ERYTHROCYTE PARAMETERS USING AN ELECTRONIC HAEMATOLOGY COUNTER

Pages with reference to book, From 118 To 119

Sir,

Differences in the size of the erythrocyte and in the concentration of haemoglobin in each erythrocyte form the basis of a clinically useful and widely accepted classification of anaemias. The advent of automated electronic instruments for measuring haematologic parameters has changed the emphasis of erythrocyte indices. Electronically obtained haematocrit values are independent of the amount of trapped plasma and of the concentrations of anticoagulants and these favour accurate measurement of MCV and MCHC1. - The increased reliability of the erythrocyte count has enhanced the value of MCV. It is therefore considered valuable automated index and serves as probably the most effective discremenant for classifications of anaemias2. In the last few years many laboratories in Pakistan have or are in the process of changing over from manual to automatic counters for haematological parameters analysis. We have been using such a counter since 1983 and would like to share our values for normal Pakistani males and females of erythrocyte parameters with the new users. Six hundred samples of normal healthy males and females were analysed on a 8 parameter LINSON electronic counter. All individuals tested were adults in the age range 20 — 50 years. Samples were analysed on a 1:80,000 EDTA blood dilution with a 80 micron aurifice tube. The instrument was calibrated using COULTER 4C normal and abnormal controls. Parameters of adult males are given in Table 1 and females in Table II.

TABLE I. Erythrocyte Parameters in Adult Males.

Parameter	Unit	Mean Value	Range
Haemoglobin	gm/dl	14.82 ±1.16	11.7 – 16.5
RBC	10^{12}/L	5.34 ±1.11	4.2 – 6.5
PCV		47.23 ±5.44	38 – 57
MCV	fl	86.11 ±5.57	75 – 95
MCH	pg	28.32 ±2.35	25 – 35
MCHC	gm/dl	31.56 ± 3.45	27 – 38

TABLE II. Erythrocyte Parameters in Adult Females.

Parameter	Unit	Mean value	Range
Haemoglobin	gm/dl	13.43 ±1.00	11 – 15.5
RBC	10^{12}/L	4.75 ±0.57	3.8 – 5.8
PCV		41.29 ±5.04	34 – 50
MCV	fl	84.37 ±5.84	73 – 94
MCH	pg	28.63 ±3.26	23 – 36
MCHC	gm/dl	32.92 ±3.74	26 – 38

The accuracy of the erythrocyte absolute values depend on the accuracy of the estimation from which they are calculated, i.e., red cell counts, Hb and PCV. RBC counts performed by electronic counters have no inherent errors since large number of cells are counted and PCV estimations are 2.5% lower than manual methods since counter PCV is based on sizing the cell. Thus electronically based values of erythrocyte parameters are reproducible within ± 2% limits 95% of the time. Red cell parameters show a considerable variation in normal subjects and these depend on two main factors, age and sex. However they remain fairly constant in adult individuals. Comparison of our data from Western norms (Table III)

TABLE III. Erythrocyte Parameters in Anglo–American Populations.

Parameter	Unit	Mean	Range
Haemoglobin	gm/dl	N.A	M 14 – 18
			F 12 – 16
RBC	10^{12}/L	N.A	M 4.5 – 6.6
			F 3.9 – 5.6
PCV		N.A	M 40 – 58
			F 35 – 50
MCV	FL	N.A	A 76 – 96
MCH	pg	N.A	A 27 – 32
MCHC	gm/dl	N.A	A 30 – 35

KEY: NA (Not Applicable), M (Male), F (Female), A (Adult).

3 shows that with the exception of the RBC counts most of our indices are lower with lower ranges.

This observation leads to an interesting suggestion i.e. that in our population the erythron is smaller with low haemoglobin content. These differences may be due to climatic or racial variations. However, we have to await similar reports from other laboratories to know their true significance. We suggest that our values be used as starting guidelines for normal adults instead of Western norms till a consensus is reached on the whole population of Pakistan from Peshawar to Karachi.

Faithfully yours,
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