Determination of Red Cells Count and Red Cells Distribution Width Reference Interval among adult male from BejaTribes in Port Sudan City: A Pilot Study

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ABSTRACT

Hematological reference values are very important for diagnosis interpretation of the results and decision-making. This is a descriptive cross sectional study was conducted in Port Sudan City aimed to establish the red blood cells count and red cell distribution width reference interval among apparently healthy adult Sudanese males belong to Beja Tribes. A total of 1000 voluntary blood donors with age ranging between 18 and 70 years of life were participated in this study according to inclusion criteria. The data was analyzed by SPSS software. The mean value of RBCs count was 4.97(0.42), RDWSD was 44.17(4.16) and the RDWCV 13.32(1.12).

Keywords: Beja Tribes, Determination of red cells count, Red cells distribution width, Port Sudan city

ORIGINAL RESEARCH ARTICLE

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CITATION OF THE ARTICLE

I. INTRODUCTION

Hematological values for the normal and abnormal will overlap and a value within the recognized normal range may be definitely pathological in a particular subject. For these reasons the concept of 'normal values' and 'normal ranges' has been replaced by reference values and the reference range, which is defined by reference limits and obtained from measurements on the reference population for a particular test [1] or with a high specificity for health (typically 95% or more). [2] Red blood cells (also referred to as erythrocytes) are the most common type of blood cell and the vertebrate organism's principal means of delivering oxygen (O2) to the body tissues via the blood flow through the circulatory system. They take up oxygen in the lungs or gills and release it while squeezing through the body's capillaries. These cells' cytoplasm is rich in hemoglobin, an iron-containing biomolecule that can bind oxygen and is responsible for the blood's red color. In humans, mature red blood cells are flexible biconcave disks that lack a cell nucleus and most organelles. 2.4 million new erythrocytes are produced per second. The cells develop in the bone marrow and circulate for about 100–120 days in the body before their components are recycled by macrophages. Each circulation takes about 20 seconds. Approximately a quarter of the cells in the human body are red blood cells. [12] RDW-CV is calculated from the erythrocyte volume distribution histogram. It represents the coefficient of variation of erythrocyte volume around MCV. It is calculated as follows: RDW-CV (%) = 1 SD (femtoliters [fl])/MCV (fl) × 100, where 1 SD = 1 SD in relation to MCV, which is obtained at a height of 68.2% above the base of the erythrocyte volume distribution histogram. MATH1SD is a parameter that represents the mathematical deduction of 1 SD around MCV and is calculated as follows MATH-1SD

(fl) = RDW-CV (%) × MCV (fl)/100. RDW-SD is determined from the width of erythrocyte volume distribution curve at level 20% above baseline and is expressed in femtoliters. The Figure shows the obtainment of these parameters. [14] There were several previous studies have been done regarding to the reference interval such study in Southern India which reported that the RBCs count reference interval was (4.01-6.04) and RDWCV was (12.23- 15.36) [16].Other study done in Ghana among adult male reported that the reference interval of RBCs count reference interval was (3.79–5.96) and the RDWCV was (11.5–16.7). [17] A study done in Kenya reported the reference interval of RBCs count was (4.4–6.3). [17] Other study done in Malaysia 15 reported that the reference interval of RBCs count was (4.53–5.95), RDWSD was (37.5–48.1) and the result of RDWCV was (12–14.8). [18] There are many factors that influence reference intervals, such as age, sex, genetic, environment factor, and life style. In Sudan The doctors used the Caucasian reference interval and no publish data regarding reference interval for Sudanese population, therefore there is a need to have our own reference interval.

II. MATERIALS AND METHODS

By using Mindray BC-300, 1000 were analyzed, the study duration from November 2016 to May 2017 at Port Sudan city among Beja Tribes.

III. STATISTICAL ANALYSIS AND GRAPHICAL PRESENTATION

Data was analyzed by SPSS variation 22to get the mean.

IV. RESULTS

A total of (1000) apparently healthy adult Sudanese male from Beja tribe at Port Sudan city were enrolled in this study, they selected according to the inclusion criteria. Table (3.1) shows the mean (SD), lower and upper 95% confidence interval of RBCs counts, RDW SD and RDW CV among apparently healthy adult Sudanese male from Beja tribe were in Port Sudan City. The mean has been used because the data shows normal distribution pattern of RBCs counts, RDW SD and RDW CV. The mean located between the upper and lower 95% CI which indicate the precision of the data.

Table (3.1)

Group	95% Confidence interval		Mean (SD)
	Lower	Upper	
RBCs count	4.94	5.00	4.97(0.42)
RDWSD	43.91	44.43	44.17(4.16)
RDWCV	13.25	13.39	13.32 (1.12)

Table (3.2) shows the calculation of reference interval of RBCs counts, RDW SD and RDW using the following formula means ±2SD.

Table (3.2)

Group	Reference interval mean ±(2SD)
RBCs count	(4.13 -5.81)
RDWSD	(35.85- 52.49)
RDWCV	(11.08- 15.56)

Figure (3.1) shows the pattern of normal distribution of the data of the RBCs counts, among apparently healthy adult Sudanese male in Port Sudan city.
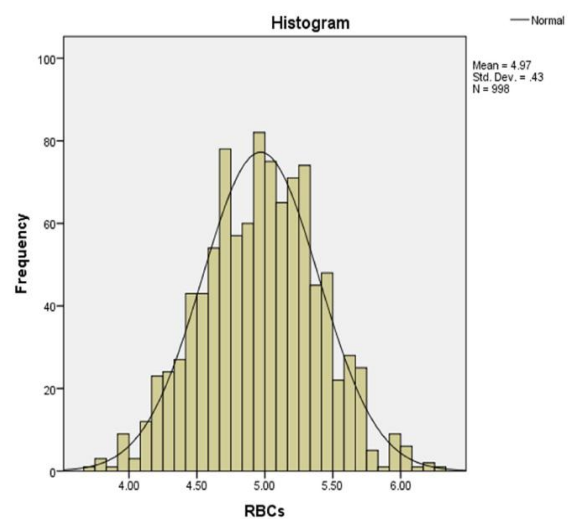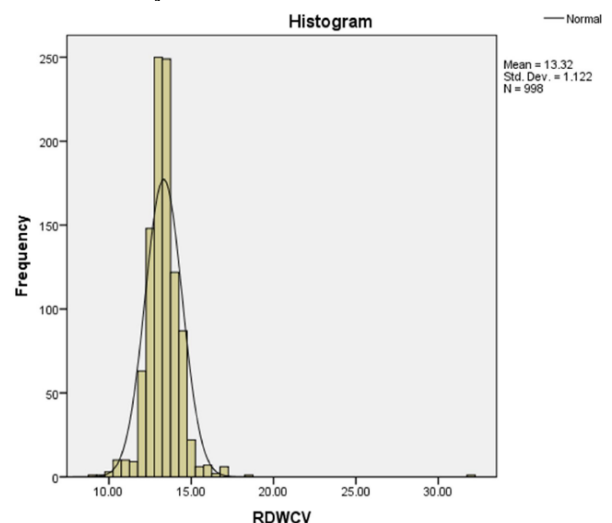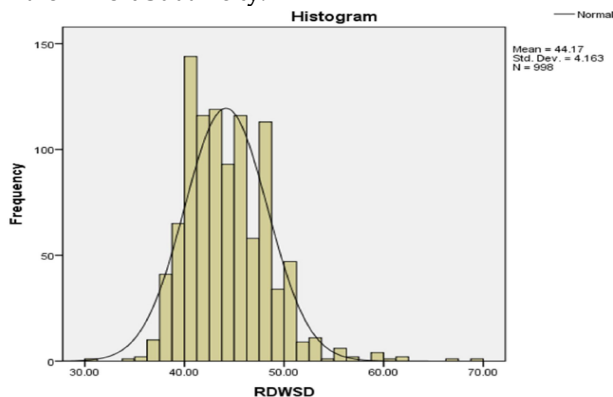

Histogram

Mean = 4.97
Std. Dev. = .43
N = 998

Figure (3.2) shows the normal distribution of the data of the RDWCV, among apparently healthy adult Sudanese male at Port Sudan city.

Histogram

Mean = 13.32
Std. Dev. = 1.122
N = 998

Figure (3.3) shows the normal distribution of the data of the RDWSD, among apparently healthy adult Sudanese male in Port Sudan city.

V.   DISCUSSION

Clinical laboratory reference intervals are an important tool for identifying abnormal laboratory results and for ultimately guiding patient management decisions. The reference intervals affected by sex, age, population, genetic, demographic, nutritional and environmental factors.[20],[21] This is a cross sectional study design conducted among apparently healthy adult Sudanese male from Beja tribe. The mean (SD) was used as analytical method because the data showed normal distribution and also it is more informative than other central tendency measures and can be used for inferential statistics of the population. This study was performed among (1000) normal subjects were selected according to inclusion criteria, their age ranged from 18-70 the mean age was 26 years. The result of this study showed RBCs count was 4.97(0.84), RDWSD was 44.17 (8.32) and RDWCV was 13.32 (2.24). A study done in Southern India among adult male revealed that the reference interval of RBCs count was (4.01-6.04) which was similar to this study in lower limit of reference interval. However the upper limit of our study reference interval was slightly lower than the study done in Southern India.[16] Other study done in middle Ghana among adult male was reported that the reference interval of RBCs count was (3.79–5.96). The lower limit of the present study was slightly higher and the upper limit was slightly lower than the above mentioned study.[17] A study done in Kenya among adult male showed the reference interval of RBCs count was (4.4–6.3) which was higher than this study reference interval. [17] Other study conducted in Malaysia among multiethnic population adult male showed RBCs count reference interval was (4.53–5.95). The lower 29 limit of the present study was slightly lower and the upper limit was similar to the study done in Malaysia. (18)Another study performed in Khartoum north among adult male revealed that the RBCs count reference interval was (4.6 – 5.6) which was higher in lower limit and lower in the upper limit when compared with this study.[19] A study in Malaysia was conducted among adult male concluded that the RDWSD reference interval was (37.5 – 48.1) when compared with the present study the

lower limit showed slightly higher and the upper limit was slightly lower. [18] A previous study was done by Angeli Ambayya et al 2014 among adult male reported that the result of RDWCV reference interval was (12 – 14.8). The lower limit of the present study was slightly lower and the upper limit was slightly higher than the previous study. [18]

VI.   CONCLUSION

The present study concluded that the reference interval of RBCs and RDW among Beja tribe was determined which was similar to many and differ from others. The difference might be due to genetic, geographic, and environmental factors.

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