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The Relation Of Hypertension With Red Cell Distribution Width From Patients In Iraq.

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ABSTRACT

Red blood cell distribution width (RDW) is a measure of variability in size of circulating erythrocyte (anisocytosis),and its measured routinely in standard complete blood count, it's a noval predictor of mortality in many cardiovascular diseases including ischemic heart disease and heart failure ,we aimed to show whether RDW value differ between healthy population and patient with hypertension (newly diagnosed hypertension and long term hypertension).

Patients and methods: A total of 140 patients participated in this study A (50 healthy people as a control group , 50 patients with newly diagnosed hypertension ,and 40 patients with long term hypertension). Blood pressure,ECG ,complete blood count ,ESR and biochemistry all measured in standard methods .

Results: RDW were significantly higher among patient with hypertension (newly diagnosed and patients with long term hypertension) ,compared to controls group ,the mean of RDW was(13.30+_1.75),(15.42+_0.8) and (12.31+_0.59) , respectively .and its higher in patients with long term hypertension than newly diagnosed patients.

Conclusion: Hypertension affect the level of RDW ,and its effect increase with increase duration of hypertension.

Keywords: hypertension, RBC, ESR, RDW.

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INTRODUCTION

Hypertension is one of the most common worldwide disease affecting human and it is a major risk factor for stroke , myocardial infarction , vascular disease and chronic kidney disease.[1] According to the American Heart Association (AHA) approximately 75 million adult in united state are affected by hypertension , which is defined as a systolic blood pressure of 140 mmHg or more and diastolic blood pressure of 90 mmHg or more or taking antihypertensive medication.[2]

In Iraq , the prevalence of high blood pressure among the adult population (25 years and above) and the use of medication to control it , was found to be 40% of the population in 2008. About 50% of total mortality in Iraq is caused by non communicable disease .High blood pressure or hypertension , is a major contributor to it , a global epidemic which necessitates greater and coordinated efforts by all health provider.[3] Hypertension increase the risk of several important adverse outcome , including the progressive loss of renal function leading to renal impairment , early development and accelerate progression of CVD and premature death. [4,5] Red blood cell distribution width (RDW) is the coefficient of variation of the mean corpuscular volume (mcv) and it's the measure of variability in size of circulating erythrocyte (anisocytosis) ,and it is measured routinely in standard complete blood count , normal value range between (11.6-14.6).[6] Increased RDW indicate the presence of anisoccytosis , which is related to impaired erythropoisis and erythrocyte degradation , reflecting chronic inflammation and a high level of oxidative stress .[7] Elevated RDW can be observed in many clinical condition ,such as heamolysis , after blood transfusion and in response to ineffective red cell production , which can be caused by deficiencies in iron , vitamin B12 or folate.RDW is also increased in certain clinical statues ,such as pregnancy ,thrombotic thrombocytopenic purpura and inflammatory bowel disease .Due to a lack of knowledge regarding its historical prognostic significance ,RDW has previously been ignored beyond evaluation of anemia .[8-10] Recently ,many studies have revealed that the baseline RDW value has been shown to be associated with long term adverse event in both acute and chronic condition ,such as acute myocardial infarction , heart failure , angina pectoris ,stroke, and peripheral arterial disease ,as well as in patient who are free of coronary arterial disease.[11-13] Elevated level of RDW associated with high risk of mortality in patients with cardiovascular diseases ,Chen et al[14] concluded that elevated RDW value were associated with an increased risk of all-cause mortality in patients without known heart disease . Furthermore, Perlstein et al [15] showed that RDW strongly predicted all-cause and cardiovascular mortality. Similarly, Patel et al [16] demonstrated that RDW was a powerful predictor of mortality in older adult with or without major age associated diseases.

PATIENTS AND METHODS

This is a case -control study conducted at Al-Sader medical city ,department of internal medicine in Al-Najaf Al-Ashraf city, during the period from 15th of May2014 to the 6th of January 2015. Fifty patients diagnosed with hypertension for the first time and forty patients with long term hypertension and fifty healthy controls participated in the study. The patients with hypertension were recruited from the medicine outpatient department and the visitors of emergency department at Al-Sader medical city. The control group consisted of 50 volunteers who were completely healthy with normal blood pressure ,their age ranging between (25-50). The newly diagnosed hypertensive patients have more than 2 abnormal reading in the last few days and they came to the hospital for treatment, the age of this group ranging from (27-55) years old. The patients with long term hypertension represent the patients with many years of high blood pressure (the average of duration is 5 years), but who otherwise healthy ,their age ranging between (31-60). All the patients have detailed history and physical examination .ECG, complete blood count ,ESR, lipid profile ,blood urea ,serum creatinine and fasting blood suger were measured by standard methods. The patients who had anemia ,chronic renal failure, chronic heart failure, ischemic heart disease were excluded from the study. Blood pressure measured after the patient has been seated comfortably for 5 minutes,the back supported and the arm bare and at heart level. Mercury manometer used for blood pressure measurement ,the bladder encompasses more than two third of the arm ,the cuff of 12 cm width and 35 cm length and it's lower border 2.5 cm from cubital fossa.

Blood pressure measured in both arms in sitting position ,two readings in each arm 15 minutes between every read. Blood collected in EDTA was mixed by inversion several times and used within 30 minutes for complete blood counts in Sysmex Kx-21 automated hematology analyzer .For fasting blood glucose , blood urea and serum creatinine Abbott architect plus C4000autoanalyere used.

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Statistical analysis:

By using the statistical package for social sciences (SPSS) software for windows ,data of all participants (cases and controls) were entered and analyzed with appropriate statistical tests . Level of significance (P .value) of <0.05 indicate a significant difference .

RESULTS

Female represent 56% of controls ,62% of newly diagnosed cases , and 60% of patients with uncontrolled hypertension ,while male represent 44%, 38%, and 40% respectively, as shown Figure : 1

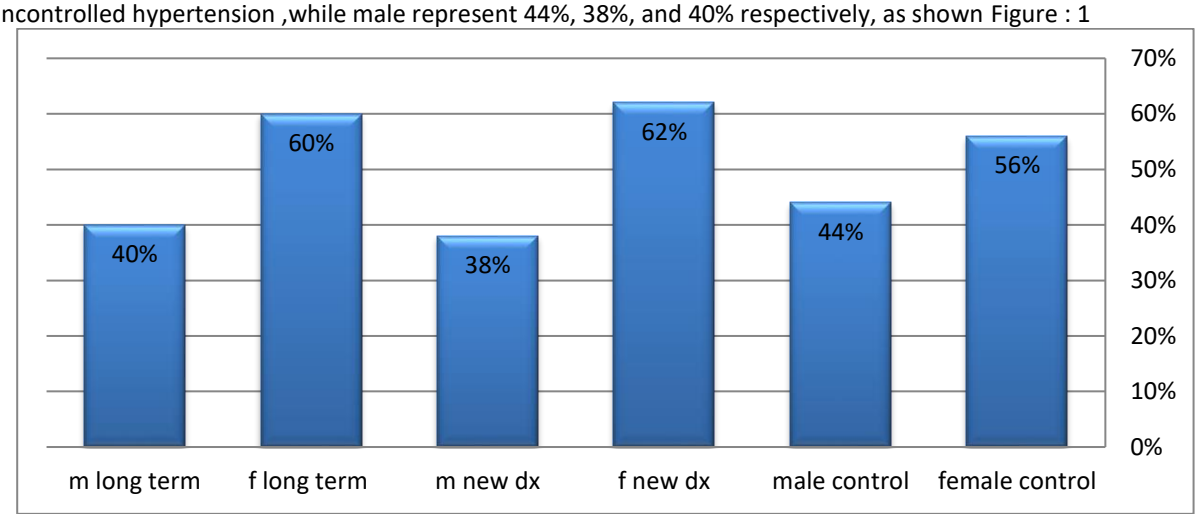

Figure : 1 showing comparison among the three groups according to gender distribution.

Mean age of newly diagnosed cases was 42.3 years, and for long term hypertensive patients the mean age was 45.75 years ,while it was 37.62 years for controls ,as shown below Figure:2

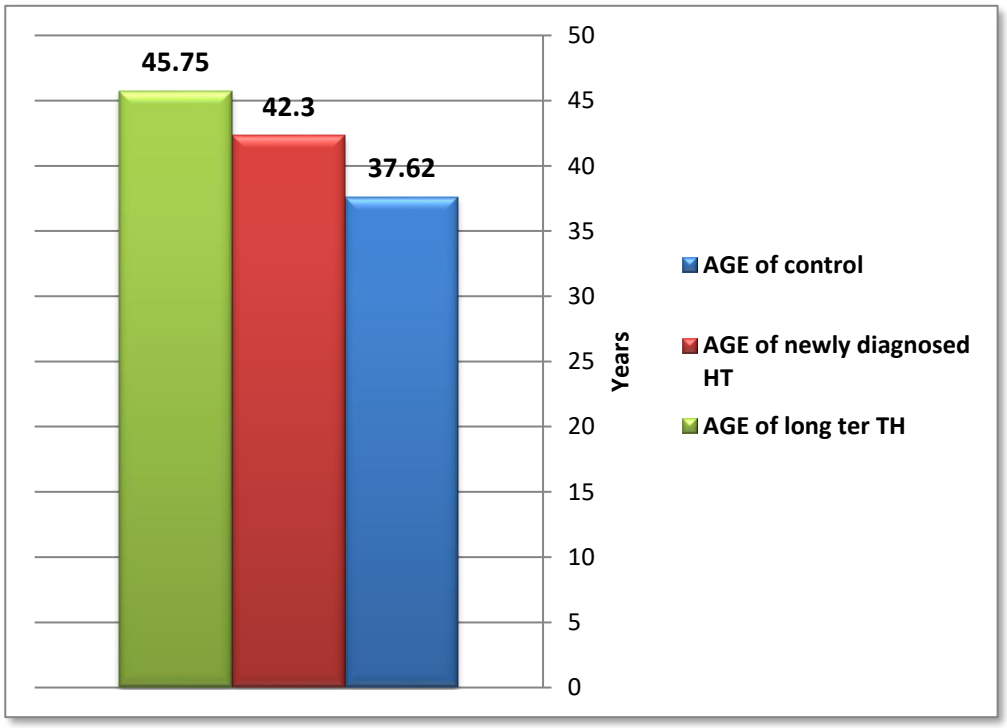

Figure:2 showing comparison among the three groups according to age. RDW increase with age in all three groups as shown in table 1

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Table 1: showing RDW according to age groups

however , no statistically significant difference had been found between the control and newly diagnosed and patients with long term hypertension p >0.05 as shown Table 2:

Table 2: showing comparison between control & newly diagnosed HT& long term hypertension groups in regard to age.

Groups	N	mean	SD	P-value
Control	50	37.62	0.59750	-----
Newly diagnosed HT	50	42.3	1.75445	0.21
long term hypertension	40	45.75	1.75769	0.33

Regarding blood pressure ,for newly diagnosed cases the mean was 168.40 for systolic ,and 94.8 for diastolic, ,and for cases with long term hypertension the mean was 163.25 for systolic BP ,and 91.75 for diastolic ,the mean for systolic blood pressure was 102.2and for the diastole it was 65, as shown Table 3 :

Table 3: showing mean systolic and diastolic BP in the three groups

Groups	Systolic BP(mean)	Diastolic BP(mean)
Controls	102.2	65
Newly diagnosed	168.4	94,8
Long term HTN	163.2	91.7

Figure 3: showing comparison among the three groups according to their blood pressure.

Age	Control(RDW)	Newly dx HTN(RDW)	Long term HTN(RDW)
25-30	11.3	12	-----
31-35	11.9	12.2	13
36-40	12.2	12.9	14.2
41-45	12.8	13.4	15.3
46-50	13.4	14.6	16.2
51-55	-----	15.2	16.8
56-60	-----	-----	17.1

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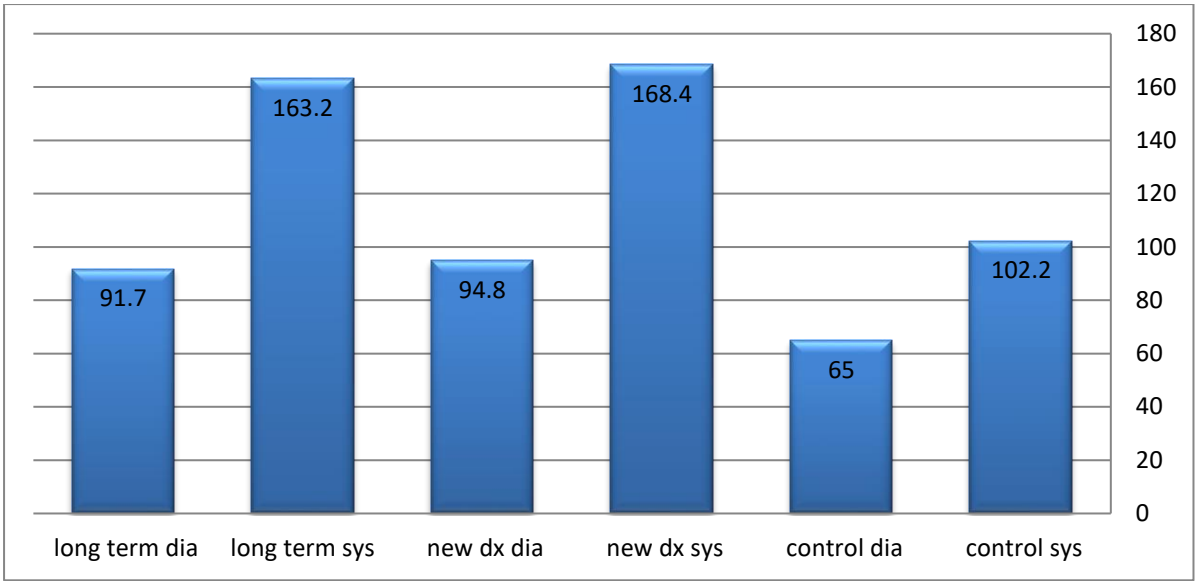

The RDW were significantly higher among the patients with newly diagnosed hypertension as compared with those of controls group ,the mean of RDW of patients with newly diagnosed hypertension was (13.30_+1.7), higher than that of controls group (12.31_+0.59),p. value (<0.05) The mean was even higher among patients with long term uncontrolled hypertension ,it was(15.42+-0.8) compared to (12.3+-0.59)for controls group ,it show significant elevation ,p. value (<0.05),as shown.

Table 4: showing comparison between control & newly diagnosed HTN& long term groups in regard to their RDW.

Groups	N	mean	SD	P-value
Control	50	12.3120	0.59749	-----
Newly diagnosed HT	50	13.3040	1.75859	0.05
Long term HT	40	15.4275	0.80351	0.05

When we put the three groups in comparison ,the mean of RDW of patients with long term hypertension (15+-0.8),was higher than newly diagnosed cases (13.30+-1.75),and higher than control (12.3+-5.59),and the mean of newly diagnosed cases lower than long term uncontrolled hypertensive patients ,but higher than controls group ,as shown:

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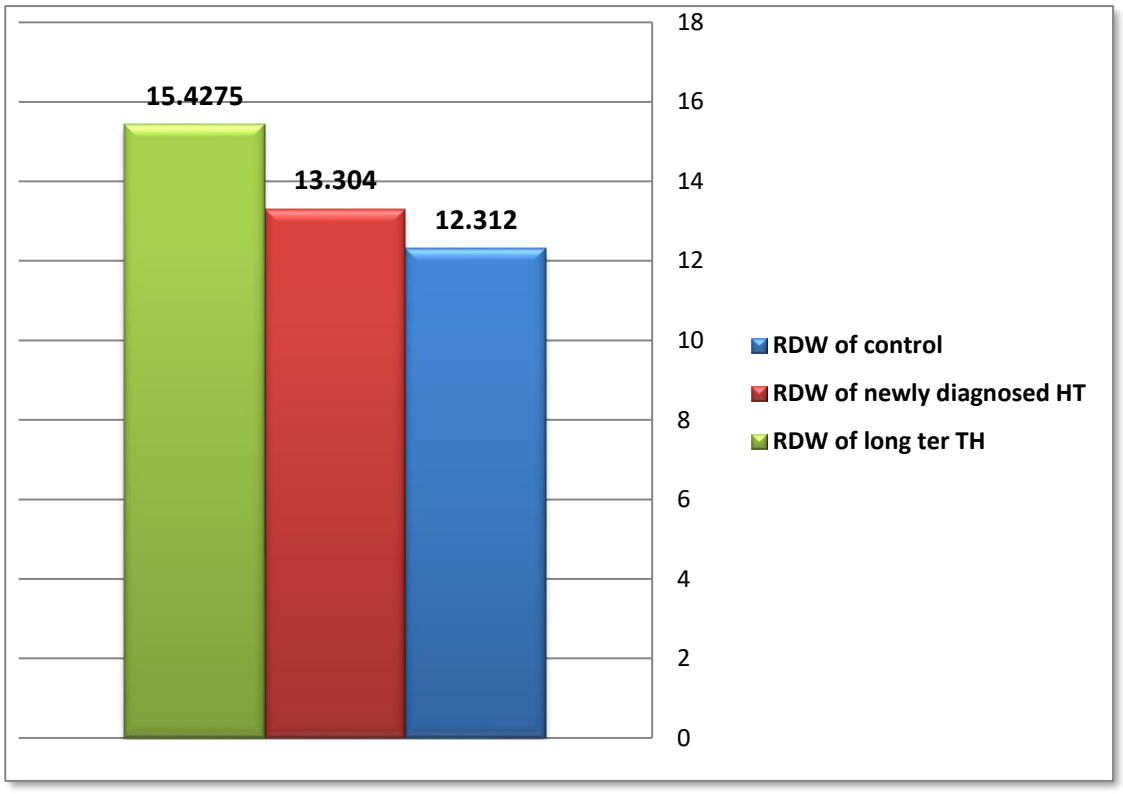

Figure 4: showing comparison among the three groups according to their RDW.

Hemoglobin level show no significant changes between newly diagnosed cases ,mean was (13.71_+149) and the controls group mean(13.73_+1.18), Comparing between patients with long term uncontrolled hypertension and controls group regarding hemoglobin show no significant elevation ,the mean was (14.11+-1.32) and (13.73 +-1.18) respectively as shown below

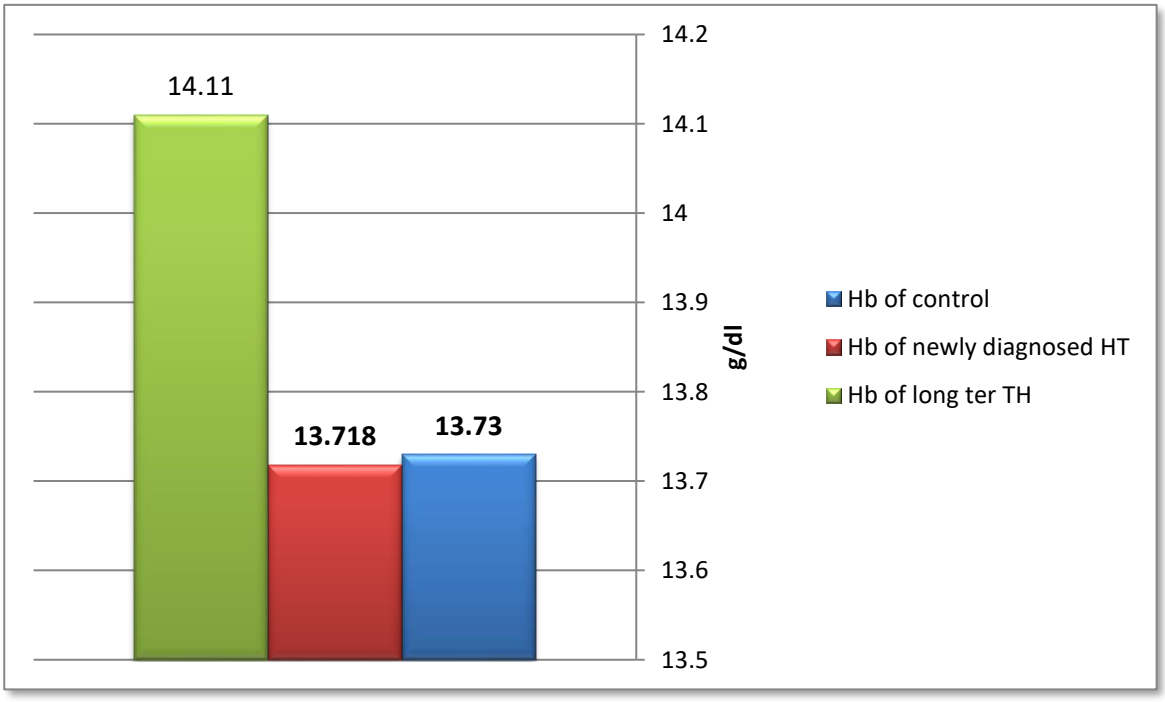

Figure 5: showing comparison among the three groups according to their hemoglobin.

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Table 5: showing comparison between control & Newly diagnosed HT& long term HTN groups in regard to their hemoglobin.

Groups	N	Mean	SD	P-value
Control	50	13.7300	1.18722	
Newly diagnosed HTN	50	13.7180	1.49116	0.965
Long term HTN	40	14.1100	1.32274	0.155

DISCUSSION

Red blood cell distribution width reflect the variability in circulating red blood cell size ,it's based on width of red blood cell volume distribution curve ,with larger value indicating greater variability [17] Red blood cell distribution width is automatically recorded in any automated hematology analyzer ,recently many studies have revealed that RDW value have been associated with long term adverse events in both acute and chronic condition , such as myocardial infarction , heart failure, angina pectoris, stroke and peripheral arterial diseases [18-21]. In the present study RDW evaluated as part of complete blood count to see whether it's value affected by hypertension or not . It was observed that RDW value increased with age ,it was higher in older people in all the three groups ,but when we compared the age between the controls group and that of newly diagnosed hypertensive patients and patients with long term hypertension there was no significant difference .There was also no significant difference in hemoglobin level of controls group compared to that of newly diagnosed or patients with long term hypertension. It was also observed that RDW is elevated in patients with hypertension ,the results show that both test groups have high statistical significance(p .value <o.o5),regarding RDW compared with control group ,and it's higher in patients with long term hypertension than newly diagnosed patients . This finding is well with agreement with that of Wen et al[22]) who observed an elevated level of RDW in patients with hypertension, it's also agreed with Jithesh et al[23] that found RDW is elevated in patients with hypertension as a marker of inflammation ,so as Tanidi A,topal PE[24()] who had nearly similar finding for our study .

One of the explanation about the relationship between hypertension and elevation of RDW values is inflammation .Inflammation might contributes to an increased RDW by not only impaired iron metabolism but also by inhibiting the production of or the response to eryropoitien or by shortening RBC survival ,in addition to inflammation ,oxidative stress might also contribute to anisocytosis while erythrocyte tremendous antioxidant capacity and serve as a primary antioxidant , they are prone to oxidative damage that reduce erythrocyte survival.[25-27] Recent studies revealed that there is a strong association between hypertension and inflammation ,however ,whether inflammation is a cause or a result of hypertension is not well understood .Oxidative stress and endothelial dysfunction are known to be associated with inflammation and can contribute to hypertension , at least in part by exacerbating the inflammatory response .So as we mentioned above, inflammation might explain how hypertension cause elevation in RDW value.[28-30] RDW is higher in patient with hypertension ,and the elevation is higher in patients with long term hypertension than in patients with newly diagnosed hypertension.

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