Evaluation of the Hematological Profile Levels in Iraqi Patients with Multiple Sclerosis

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Abstract

Multiple Sclerosis (MS) is a persistent progressive neurological disease of the central nervous system that attacks the myelinated axons. Discontinuous immune–moderate inflammatory alterations in the myelin sheath. The MS research community is very interested in characterizing the physiological variations seen in MS and its subtype, and some studies have shown the presence of cerebrospinal fluid and hematology-related biomarkers connected to multiple sclerosisstatus. The aim of the study detects the changing that happened in CBC tests in multiple sclerosis patients.

MS patients (n=100) were divided into two groups; newly diagnosed (42), and patients with ongoing treatments (58). These groups were compared to healthy subjects (n=55); the mean age ±SD was (30±8.46 years), (37±8.06years), and (31±8.73 years) for MS newly patients, patients with ongoing treatments, and healthy subjects, respectively.hematological parameters (hemoglobin concentration (HB), packed cell volume (PCV), white blood cells (WBC), and platelet count (PLT) were evaluated by immediately analyzing entire blood for a complete blood picture using the fully automated analyzer Sysmex Xn 1000 hematology in Baghdad teaching hospital. the result of the current study was the hematological parameters did not differ significantly [Hb, PCV, WBC, and PLT] in MS patients group when compared to the control group.

Keywords: multiple sclerosis, Hematology, CBC.
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Introduction

Multiple sclerosis (MS) is a central nervous system disease that is chronically inflammatory, autoimmune, and demyelinating [1]. There are four clinical types of this disease which are relapsing-remitting multiple sclerosis (RRMS), secondary progressive multiple sclerosis (SPMS), primary progressive multiple sclerosis (PPMS), and relapsing-remitting progressive multiple sclerosis (PRMS) .About eighty-seven percent of people with RRMS experience acute episodes (relapses), which are characterized by partial or complete recovery (remission) [2].

Multiple symptoms may be present in patients such as vision alterations (diplopia, a loss of vision in one eye), weakness, poor coordination, sensory loss, or changes in bowel

and bladder function. Cognitive change, weariness, and mood disruption are less diagnostic but nevertheless incapacitating symptoms. A severe disability could potentially result from a disease's progression. It is possible to treat MS symptoms using a variety of drugs and other methods that treating those suffering from this disease's recurring forms has been transformed by the accessibility of disease-modifying medicines. These drugs probably work by reducing immune-mediated inflammation to manage the underlying illness process. They neither treat the illness nor repair the harm caused by earlier occurrences. When these medications are administered to patients before more serious, widespread injury and incapacity have taken place, their effects typically seem to be more robust [3].

Neurons have a simple ability to regenerate. And also found a decrease in the production of myelin from the white matter that appears naturally from patients with multiple sclerosis compared to healthy people of close age [4]. The reports have also demonstrated that patients' white blood cells' (WBC) and red blood cells' (RBC) membranes exhibit disorders of metabolism, like modifications in the fatty acid composition of myelin. Phospholipase A2 is known to target erythrocytes with low membrane fluidity, as documented in patients with multiple sclerosis (MS). Arachidonic acid is released from membrane phospholipids by the enzyme phospholipase A2 during the activation of an inflammatory response. Any modifications to the RBC profile, particularly in its capability to carry oxygen, could be anticipated to contribute to the disease's etiology [5].

Methods

Study population

This study has been achieved at the Medical City Complex from November 2021 to February 2022. Permissions were secured from Baghdad, Iraq's medical city hospitals, and the University of Technology's institutional ethical council gave its approval, Baghdad, Iraq (Ref. No. AS 1974-17-10- 2021) in conformity with the 2000 revision of the Helsinki Declaration from 1975. Prior to the collection of any data or samples, all participants were told of the study's design and goals and provided with an opportunity to sign an informed consent form.

The study includes 155 subjects divided into three groups as follows:

(I) Group A (n=58): old MS patients under different treatment protocols.

(II) Group B (n=42): newly diagnosed patients.

(III) Group C: (n=55) apparently healthy subjects were enrolled in the study as a control group.

The medical history of all multiple sclerosis patients has been taken, detailed clinical checks with a particular questionnaire formula occupied for each patient contain; duration of disease, age, height and body weight, type of drug, and symptoms include (vision problems, bladder dysfunction, muscle stiffness and spasms, tremor, slurred speech, fertility status, patient's family history of MS, and other diseases including diabetes mellitus or hypertension.)

Materials

hematological parameters (HB), (PCV), (WBC), and (PLT) were evaluated by immediately analyzing entire blood for a complete blood picture using the fully automated analyzer Sysmex Xn 1000 hematology in Baghdad teaching hospital.

Laboratory assessment

3 ml of whole blood from each participant had to be drawn straight from the vein into an EDTA-containing tube, and the operation had to be done in an aseptic manner.

Statistical Analysis

The analysis was submitted using MedCalc Software, MedCalc Statistical Software version 16.4.3.The results were presented as mean SD and the parameters were normally distributed. A one-way ANOVA test and an independent test were used to examine group differences. The reliability of markers as illness indicators

was determined using the receiver operating characteristic curve (ROC curve). Area under the curve was used to compare the markers.. Data were considered significantp≤0.05.

Results and discussion

Hb, WBC, RBC and platlate level

In newly diagnosed patients, the mean RBC 10^6/UL Levels did not significantly change when compared to control group (4.70±0.11 vs. 4.67±0.0710^6 /UL, p≤0.05). As well as, there was no significant rise in MS patients receiving treatments (4.42±0.08 10^6/UL) when a contrasted healthy subjects(p ≤ 0.05). Additionally, no significant distinction between the newly diagnosed patients& the patients receiving the continued treatment patients(p≤0.05), as shown in table (1).

The mean Hb levels of newly diagnosed patients did not significantly change. (13.26±0.28g/dl) when contrasted to control group (13.74±0.22g/dl, p≤0.05). There was no significant rise in MS patients receiving treatments (13.80±0.25g/dl) when contrasted to the healthy group (p≤ 0.05). There was no significant distinction among the newly diagnosed patients and the group of patients receiving continuous treatment (p ≤ 0.05), shown in table (1).

The mean WBC levels in newly diagnosed patients did not differ significantly (7.01±0.37 10^3/UL) when contrasted to the control group (6.66±0.23 10^3/UL, p≤0.05). There was no significant change in MS patients receiving treatments (6.42±0.20 10^3/UL) when contrasted to the control group (p ≤ 0.05). Additionally, there was no significant distinction among the newly diagnosed patients and the patients receiving continued treatment patients (p ≤ 0.05), as shown in table (1).

Table (1): The mean ±SD for PLT 10^3/ UL, RBC 10^6/UL, HB g/dl, and WBC 10^3/ UL levels in all studied groups.

Groups	Plt	RBC	Hb	WBC
Control mean±SD Range	251.25±9.19a 432-145	4.67±0.07a 5.79-3.25	13.74±0.22a 17-10.3	6.66±0.23a 11.87-4.41
Newly mean±SD Range	264.57±10.03a 427.3-146	4.70±0.11a 6.55-3.87	13.26±0.28a 18.3-10.4	7.01±0.37a 13.45-4.18
Patient mean±SD Range	252.24±8.53a 404-136	4.42±0.08a 5.6-3.15	13.80±0.25a 16.4-8	6.42±0.20a 9.82-4.07
LSD	25.96	0.42	0.70	0.73

When the letters differ from the same column, it means a significant difference (p≤0.05)

In 2012, 31 MS patients and 30 matched control persons had CBC by Gloudina M. Hon and colleagues. Contrary to the current study, they discovered that hemoglobin (HGB) was considerably reduced in patients, and that both (RBCs) and (HCT) were not significantly affected. However, those individuals also had a non-significant rise in neutrophil percentage [6].

A study has found an association between chronic treatment with natalizumab (TYSABRI) and significant alterations in whole blood cell counts, including the appearance of hematopoietic precursors not present in the blood of a person who does not have the disease [7].

RBC count, hemoglobin, hematocrit, and mean corpuscular volume varies among patients who have been assessed with relation to clinical status and disease development (MCV). Patients with relapsing-remitting multiple sclerosis (RRMS) had a lower RBC count than those with (SPMS) [8].

In 2021 Jacob M. Miller and colleagueslooked at the distinctions and variations in hematological profiles between MS cases and controls in both Caucasians and African Americans. A comparable investigation should also be performed to look into the variations between RRMS/SPMS and PPMS patients. The analysis revealed several biomarkers that varied between the groups [9].

Lymphoid neutrophil ratio (NLR) and monocyte lymphocyte ratio (MLR) are poorly available and readily available components of a blood count (CBC); In the case of infection, in the event that they appear in a specific pathological condition, in a pathological condition related to each other. In neuroscience, NLR improves induced stroke outcomes, which is high compared to healthy controls in degenerative conditions such as Alzheimer's disease [10, 11] and Parkinson's disease [12] and multiple sclerosis [6]

The current study labeled the strength of the association as follows:values of r= 0-0.19 are regarded as very weak, values of r = 0.2-0.39 as weak, values of r= 0.40-0.59 as moderate, values of r= 0.6-0.79 as strong andvalues of r= 0.8-1 as very strong correlation.

There is a significantmoderate positive correlation between RBC with Hb (r=0.470, p≤0.05) and a significantvery weakpositive correlation between RBC with WBC (r=0.198, p≤0.05).shown in figures (1) and (2).

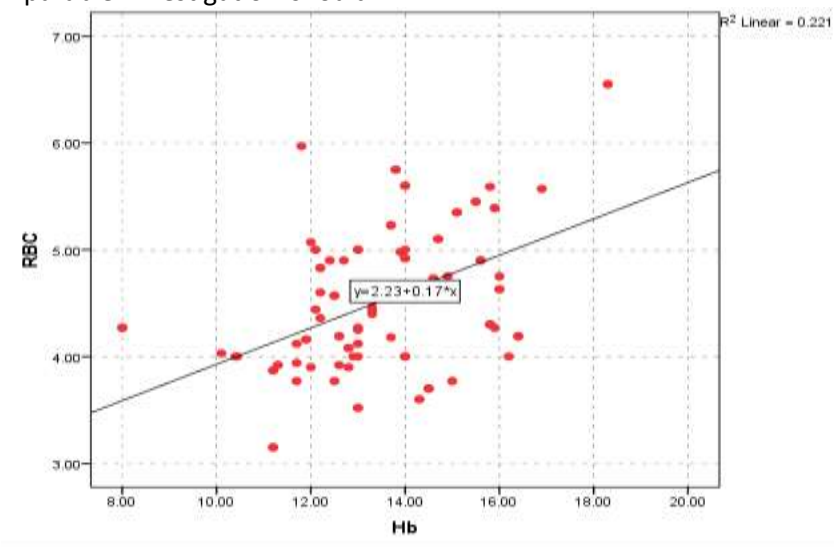

Figure (1) correlation between RBC and Hb

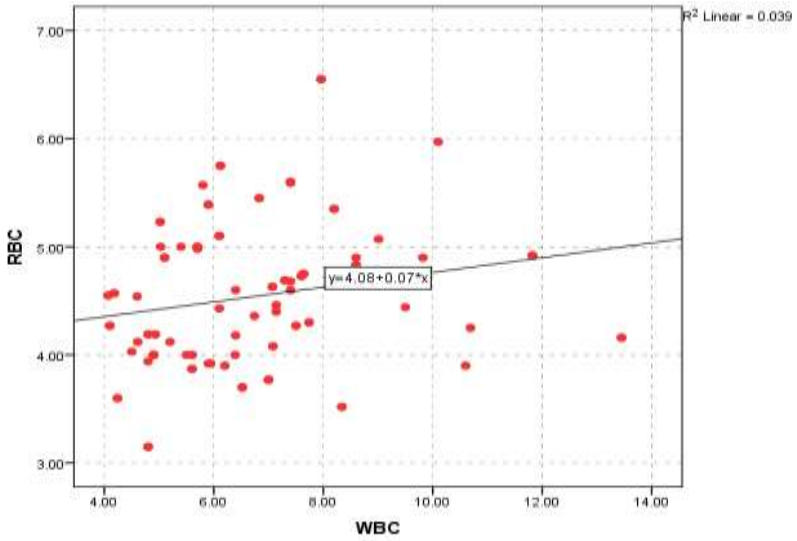

Figure (2) correlation between RBC and WBC

There is a significant weakpositive correlation between Hb with PLT(r=0.2,p≤0.05).Figure (3) explains that

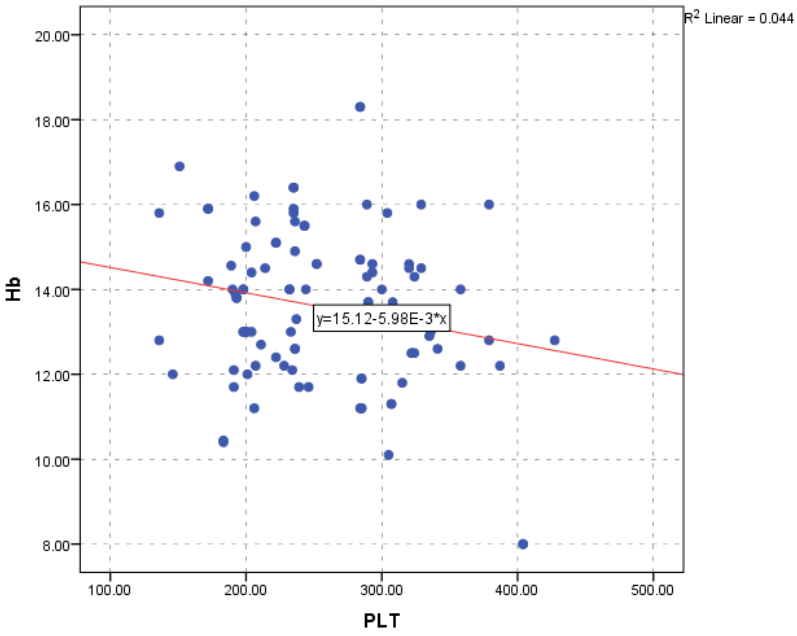

Figure (3) correlation between Hb and PLT

Conclusion: The present results conclude that(Hb), (PCV), (WBC), and (PLT) cannot be used as diagnostic markers for multiple sclerosis patients, because there were no significant differences among the study groups,Therefore, other markers must be found for the purpose of diagnosing the disease more accurately.

Acknowledgments

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Conflicts of interest

There are no conflicts of interest

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