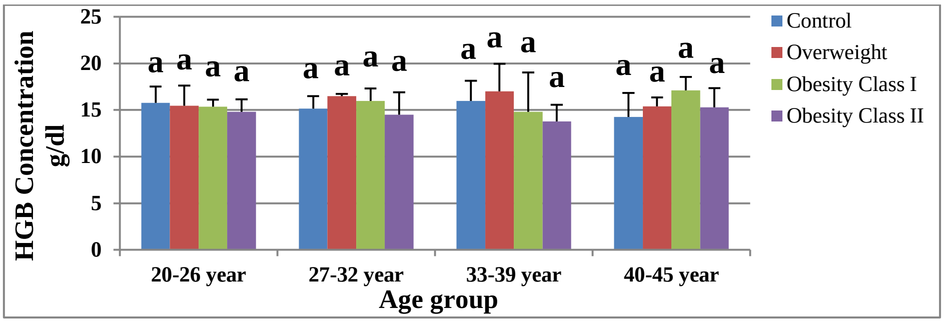

Figure (9): HGB concentration (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in g/dl.

Figure (9) showed no significant differences ($p > 0.05$) in HGB concentration in all age groups between control and obesity groups . HCT revealed no significant differences ($p > 0.05$) between the obese and control groups in all age groups as in the figure (10). MCV demonstrated no significant differences ($p > 0.05$) in all age groups between control and high BMI groups as in the figure (11). MCH showed no significant differences ($p > 0.05$) between the obese and control groups in all age groups as in the figure (12).

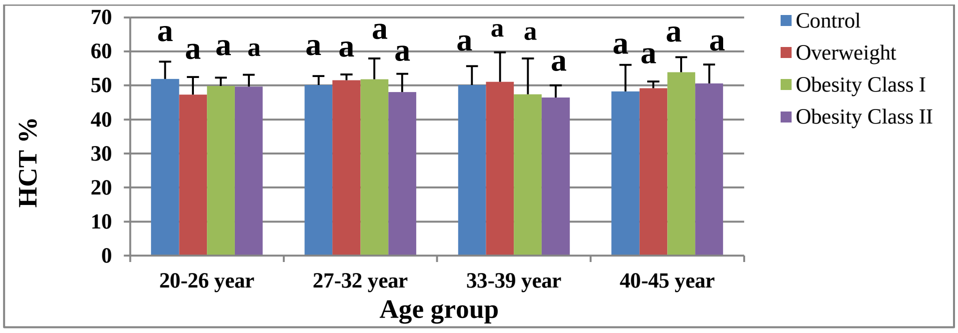

Figure (10): HCT (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in g/dl.

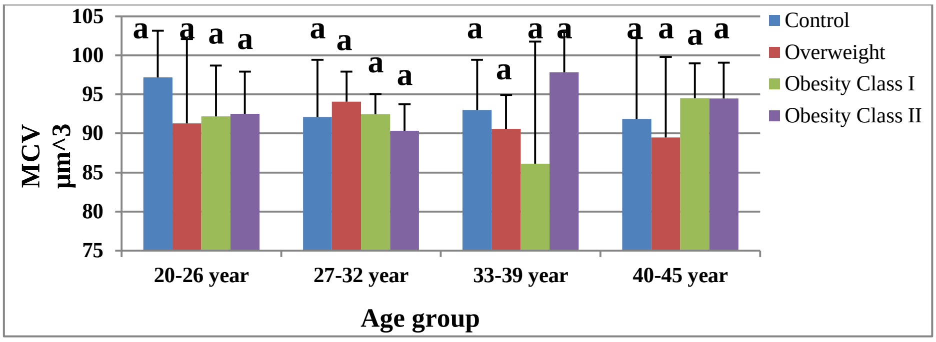

Figure (11): MCV (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in µm^3.

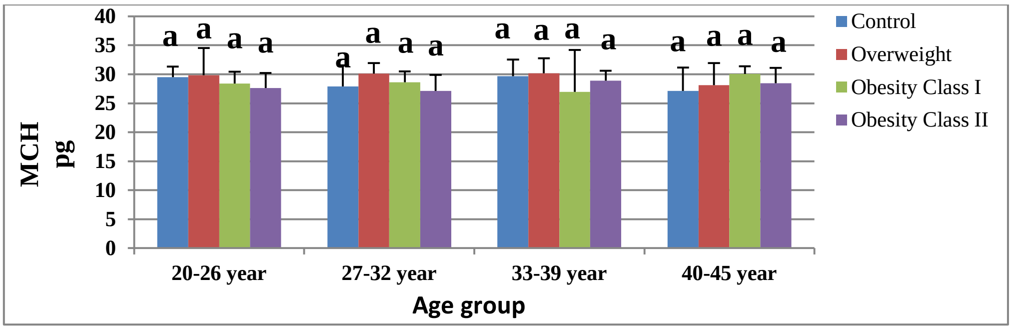

Figure (12): MCH (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in pg.

figure (13) revealed no significant differences ($p > 0.05$) in MCHC between control and obesity groups in age groups 27-32 year and 33-39 year , while a significant increase ($P < 0.05$) in overweight compared with control and obese groups in age group 20-26 year , also it was demonstrated a significant increase ($P < 0.05$) in overweight and obesity class I groups compared with control and obesity class II in age groups 40-45 year.

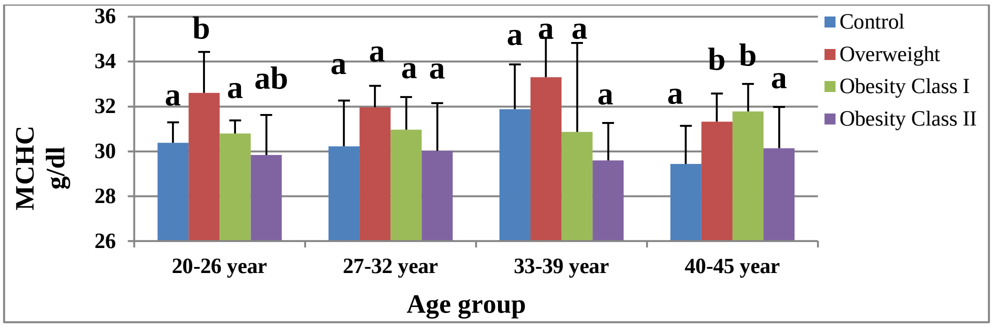

Figure (13): MCHC (mean ± SD) in the control , overweight , obesity class I and obesity class II groups in g/dl.

Figure (14) showed no significant differences ($p > 0.05$) in RDW% in all age groups between control and obesity groups.

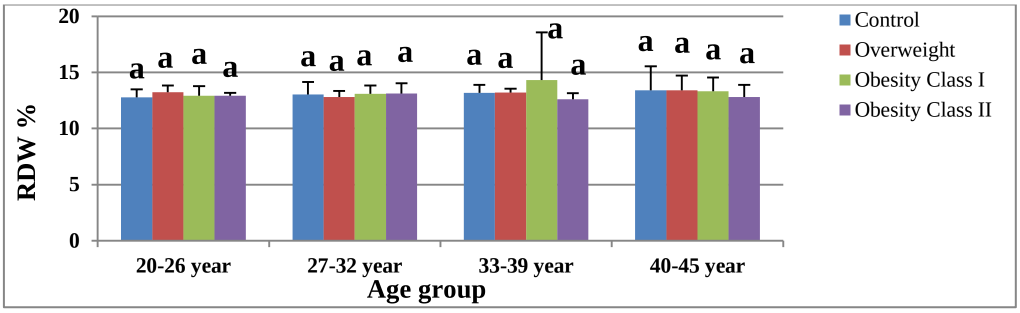

Figure (14): RDW% (mean ±SD) in control , overweight , obesity class I and obesity class II groups .

Figure (15) demonstrated no significant differences (p > 0.05) in RDW-SD between control and obesity groups in all age groups.

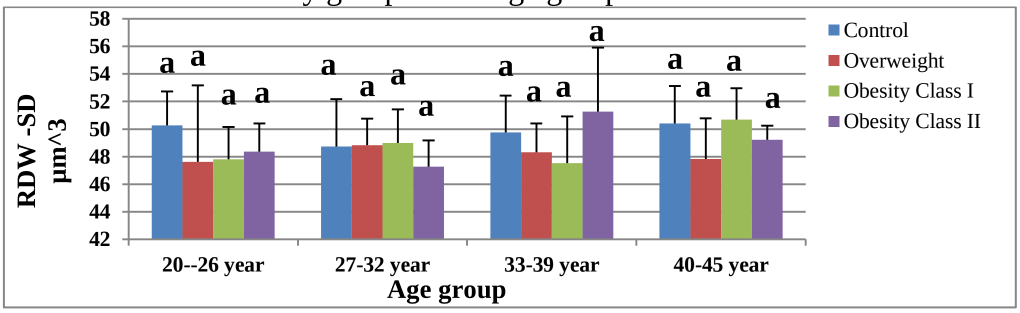

Figure (15): RDW-SD (mean ±SD) in control , overweight , obesity class I and obesity class II groups in µm^3.

Figure (16) revealed no significant differences (p > 0.05) in PLT between control and obesity groups in all age groups.

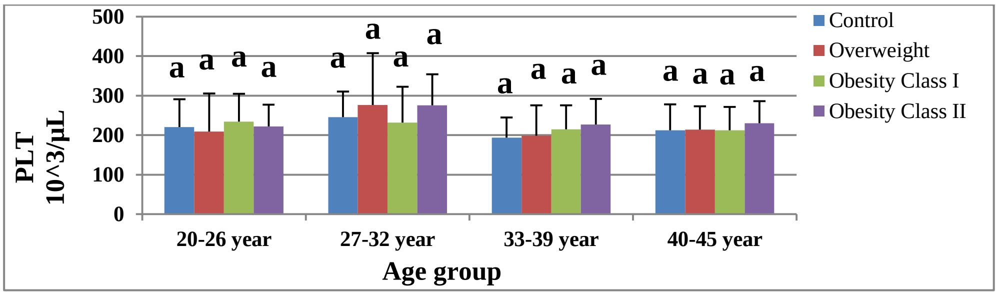

Figure (16): PLT count (mean ±SD) in control , overweight , obesity class I and obesity class II groups in 10^3/µ

Figure (17) showed no significant differences (p> 0.05) in MPV in all age groups between control and obesity groups. Also figure (18) showed no significant differences (p> 0.05) in PCT between control and obesity groups in all age groups. Figure (19) sowed no significant differences (P> 0.05) in PDW% in all age groups between control and high BMI groups. Figure (20) demonstrated no significant differences (P>0.05) in ESR in age groups 27-32 year , 33-39 year and 40-45 year between control and obesity groups , while a significant increase (P <0.05) in ESR in overweight and obesity class II compared with control and obesity class I in age group 20-26 year .

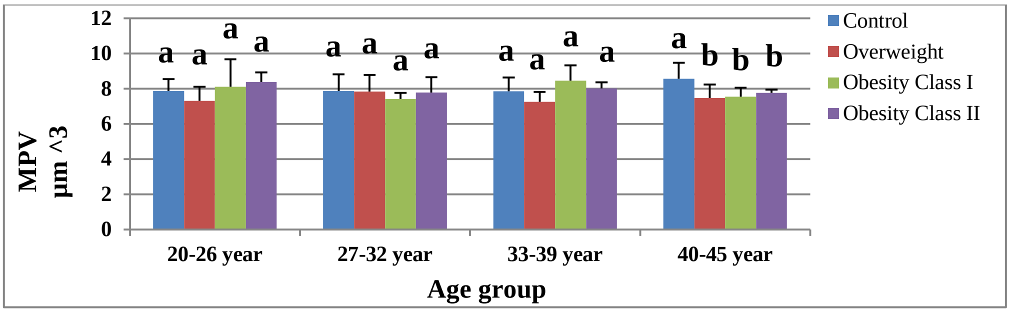

Figure (17): MPV (mean ±SD) in control , overweight , obesity class I and obesity class II groups in µm^3.

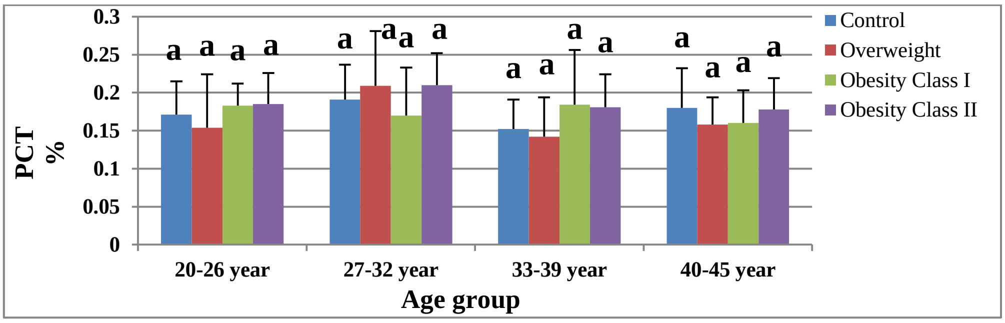

Figure (18): PCT % (mean ±SD) in control , overweight , obesity class I and obesity class II groups .

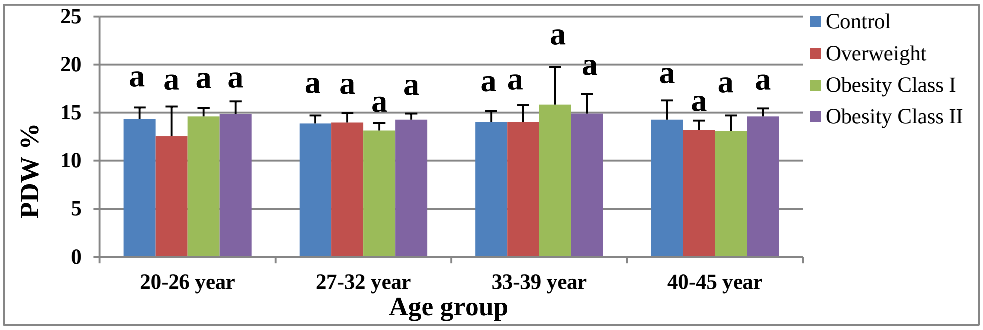

Figure (19): PDW % (mean ±SD) in control , overweight , obesity class I and obesity class II groups .

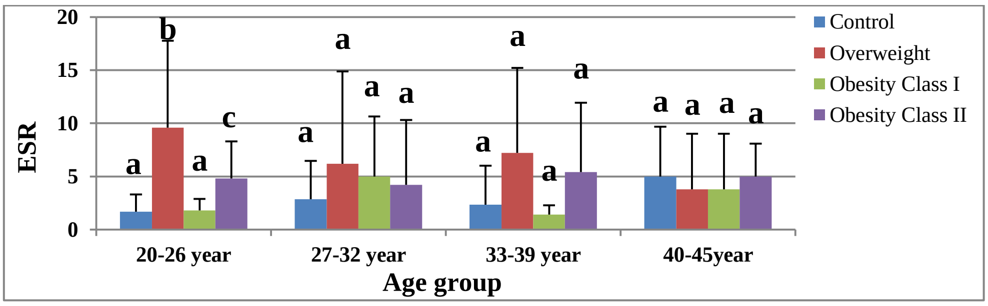

Figure (20): ESR (mean ±SD) in control , overweight , obesity class I and obesity class II groups .

Discussion

The negative correlation between CBC constituent in our investigation with minor exception (WBC& MCHC) between obese (according BMI) in different age groups and control subjects already may not reflect any develop in metabolic syndrome. In the present study we have some of opinions about obese persons. Firstly, obese can be classified as healthy and patients or not? Secondly the five or six intervals in age group are worthy for obese –control study ? our investigation by CBC constituent using as predictor for our opinions. The our analysis showed no significant analysis (GRA% , RBC , HGB , HCT , MCV , MCH , RDW% ,RDW-SD , PLT , PCT% , PDW%) as compare with control. This negatively relationship may would expected the normality between the control and obese person .Thus , we can classify some of obese persons as healthy ,regardless those are overweight or obese class I or II. In previous studies the showed that CBC highly correlated with obesity and complication of metabolic syndrome for example the WBC differential count and RBC indices count can be considered the diagnostic feature of metabolic syndrome, WBC and Platelets count showed a very significant correlated with insulin resistance while RBC count showed no significant found with insulin resistance (Chen *et al* ., 2006). Also, the elevated of WBC cells was related with the decline of insulin sensitivity and positively with adiposity and investigated the development of diabetes type II and insulin resistance was associated with the role of inflammation (Vozarova *et al*.2002). Tenório *et al* (2014) showed that WBC count is considered a marker associated with cardiometabolic disorders which contributed in the development of cardiovascular diseases in obese individuals , where Cardiorespiratory fitness was considered a good protective factor against health problems .

Kobayashi *et al*. (2001) showed the estimation of the hematological parameters which was conducted as a part of the heath examination before the incidence of Ischemic heart disease , the results of this examination were not biased of the presence of the disease itself , In Japan the hematological examination was an obligatory part of the periodic health examination. the above-normal levels of hematological parameters used to indicate individuals with a high risk of Ischemic heart disease .

In the cross sectional study among office and professional workers who received yearly health examinations Lohsoonthorn *et al* (2007) showed that WBC count was increased in both males and females While hemoglobin, hematocrit and platelet count were increased only in females with metabolic syndrome Wannamethee and Shaper (1994) showed in men in 24 British towns a significant relationship between hematocrit and many lifestyle features , blood pressure and blood lipid .

The current study showed a significant analysis in WBC in obese as compare with control group in age 33-39 and 40 -45 this result corresponding with previous study and but not agree especially in 20-26 and 27-32 age group. Elevated WBC count was associated significantly with many factors such as smoking , BMI , lipid profile , glycemic status , gender , age and HbA1c (Jiang *et al*.,2014). Wight loss in the long term was considered a good marker for reducing leukocyte count , inflammatory cytokines such as interleukin 1ß , IL-6 , TNF- α and oxidative stress (Chae *et al*.,2013;Ishizaka *et al*., 2007). Our study didn't include cytokines measurement , viral profile and oxidative profile staff. Thus the increasing WBC may be related with each one. According our finding we are aim to use the CBC constituent for control selection and can be used for classify obese as healthy or patient. This make sense 15 years as a good intervals for age groups.

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