11 IMPACT OF AGING (ELDERLY GROUP) ON RED BLOOD CELL DISTRIBUTION WIDTH (ANISOCYTOSIS), A COMPARATIVE STUDY BETWEEN YOUNG AND ELDERLY SUBJECT

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Key words: Red blood cell Distribution Width, elderly and young group. Anisocytosis.

NSS: National service scheme , RBC: red blood cells

 RDW: Red blood cell distribution width ,MCV: Mean corpuscular volume , MCH: Mean corpuscular hemoglobin , MCHC: Mean corpuscular hemoglobin concentration RDW-CV : Red blood cell distribution width coefficient variation ,RDW-SD : Red blood cell distribution width standard deviation

Abstract:

Back ground:

As this RDW parameter is available since the introduction of automated haematology analyzer ; their clinical significance is under way. Increased RDW is found in hepatic, renal, cardiac, endocrinal and many metabolic abnormalities. It is found to be an independent marker of disease and in future we expect some prognostic value also. The most interesting observations are the association of RDW with erythropoietin deficiency and rather more with erythropoietin resistance. In this article we have studied the relation between RDW and aging and the mean value of RDW amongst young group with elderly group of people. Soon more researches will reveal whether the anisocytosis is cause or effect of disease and will able to reply whether the anisocytosis is independent disease or not. In this article we have try to study the effect of and correlate the age and RDW especially young and elderly group of people.

OBJECTIVE:

To study the Impact of aging on Red blood cell distribution width (RDW) and compare the RDW among young and elderly group

DESIGN:

Cross-sectional comparative study.

SETTING:

Data collected from camps organized by NSS Unit in AMCMET medical college in college and elderly houses in Ahmedabad

Subjects :177 adults 94 young and 83 elderly.

RESULT AND OUTCOME:
COMPARATION OF MEANS AND STARNDARD DEVIATION OF RDW OF YOUNG AND ELDERLY GROUP OF SUBJECTS
OBSEVATION AND RESULTS:
MEAN VALUES OF RDW OF YOUNG N1 GROUP AND ELDERLY GROUP N2 WERE COMPARED AND FOUND THAT AGED GROUP HAD   STATISTICALLY SIGNIFICANTLY MORE RDW COMPARED TO YOUNG GROUP.

Conclusion: The study documented the fact that the Red cell Distribution Width is increased statistically significantly amongst elderly group suggesting that there significant anisocytosis is prevailed among elderly aged group of persons . With introduction of computed automated hematology analyzer, RDW is relatively a new hematology parameter and current role of the parameter is under way. RDW is a useful for differential diagnosis of anemia especially Beta thalasemia trait and iron deficiency anemia. It is suggested that RDW is raised even before overt hematological parameter of anaemia and also useful for early detection of anaemia in pregnancy . Studies have shown that raised RDW i.e. anisocytosis is associated with decrease in serum erythropoietin or erythropoietin resistance . As wide a variety of human disorders are found to be associated with anisocytosis so increased RDW behaves as a biomarker itself and may be a potential target of future as independent disease process but more interventional studies are required. RDW is a simple and inexpensive parameter, which reflects hematological risk factors associated with   liver, cardiac. lung ,renal ,endocrinal and metabolic abnormalities including cancer and genetic anomaly such as shortening of telomere length .In Future more researches will reveal RDW as a valuable for many clinical conditions as diagnostic ,therapeutic and prognostic marker.

Introduction.
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         Anisocytosis [″aniso″ meaning ″unequal″, y associated with poikilocytosis .Previously it was marked as part of peripheral smear examination and also graded like 1+,2+..Though the poikilocytosis is difficult to quantify ,the Anisocytosis can be measured in all automated hematology laboratory as red blood cell distributioand ″cytosis″ which has a reference to cells]is condition in which the red blood cells of a person are found to be of unequal size .It is usualln width (RDW).The RDW is used along with the indices (MCV, MCH, MCHC) to describe a population of RBCs. Red blood cells distribution wide (RDW) is relatively a new red blood cells and hematology laboratory parameter. High value suggests significant anisocytosis and poikilocytosis i. e. Increased variation in size and shape of Red blood cells. It is associated with many types of anaemia i. e. Iron deficiency and other nutritional deficiencies anaemias. It is found that increased RDW is observed even before development of anaemia. As this RDW parameter is available since the introduction of automated hematology analyzer ; their clinical significant is under way. Increased RDW is found in hepatic, renal; cardiac, endocrinal and many metabolic abnormalities. It is found to be an independent marker of disease and in future we expect some prognostic value also. The most interesting observations are the association of

RDW with erythropoietin deficiency and rather more with erythropoietin resistance. In this article we have studied the relation between RDW and aging and the mean value of RDW amongst young group with elderly group of people. Soon more researches will reveal the whether anisocytosis is cause or effect of diseases and will able to reply whether the anisocytosis is independent disease or not.

Material and method:

The data were collected from subject attended various NSS camp set ups organized by NSS unit AMCMET medical college Ahmedabad . The subjects were divided into two groups 1 N1: group consisting young group was medical students of age 17-19 (Mean age 18.2) and 2 N2: elderly group was residents of elderly houses where the camps were organized. Blood samples were collected and send to hematology auto analyzer instrument which is used to measure red cell distribution width by automated methods to measure red blood cell distribution width (RDW). The RDW measures the anisocytosis, There are two RDW measurements 1]Red cell distribution width - coefficient of variation (RDW-CV), 2] red cell distribution width - standard deviation (RDW-SD).

The RDW-CV is a calculation based on both the width of the distribution curve and the mean cell size. It is calculated by dividing the standard deviation of the mean cell size by the MCV of the red cells and multiplying by 100 to convert to a percentage. A normal range for the RDW-CV is approximately 11.6 – 14.6% (for adults). Because it is a calculation, the RDW-CV is dependent not only on the width of the distribution curve but also the MCV of the red cell population .The RDW-SD is an actual measurement of the width of the red cell distribution curve in femto liters (fL). The width of the distribution curve is measured at the point that is 20% above the baseline. The normal RDW-SD range is 40.0 - 55.0 femto liters fL. Red blood cell distribution width is a way to measure red blood cell volume and size.

See the diagram: The RDW-SD is an actual measure of size. It is derived by finding the width in at the 20% height of the distribution histogram. See the diagram below for a clearer visual explanation of how the number is determined. The RDW-CV is determined by taking the standard deviation of RDW-SD and the mean corpuscular volume (MCV) number. Again, see below for a visual explanation of how this works.
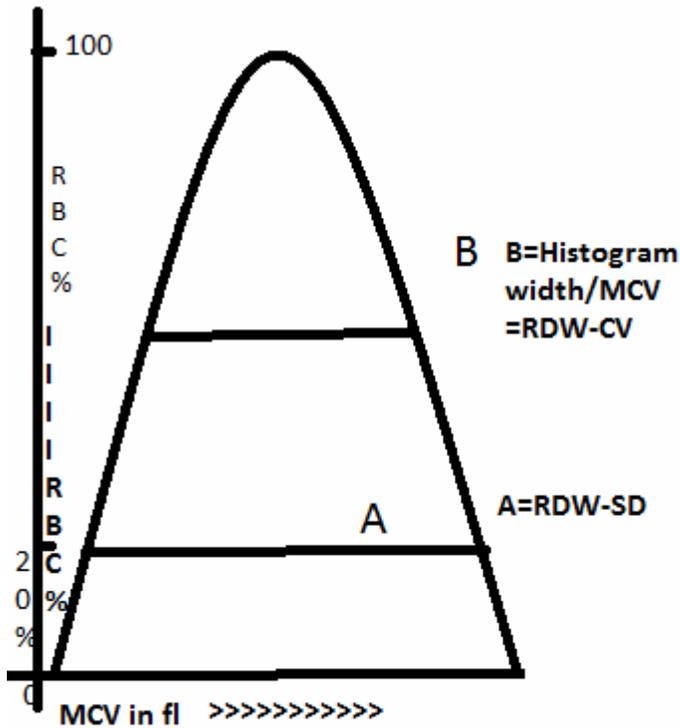
Generally high RDW indicates mixed population of small and large RBCs, young RBCs tend to larger . For example in iron deficiency anemia or pernicious anaemia there is a high variation (anisocytosis) in RBC size (along with variation in shape – poikilocytosis), causing an increase in the RDW. Red cell distribution curves are an integral part of RBC automated hematology analysis and are available on virtually all automated hematology analyzers.

RDW were measured amongst both the young and elderly groups and mean, standard deviation, SEM, p value were measured using   Statistical soft were systat /Mystat. p value was considered significant if it is less than 0.05.

Observations and Statistical tests:

Table 1 showing RDW ,mean value and SD among N1 young and N2 elderly group

Gr	N1	N2
N of Cases	94	83
Minimum	12.200	13.200
Maximum	18.400	19.900
Arithmetic Mean	14.129	15.220
Standard Deviation	1.340	1.670

Table 1 showing RDW ,mean value and SD among N1 young and N2 elderly group

N1 young group N2 elderly group

GROUP	N	Mean	Standard Deviation
N1 young	94	14.129	1.340
N2 elderly	83	15.220	1.670

statistics

Difference in Means	:	-1.092
95.00% Confidence Interval	:	-1.542 to -0.642
Z	:	-4.756
p-value	:	0.000

Separate Variance

Difference in Means	:	-1.092
95.00% Confidence Interval	:	-1.545 to -0.638
t	:	-4.756
df	:	156.984
p-value	:	0.000

Pooled Variance

Difference in Means	:	-1.092
95.00% Confidence Interval	:	-1.539 to -0.645
t	:	-4.821
df	:	175.000
p-value	:	0.000

Two-sample z-test
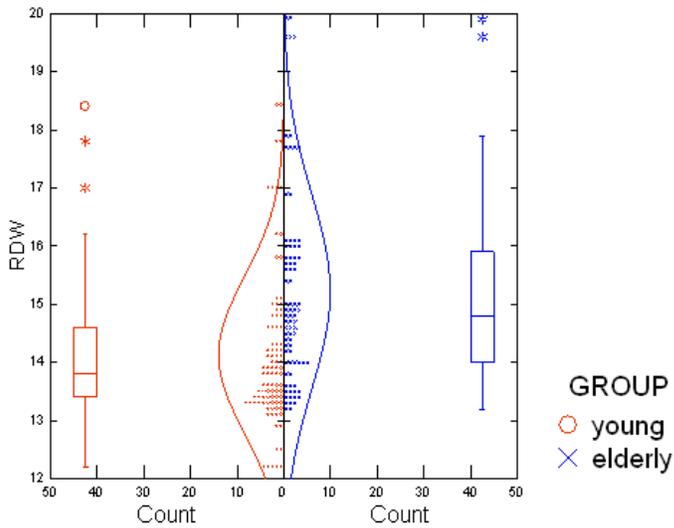
From the statistical test It was found that RDW was statistically significantly high amongst elderly group compared to young student group.

Discussion:

The study documented the fact that the Red cell Distribution Width is increased statistically significantly amongst elderly group suggesting that there significant anisocytosis is prevailed among elderly aged group of persons .Many researcher i.e.Cheng CK et al , Qiao R et al ,, Lippi G et al , Loprinzi PD et al , *Alis R* et al , , Johannes J found relation of RDW with age and gender and RDW found to be increased with age. In context to gender there is no uniform observation .In our study means RDW is high among female compared to male gender but is statistically not significant. With introduction of computed automated hematology analyzer, RDW is relatively new parameter and current role of the parameter is under way. Tony Badrick et al found RDW a useful for differential diagnosis of anemia especially Beta thalasemia trait and iron deficiency anemia. Though many anaemias associated with raised RDW i.e. Iron deficiency ,hemolytic anemia ,early vitamin B12 & folate deficiency   ,HbS/Beta Thalassaemia ,microangiopathic hemolytic anemia ,Chronic hepato biliary disease ,hereditary spherocytosis ,Sickle cell anemia. If red blood cell counts are of a normal but raised RDW is still indicate early stage of anaemia and required further investigations. Myelodysplastic Syndrome, formation of irregular sized blood cells is another condition associated with Anisocytosis and increased .

Studies have show that anisocytosis is associated decrease serum erythropoietin Or erythropoietin resistance . As wide a variety of human disorders are associated with anisocytosis so increased RDW behaves as a biomarker of impaired erythropoiesis .

Raised RDW is also found to be associated with oxidative stress, inflammation, poor nutritional status, hypertension, and dyslipidemia and many more conditions. Red cell distribution width appears to be a reliable and useful parameter for early detection of iron deficiency during pregnancy. Anisocytosis itself may be a potential target of future as independent disease process but more interventional studies are required .RDW is massively growing interest as a prognostic marker also.But before that age dependent norms are to be established and whether RDW is a cause or effect of disease is also to be established.Interventional studies are required to lower the RDW in Acute and chronic disorders. RDW suggest degree of heterogeneity of erythrocyte volume (conventionally known as anisocytosis). RDW is a simple and inexpensive parameter, which reflects Hematological risk factors associated with   liver, cardiac. lung ,renal ,endocrinal and metabolic abnormalities including cancer and genetic anomaly such as shortening of telomere length .Interestingly number of discriminant functions based on the use of the RDW and other RBC parameters have been proposed for the

discrimination of iron deficiency anaemia and Beta thalasemia trait but none has 100%

sensitivity and specificity for discrimination between Thal Minor and Iron Deficiency in

particular. so to summerise today at present use of RDW and RDW-SD for diagnosis of disease should be
used with caution and useful only as a guide, i.e., not diagnostic. But in future more researches will reveal RDW as a valuable routine marker for many clinical conditions as diagnostic ,therapeutic and prognostic purpose .

Conclusion: The study documented the fact that the Red cell Distribution Width is increased

statistically significantly amongst elderly group suggesting that there significant anisocytosis is

prevailed among elderly aged group of persons . With introduction of computed automated

hematology analyzer, RDW is relatively a new hematology parameter and current role of the

parameter is under way. RDW is a useful for differential diagnosis of anemia especially Beta

thalasemia trait and iron deficiency anemia. It is suggested that RDW is raised even before over

hematological parameter of anaemia and also useful early detection of anaemia in pregnancy .

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Or erythropoietin resistance . As wide a variety of human disorders are found to be associated

with anisocytosis so increased RDW behaves as a biomarker itself and may be a potential

target of future as independent disease process but more interventional studies are r'equired.

RDW is a simple and inexpensive parameter, which reflects hematological risk factors associated

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