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# Effecting of Hemodialysisprogression on Thyroid Hormones and Complete Blood Count for Iraqi Chronic renal failure Patients

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## Abstract

**Background:** Chronic renal failure is one of the most reasons of death globally today.Numbers of persons with this disease is rising rapidly. Advancement of disease is associated with several complications, as well as thyroid dysfunction and Blood disorders.

**Methods:** Case-control study was conducted among sixty Iraqi people samples. Thirty healthy people and other thirty chronic renal failure people. Blood samples (5 ml) were collected to evaluate T3, T4, TSH,Hemoglobin, RBCs count, WBCs count, platelets count, MCV, PCV, MCH and MCHC. (LSD), (ANOVA) and correlation of coefficients were used in statistical analysis at $p \leq 0.05$.

**Results:** Significant decrease in the levels of T3 and T4hormones, while there is significant increase in the level of TSH hormone in patients undergoing hemodialysis by progression of hemodialysis period compared to the control group. Significant decrease in the levels of Hemoglobin, RBCs count, PCV, while there is significant increase in the WBCs count. Insignificant differences in platelets count, MCV, MCH and MCHC. Correlation of coefficient analysis shows a positive and negative correlation between the most studied variables

**Conclusions**: Thyroid dysfunction and blood disorders are common in Iraqi Chronic renal failure patients. progression of hemodialysis period have significant effect on all of ( T3,T4,TSH, Hemoglobin, RBCs count, WBCs count and PCV) and insignificant effect on all of (Platelets count, MCV, MCH and MCHC). Chronic renal failure is main cause of Thyroid dysfunction and anemia diseases.

**Keywords: Chronic renal failure, Hemodialysis, Iraq, Thyroid dysfunction, anemia, CBC**

## Introduction

Chronic renal failure is one of the most common diseases today as kidney disease(1). It is evaluated in terms of kidney function by determining glomerular filtration rate and checking creatinine and urea levels (2).Harshness of chronic renal failure (CRF) categorized by expertrules in five stages, Fifth stage is a most severe stage often called end stage kidney failure or end stage renal disease (ESRD), hemodialysis often use for this stage. Hemodialysis actionssubstitute some of these

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functions through diffusion (waste extraction) and ultrafiltration (fluid extraction). Hemodialysis, is a technique of purifying the blood, when the kidneys are not working typically(3).

Anemia is Known as a decline in one of the main red blood cell variables: hemoglobin (Hgb) concentration, PCV, or red blood cells count. World Health Organization describes anemia as a hemoglobin level of less than 13 g / 100 ml in men and women after menopause, and less than 12 g / 100 ml in premenopausal women. The prevalence of chronic anemia associated with kidney disease in general is about 50%(4)(5). Although anemia can be diagnosed in patients at any stage of chronic renal failure, there is a strong correlation between the prevalence of anemia and the severity of chronic renal failure.This type of anemia is usually slight or moderate, frequently without strong changes in the morphological characteristics of red blood cells. Pathogenesis of anemia is linked with defection of erythropoietin synthesis due to kidney disorder(6).

So, major care suppliers play an vital role in the diagnosis and follow-up of anemia inChronicrenal failure patients. Although anemia can result from multiple causes iron deficiency, folic acid deficiency, or vitamin B12 deficiency or severe parathyroid glands(7).The defect in Erythropoietin hormone production is the chief cause of anemia associated with Chronic renal failure. Erythropoietin is a glycoprotein secreted from the interstitial fibroblasts in the kidney and is necessary for the growth and differentiation of red blood cells in the bone marrow (8).

Thyroid hormones have a vital role in controlling metabolism, growth, protein biosynthesis and affecting other hormone functions (9). Two chief thyroid hormones are triiodothyronine (T3) and thyroxine (T4). These hormones can have a relationship with renal diseasetoo, so it is vital to consider the physiological relationship of thyroid dysfunction with respect to Chronic renal failure(10). It has been observed that renal disease has affected the functioning of the thyroid gland and the peripheral metabolism of thyroid hormones (11).

Chronic renal failure is a universal health threat related with an worrying increase in morbidity and death. There are several mechanisms explaining the relationship between thyroid and renal failure (12). Thyroid hormones have pre-renal and intrinsic renal effects by which they rise the renal blood stream and glomerular filtration rate (GFR). Hypothyroidism is related with reduced GFR and hyperthyroidism results in increased GFR in addition to increased activation of renin-angiotensin-aldosterone system(13). Chronic renal failure patients have increased rate of primary and sub-clinical hypothyroidism.Physiological profits of a hypothyroid in Chronic renal failure, and hazard of Chronic renal failuredevelopment with hyperthyroidism emphasize on a conventionalmethod in the treatment of thyroid dysfunction in Chronic renal failure patients(14). Thyroid dysfunction is as wellrelated with glomerulonephritis frequently by a common autoimmune etiology(15). The relationship between the thyroid gland and kidneys in each other's functions has been

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known for many years. Thyroid disorder has an effect on kidney physiology and its growth, while kidney disease may cause thyroid gland dysfunction. Thyroid and kidney disorders may affect with other common factors. Additionally, treating one disease may affect strategies for the other disease(16).

Thyroid hormones affect severalfeatures of the kidney, as well as development and hemodynamics.Thyroid disorders should be correctly and punctually treated due tospecial effects of thyroid hormones on the body metabolism (17). Subclinical hypothyroidism is widespreaddisorderin thyroid dysfunction; there is still controversy concerning over and undermanagement of this disease (18). Subclinical hypothyroidism is well-defined when the thyroid stimulating hormone (TSH) concentration is rise and the free thyroxineconcentration is normal (19). In knownapplication, medics and clinicians don't recommend treating asymptomaticSubclinical hypothyroidism(20). This may be for the reason that the TSH concentration in about 60% of Subclinical hypothyroidism patients with a slightraise in TSH (4–10 mIU/L) become controlled without interference(21).(22)

Aim of the current study is to find the effect of hemodialysis onthyroids gland hormones (T3, T4), thyroids stimulation hormone TSH and blood variables (Hemoglobin Hb, Red blood cells (RBCs) count, White Blood Cells (W.B.Cs) count, Blood platelet count, Mean corpuscular volume (M.C.V), Packed cell volume (P.C.V), Mean corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC). Knowledgethe relationship and Correlation ofcoefficientamongall these variables in patients with kidney failure undergoing hemodialysis in Ramadi Teaching Hospital, Anbar, Iraq.

**Methods and study groups**

Blood samples were collected, thirty healthy people samples without symptoms and signs of kidney failure and thyroid disorders. Furthermore, thirty chronic renal failure people samples were collected too.Demographic features age, gender and medicinal history of diseases;cardiovascular diseases, hypertension and diabetes mellitus of both patients and healthy people were noted. All people samples (control and patients) have age between a (20-75) years.

Venous blood (5) ml was taken for the control group, as well as for the patients group (before and after hemodialysis), from the hemodialysis unit in Ramadi Teaching Hospital. Venous blood (2.5) ml was placed in EDTA tubes without storage to measure blood variable. Other part of blood was placed in clean and dry tubes (gel and clot activation tube) at (37) ° C for (10) minutes, the serum was separated by centrifuge (3000 r / min) for (10) minutes, the level of hormones was measured in the serum.least significant difference (LSD), Analysis of Variance (ANOVA) and correlation of coefficients were used in statistical analysis at $p \leq 0.05$.

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## Results

### 1. Concentrations of {T3,T4 and TSH} hormones:-

The results of the statistical analysis showed a decrease in the concentrations of T3 and T4 hormones, and increase TSH concentration in patients' samples subject to hemodialysis, with the advance of the hemodialysis period compared to the control group.

Means concentrations of {T3,T4 and TSH} in the blood serum before the first hemodialysis (B1)were (1.08 ng \ ml, 6.82 µg \ dl and 3.62 µml / ml) respectively, while Means concentrations of {T3,T4 and TSH} in the blood serum After the first hemodialysis (A1)were (1.02 ng \ ml, 8.58 µg \ dl and 2.48µml / ml) respectively.

After two weeks, process of hemodialysis for same patients wereRepeatedto follow up the disease condition,hormone concentrations were measured again. Means concentrations of {T3,T4 and TSH} in the blood serum before the second hemodialysis (B2)were (1.05ng \ ml, 7.76µg \ dl and 3.07 µml / ml) respectively, while Means {T3,T4 and TSH} in the blood serum After the second hemodialysis (A2)were (1.01 ng \ ml, 8.50µg \ dl and 2.21µml / ml) respectively.Means concentrations of {T3,T4 and TSH} in the blood serum of Control group (C) were (1.63 ng \ ml, 10.50 µg \ dl and 1.67 µml / ml) respectively .

**Table.(1)**: Mean values of concentrations of {T3,T4 and TSH} in the blood serum.

| | B1 | A1 | B2 | A2 | C |
|---|---|---|---|---|---|
| **T3 (ng \ ml)** | 1.08 | 1.02 | 1.05 | 1.01 | 1.63 |
| **T4 (µg \ dl)** | 6.82 | 8.58 | 7.76 | 8.50 | 10.50 |
| **TSH (µml / ml)** | 3.62 | 2.48 | 3.07 | 2.21 | 1.67 |

(B1= Before first hemodialysis, A1= After first hemodialysis, B2= Before second hemodialysis, A2= After second hemodialysis, C= Control)

Results of least significant difference (LSD) showed significant differences in the concentrations of T3,T4 and TSH of patients undergoing to Hemodialysis compared to the control group at the probability level ($p \leq 0.05$ ). Results of Analysis of Variance (ANOVA) showed a significant effect of the hemodialysis process on T3,T4 and TSH concentrations in the serum of patients undergoing Hemodialysis at the probability level ($p \leq 0.05$).

### 2. Hemoglobin concentration (Hgb): -

Results of the statistical analysis showed a significant decrease in hemoglobin concentration in the samples of patients undergoing hemodialysis to advance the hemodialysis period compared to the control group. Mean hemoglobin concentration in the blood of patients before the first hemodialysis (B1) and after the first hemodialysis (A1) (7.36 and 7.66) g / 100 ml, respectively. After two weeks, hemodialysis for same patients were Repeated, Mean hemoglobin concentration in

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the blood of the patients before second hemodialysis (B2) and after the second hemodialysis (A2) (7.56 and 8.16) g / 100 ml, respectively, while the mean hemoglobin concentration in the blood control group (C) was (15.13). Figure No. (1).

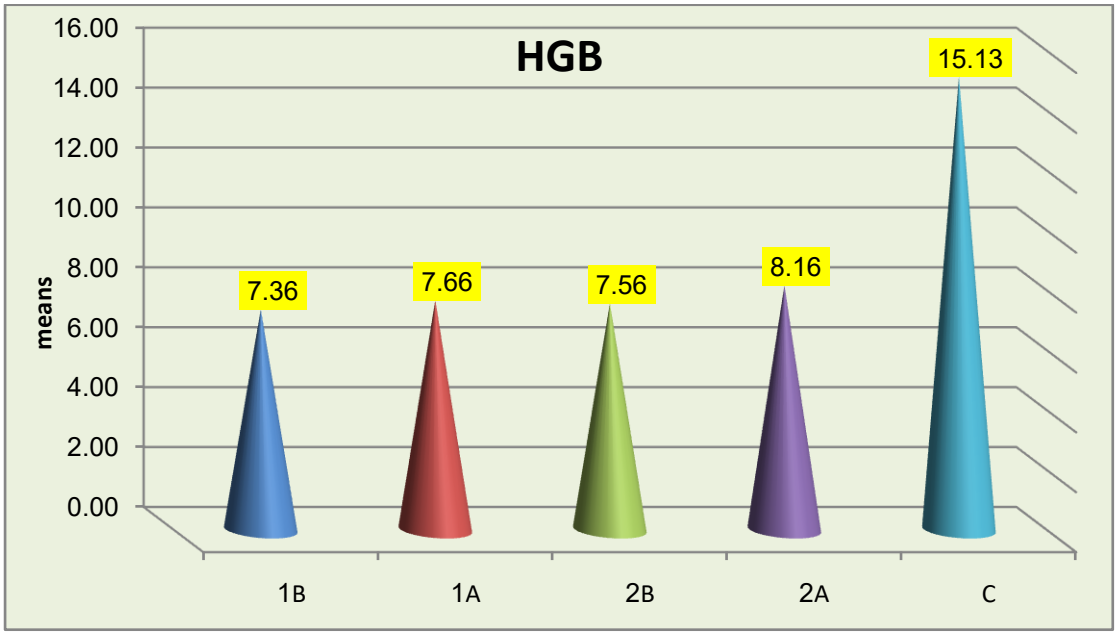


**Fig. (1)** Mean Hemoglobin concentration Hgb (g/100 mL) in in serum samples studied.

Results of LSD showed significant differences in hemoglobin concentrations of study samples. ANOVA showed the presence of a significant effect of hemodialysis on hemoglobin in the serum of patients undergoing hemodialysis at ($P \leq 0.05$).

**3. Red blood cells count (RBCs): -**

The results of the statistical analysis showed a significant decrease in the number of erythrocytes in the samples of patients undergoing hemodialysis with an advance of the hemodialysis period compared to the control group. As the average number of erythrocytes in the blood patients before the first hemodialysis (B1) and after the first hemodialysis (A1) were (2.76 and 2.83) cell / mm, respectively, and after two weeks hemodialysis for same patients were Repeated, the average number of red blood cells in blood of patients before the second hemodialysis (B2) and after the second hemodialysis (A2) were (2.79 and 3.07) cell / mm, respectively, while the average number of red blood cells in Blood of the control group (C) was (5.17) cell / mm. Show figure 2.

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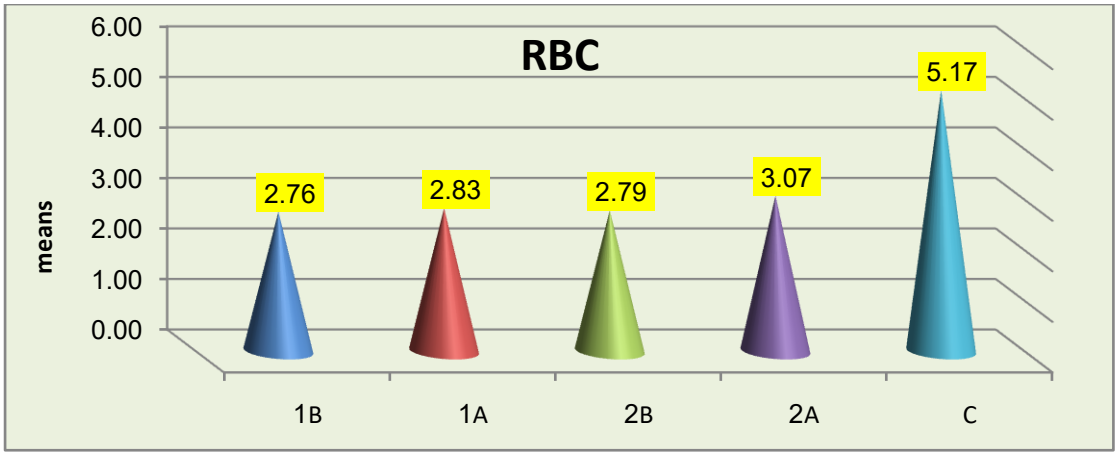


**Fig. 2)** Mean of red blood cells numbers (cell / mm) in the blood of the study samples.

Results of LSD showed significant differences in the red blood cell count for the study samples at probability level ($P \leq 0.05$). ANOVA showed significant effect of hemodialysis on erythrocytes count at ($P \leq 0.05$).

**4. White Blood Cells count (W.B.Cs): -**

Results of the statistical analysis showed an increase in the number of (W.B.Cs) in the samples of patients undergoing hemodialysis to advance the hemodialysis period compared to the control group. Mean of (W.B.Cs) number in the blood of patients before the first hemodialysis (B1) and after the first hemodialysis (A1) were (8.24 and 8.04) cell / mm, respectively.After two weeks hemodialysis for same patients were Repeated, Mean of (W.B.Cs) number before the second hemodialysis (B2) and after the second hemodialysis (A2) were (8.24 and 8.04) cell / mm, respectively, while the average number of (W.B.Cs) in the blood control group (C) was (4.57) cell / mm .Show figure 3.

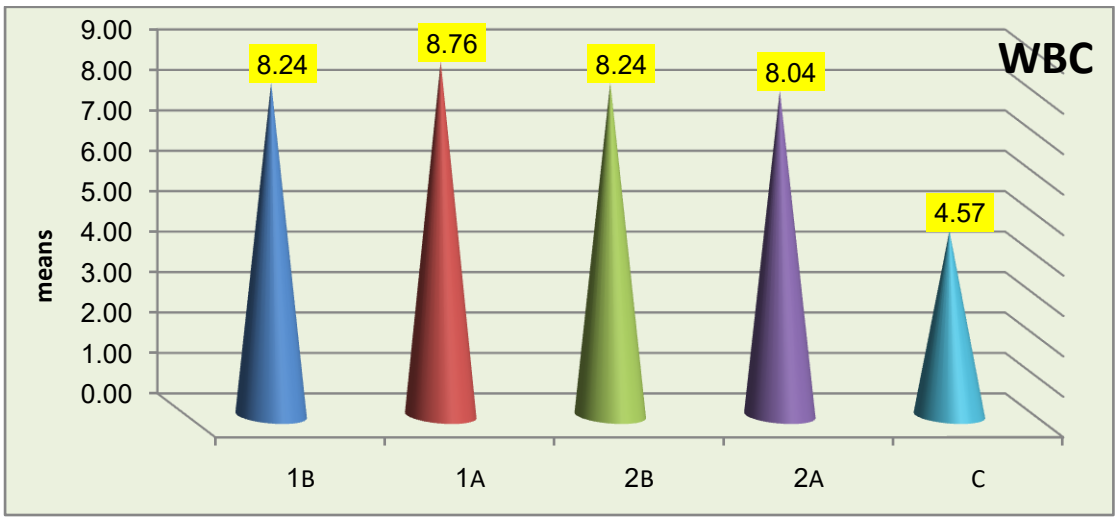


**Fig. 3)** Means of white blood cells number (cell / mm) in the blood of the study samples.

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Results of LSD showed significant differences in number of (W.B.Cs)for the studied samples at ($P \leq 0.05$). ANOVA showed significant effect of the hemodialysis process on (W.B.Cs) count in the blood of the patients undergoing dialysis at ($P \leq 0.05$).

**5. Blood platelet count: -**

Results of the statistical analysis did not show the effect of platelet count values in the samples of patients undergoing hemodialysis, with the advance of the hemodialysis period compared to the control group. Mean of platelets numbers in the blood of patients before the first hemodialysis (B1) and after the second hemodialysis (A2) were (171.60 and 1366.000) platelet / mm, respectively. After two weeks, hemodialysis for same patients were Repeated,mean of platelets numbers before the second hemodialysis (B2) and after the second hemodialysis (A2) were (177.60 and 177.60) platelet / mm, respectively, while Mean of Platelets numbers in the blood of the control group (185.00) platelet / mm Fig. (4).

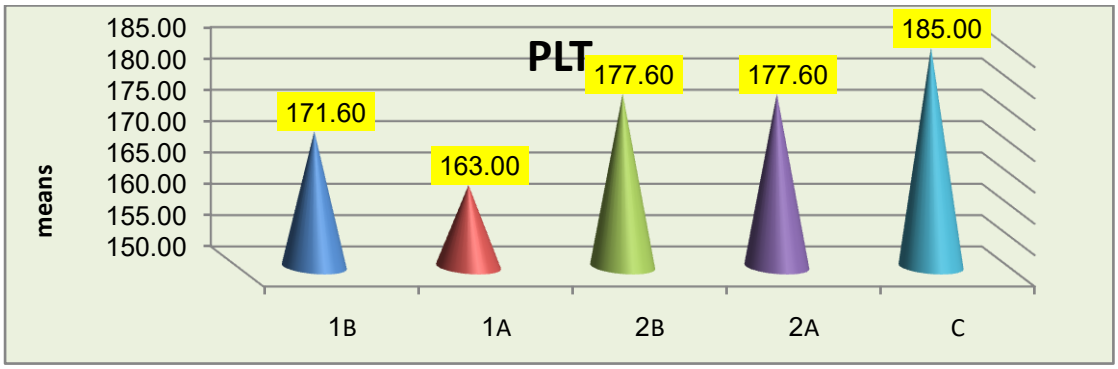


**Fig. 4)** Means Blood platelet count (platelet / mm) in the studied samples.

Results of LSD showed that no significant differences in platelet count in studied samples at (($P \leq 0.05$) and that all values from patients subject to hemodialysis and control samples were within the normal values. ANOVA showed that no Significant effect of hemodialysis on the platelet count in the blood of patients undergoing hemodialysis at ($P \leq 0.05$).

**6. Mean corpuscular volume (MCV):**

Results of the statistical analysis showed that the (MCV) of the red blood cell was not affected in the blood of patients undergoing hemodialysis with an advance of the hemodialysis period compared to the control group. (MCV) in the blood of patients before the first hemodialysis (B1) and after the second hemodialysis (A2) were (90.78 and 89.20) fimtoliter (fl), respectively. After two weeks, hemodialysis for same patients were Repeated, (MCV) before the second hemodialysis (B2) and after the second hemodialysis (A2) were (90.84 and 90.54) (fL), respectively), while (MCV) in the control group was (92.27)(fL), show Figure (5).

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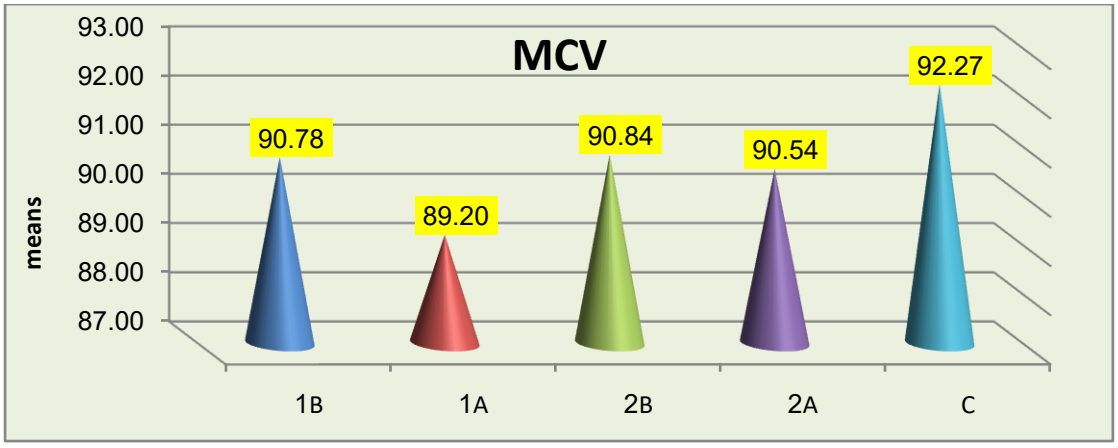


**Fig. (5)** Mean corpuscular volume (MCV)fL in the studied samples.

Results of LSD showed that there was no significant differences in the values of the (MCV) in the studied samples at (($P \leq 0.05$) and all the values of the patients and control were within the normal values.ANOVA showed that there was no effect of hemodialysis on the (MCV) at ($P \leq 0.05$).

**7. Packed cell volume PCV: -**

Results of the statistical analysis showed a significant decrease in level of PCV in the blood of patients subject to hemodialysis, with the advance of the hemodialysis period compared with the control group. Means PCV in the blood of patients before the first hemodialysis (B1) and after the first hemodialysis(A1) were (25.04 and 25.26)% respectively. After two weeks, hemodialysis for same patients were Repeated, Mean PCV before the second hemodialysis (B2 and after the second hemodialysis (A2) were (25.26 and 25.62) respectively, while Mean P.C.V of control group was (45.09%) Figure (6).

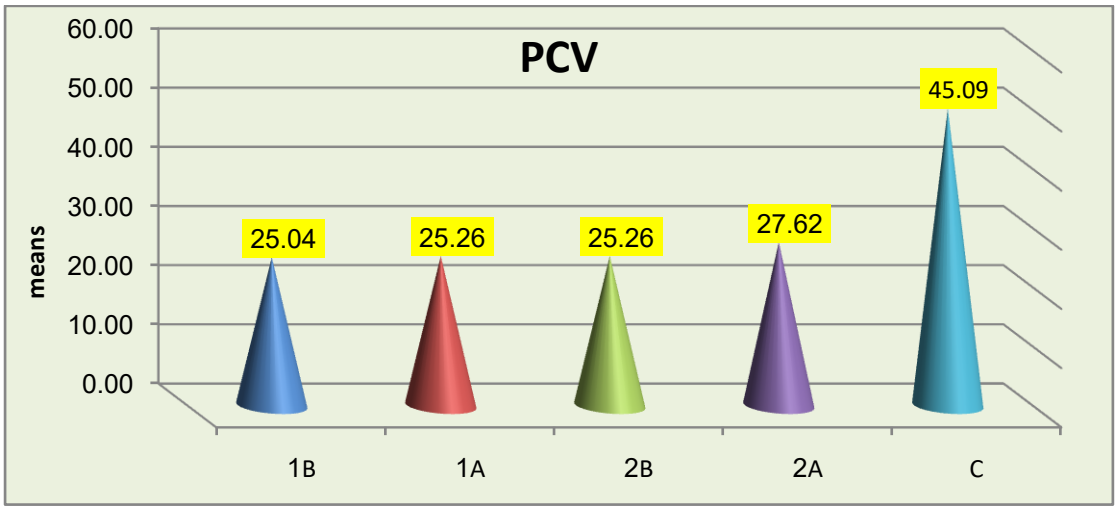


**Fig. (6)** Mean Packed cell volume (PCV) in the studied samples.

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Results of LSD showed that there were significant differences in Mean PCV of the studied samples at (P≤0.05). ANOVA showed a significant effect for hemodialysis on the Mean PCV in the blood of patients undergoing hemodialysis at (P ≤ 0.05).

**8. Mean corpuscular hemoglobin MCH: -**

Results of the statistical analysis showed there weren't differences in the values of the MCH in the blood of patients subject to hemodialysis by the advance of the hemodialysis period compared with the control group. The MCH in the blood of patients before the first hemodialysis (B1) and after the first hemodialysis (A1) were (26.80 and 27.14) g / dl, respectively. After two weeks, hemodialysis for same patients were Repeated. The MCH before the second hemodialysis (B2) and after the second hemodialysis (A2) were (27.88 and 26.84) g / dl, respectively, while the MCH in control group blood was (28.97) Figure (7).

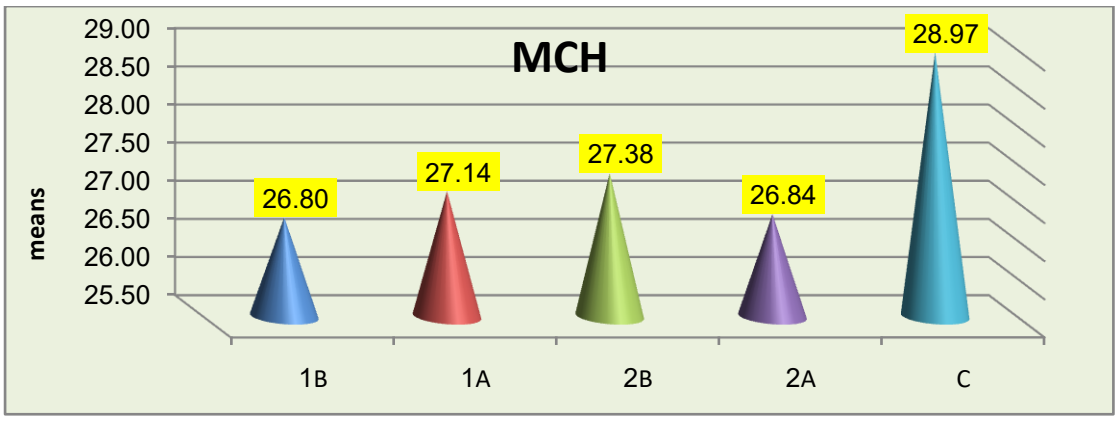


**Fig. (7)**Mean corpuscular hemoglobin MCH in the studied samples.

Results of LSD showed insignificant differences in the MCH values in the studied samples at (P ≤ 0.05), and that all values of patients and control were within the normal values. ANOVA showed no effect of hemodialysis on the MCH in patients undergoing dialysis at (P ≤ 0.05).

**9. Mean corpuscular hemoglobin concentration MCHC**

Results of the statistical analysis showed no differences in the values of MCHC in the blood of patients undergoing hemodialysis with the advance of the hemodialysis period compared with the control group. The MCHC in the blood of patients before the first hemodialysis (B1) and after the first hemodialysis (A1) were (29.52 and 30.36) g / dl, respectively.After two weeks, hemodialysis for same patients were Repeated, MCHC before the second hemodialysis (B2) and after the second hemodialysis (A2) were (30.04 and 29.72) g / dl, respectively, while MCHC of the control group was (28.97) Figure (8).

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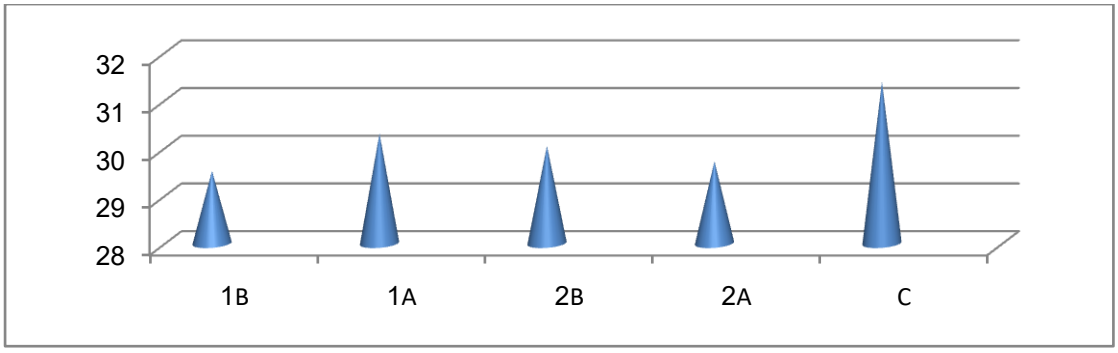


**Fig. 8)** Mean corpuscular hemoglobin concentration MCHC in the studied samples.

Results of LSD showed insignificant differences in the mean values of MCHC in studied samples at ($P \leq 0.05$), and that all values patients and control were normal values. ANOVA showeddisaffect of hemodialysis on the MCHC in patients undergoing hemodialysis at ($P \leq 0.05$ ).

**10. Correlation of coefficient: -**

Statistical analysis shows presence of positive correlation of coefficients between some studied variables as well as presence of negative correlation of coefficients between the other variables. It is understood that presence of positive correlation indicates the direct relationship between the variables, that the elevation of one of the variables leads to the elevation of the other variable, while the negative correlation exists Negative indicates the presence of the inverse relationship between the variables, that is, the increase of one of the variables leads to a decrease in the other variables, and this indicates the multiple effects of kidney failure on the physiological variables in the patient's body. show table (2)

**Table (2)** correlation ofcoefficient results among the studied variables

| Correlations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **T3** | **T4** | **TSH** | **HGB** | **RBC** | **WBC** | **PLT** | **MCV** | **HCT** | **MCH** | **MCHC** |
| **T3** | 1 | .300* | -.228 | .717** | .648** | -.357-* | .498** | .342* | .674** | .653** | .690** |
| **T4** | .300* | 1 | -.281 | .557** | .525** | -.650-** | .011 | .224 | .542** | .452** | .519** |
| **TSH** | -.228 | -.281 | 1 | -.403-** | -.458-** | -.169 | -.472-** | .415** | -.401-** | .099 | -.270 |
| **HGB** | .717** | .557** | -.403-** | 1 | .985** | -.429-** | .208 | .244 | .991** | .455** | .545** |
| **RBC** | .648** | .525** | -.458-** | .985** | 1 | -.365-* | .231 | .107 | .993** | .308* | .472** |
| **WBC** | -.357-* | -.650-** | -.169 | -.429-** | -.365-* | 1 | -.071 | -.423-** | -.415-** | -.547-** | -.485-** |
| **PLT** | .498** | .011 | -.472-** | .208 | .231 | -.071 | 1 | -.262 | .191 | -.004 | .220 |
| **MCV** | .342* | .224 | .415** | .244 | .107 | -.423-** | -.262 | 1 | .192 | .804** | .254 |
| **HCT** | .674** | .542** | -.401-** | .991** | .993** | -.415-** | .191 | .192 | 1 | .389** | .526** |
| **MCH** | .653** | .452** | .099 | .455** | .308* | -.547-** | -.004 | .804** | .389** | 1 | .754** |
| **MCHC** | .690** | .519** | -.270 | .545** | .472** | -.485-** | .220 | .254 | .526** | .754** | 1 |

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

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# Discussion

There are limited studies to follow the influence of thyroid hormones and blood variables during the course of hemodialysis progression. Most of the previous studies compared thyroid hormones and blood changes between patients with kidney failure and normal people, while the current study focused on monitoring the effect of the variable under study (T3,T4,TSH,Hb) concentrations, (RBCs, WBCs, platelets) counts, (M.C.V, P.C.V, MCH, MCHC) and find the Correlation of coefficient among these factors for patients during period of 14 days as the hemodialysis stage progressed.

Chronic renal failureaffects on concentrations of thyroid hormones in several ways, such as a decrease in concentration of thyroid hormones in the bloodstream, a change in the hormones in the surrounding tissues and its association with the transporting protein, decrease in the concentration of thyroid hormones in the tissues and increased storage of iodine element in the thyroid gland (23)(24).

The current study showed multiple disorders in the concentration of thyroid hormones. This hormones are important in regulating the process of organ development and metabolism (25). It is observed in this study there is decrease in the concentrations of hormones T3 and T4 in the blood of kidney failure people with an increase in TSH concentration (26). This matter is common in patients subject to Chronic renal failure(27), but it is not a diagnosis of an imbalance in the thyroid gland and this is consistent with earlier study (28). A decrease in thyroid hormones associated with the hemodialysis process may be due to disorders in the fluid system after hemodialysis (29) and zinc loss (30) or a defensive conditioning to maintain nitrogen from loss during hemodialysis, as these hormones maintain metabolism in order to ensure that important elements are not lost during the hemodialysis process (31). Chronic renal failure leads to many differences in hormone levels, such as testosterone is observed to decrease while increase levels of hormone (PTH) in the blood serum of patients undergoing hemodialysis (32).

The kidneys play a very significant role in metabolism, secretion and breakdown of thyroid hormones. Normally, kidney disorder leads to a disorder and a change in thyroid hormones (33). It is clear from current study hemodialysis leads to a reduction in the levels of thyroid hormones. Therefore, this means the danger of continuing the process of hemodialysis for a long time with the persistence lack of thyroid hormones, especially as the kidneys job is to excrete iodine resulting from the breakdown of thyroid hormones and thus lead to hypothyroidism,this was confirmed by early studies (32) (34).

One of the reasons for deficiency in thyroid hormones in patients with kidney failure is because the kidney stop dumping iodine resulting from the Decomposition of thyroid hormones, which leads to an increase in the level of inorganic iodine in the blood and this leads to Stimulating the thyroid gland to increase the absorption of

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iodine and leads to inhibition of thyroid hormones production as an inevitable consequence of kidney failure (35).

Results of the current study showed disorders occurred in the values of blood variables in patients undergoing hemodialysis. Causes of these disorders can be explained as a result of an imbalance in the function of the kidneys, as the kidneys are responsible for the production of the hormone erythropoietin, calcitriol, Renin as part of the functions of the glandular system in the body (36) . Erythropoietin is the hormone responsible for stimulating the formation of blood cells from the bone marrow. In the hemodialysis system, the kidney lose their ability to secrete the hormone erythropoietin which stimulates the bone marrow to secrete red blood cells (37). in addition, when a commutation of nitrogenous toxic substances occurs due to kidney failure, this leads to a suppression of bone marrow function. Therefore, in this study, cases are observed with anemia in patients undergoing hemodialysis due to low numbers of Red blood cells produced from the bone marrow (38).

The damage of cells in the kidneys due to kidney failure reduce the amount of the hormone erythropoietin, which leads to the production of small quantities of hemoglobin and thus leads to anemia as well as the loss of a quantity of blood during the process of washing the kidneys, which leads to a reduction in the various blood components. Also, the deficiency of iron and vitamin B12 and Folic acid from patients food with kidney failure is another causes of anemia(39). Results of current study are consistent with other study (6), which found a decrease in the numbers of red blood cells in the blood of people with kidney failure. This decrease is due to the kidneys losing their work and their ability to produce erythropoietin (40). The patient has a condition of anemia is a common condition in patients with kidney failure, and the severity of anemia increases with the advance of the hemodialysis period as a result of the loss of important elements of blood production. The decrease in blood cell production due to bone marrow suppression, which is the source of production of all types of blood cells (41).

Studying the change and disturbance in blood variables is important in many studies, because blood is one of the body tissues most susceptible to abnormal disorders of the body, for example, the body is exposed to toxic elements found in cigarettes and hookahs or workers exposed to inhalation of fumes and gases emitted from car fuel and others(42).The current study explain Minor changes insignificant in (platelet count, Mean corpuscular volume (M.C.V), Mean corpuscular hemoglobin MCH and Mean corpuscular hemoglobin concentration MCHC values in the samples of patients undergoing hemodialysis, with the advance of the hemodialysis period compared to the control group,It is concluded from this study that kidney failure and hemodialysis have no effect on these variables (43). The current study showed an increase in the number of (W.B.Cs) in the samples of patients undergoing hemodialysis to advance the hemodialysis period compared to the control group This fact is consistent with other study (40)

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## References

1- Siti N. Sowtali, Ali A. MohdRasani, Azarisman S. Mohd. Shah, DariahMohd. Yusoff, Che R. Draman, SakinahHarith, *et al*. Knowledge and Awareness About Chronic Kidney Disease among Undergraduate Students in International Islamic University Malaysia Kuantan Campus. *Education in Medicine Journal 2019; 11(3): 31–43.*
2- Sanyaolu,A. Okorie,C. Annan,R. Turkey,H.*et al*,. Epidemiology and management of chronic renal Filure: a global public health problem.*Biostatistics and Epidemiology International Journal (2018). 11-16.10.3088.*
3- Nawal A. Murtadha. study of some biochemical and hematological parameters in continuously hemodialysis patient, in Kirkuk city. *Tikrit J. of pure science 2018, 23(2): 73-80.*
4- Soundarya N. and Suganthi P. . A Review on Anaemia – Types, Causes, Symptoms and Their Treatments. JOSTI-Vol (1), 2016: 10- 17
5- CasesA,EgocheagaMI,TrancheS,PallarésV,OjedaR,GórrizJL,etal.Anemia of chronic Kidney disease: Protocol of study , management and referral to Nephrology.*Nefrologia (2018) 38(1);8-12.*
6- V. Manolov, D. Yonova, E. Vazelov, B. Bogov, M. Velizarova, B. Atanasova et al. Serum Hepcidin Evaluation in Patients with Chronic Dialysis. *International Journal of Biomedicine 5(2) (2015) 76-78.*
7- W.-N. Wanga, W.-L. Zhangb, T. Suna, F.-Z. Maa, S. Sua and Z.-G. Xua. Effect of peritoneal dialysis versus hemodialysis on renal anemia in renal in end-stage disease patients: a meta-analysis. *Renal Failure 2016, DOI: 10.1080/0886022X.2016.1244079.*
8- May K. Ismael. Determination of thyroid hormone levels in the serum of Non-dialyzed patients with chronic renal failure. *J. of university of anbar for pure science 2013,Vol.7:NO.3.*
9- Schroeder C. Amy and Privalsky L. Martin. Thyroid hormones,T3 andT4, in the brain. *Frontiers in Endocrinology, March 2014,V. (5), Article 40.*
10- Ross DS, Burch HB, Cooper DS, Greenlee MC, Laurberg P, Maia AL, et al. American Thyroid Association guidelines for diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. *Thyroid. 2016 Oct; 26(10): 1343–421.*
11- KC S. Raj. Thyroid function tests and its interpretation. *Journal of Pathology of Nepal (2014) Vol. 4, 584- 590.*
12- Iglesias P, Bajo MA, Selgas R, Díez JJ. Thyroid dysfunction and kidney disease: an update. *Rev Endocr. Metab. Disord. 2017 Mar; 18(1): 131–44.*
13- Pan B., Du X., Zhang H., Hua X., Wan X. and Cao C. Relationships of Chronic Kidney Disease and Thyroid Dysfunction in Non-Dialysis Patients: A Pilot Study. *Kidney Blood Press Res 2019;44:170–178.*
14- Benjamin S., Viktoria J., Mario S., Thomas R., Harald H. and Alois G. Effect of Thyroid Hormones on Kidney Function in Patients after Kidney Transplantation. *Scientific Reports, (2020) 10:2156 https://doi.org/10.1038/s41598-020-59178-x.*
15- MohitThalquotra, Rajesh Pandey, BashuDevPardhe, JeewanBhandari, Jasbir Singh and K S Sodhi. Kidneys and Thyroid Gland: Interrelation in Health and Disease. *Indo American Journal Of Pharm Research.2014:4(04).*
16- Basu,G. and Mohapatra , A. Interactions between thyroid disorders and kidney

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 5286 - 5300
Received 16 February 2021; Accepted 08 March 2021.

disease. *Indian Journal of Endocrinology and Metabolism,2012; 16:204-213.*

17- Jonklaas J, Bianco AC, Bauer AJ, Burman KD, Cappola AR, Celi FS, et al. American Thyroid Association Task Force on Thyroid Hormone Replacement. Guidelines for the treatment of hypothyroidism: prepared by the American thyroid association task force on thyroid hormone replacement. *Thyroid. 2014 Dec; 24(12): 1670–751.*

18- Ringel MD and Mazzaferri EL. Subclinical thyroid dysfunction can there be a consensus about the consensus? *J ClinEndocrinolMetab. 2005 Jan; 90(1): 588–90.*

19- Cooper DS and Biondi B. Subclinical thyroid disease. *Lancet. 2012 Mar; 379(9821): 1142–54.*

20- Bekkering GE, Agoritsas T, Lytvyn L, Heen AF, Feller M, Moutzouri E, et al. Thyroid hormones treatment for subclinical hypothyroidism: a clinical practice guideline. *BMJ. 2019 May; 365:l2006.*

21- Meyerovitch J, Rotman-Pikielny P, Sherf M, Battat E, Levy Y, Surks MI. Serum thyrotropin measurements in the community: five-year follow-up in a large network of primary care physicians. *Arch Intern Med. 2007 Jul; 167(14): 1533–8.*

22- Sang Hyuk Kim, Hyang Ki Min and Sung Woo Lee. Relationship between Thyroid and Kidney Function: Analysis from the Korea National Health and Nutrition Examination Survey Between 2013 and 2015. *Kidney Blood Press Res 2020;45:442–454.*

23- Gandham Rajeev, Wilma Delphine Silvia ChickballapurRayappa, RavellaVijayalakshmi, ManchalaSwathi and Sunil Kumar. Evaluation of Thyroid Hormone Levels in Chronic Kidney Disease Patients. *Saudi Journal of Kidney Diseases and Transplantation2015;26(1):90-93*

24- SarojKhatiwada, Rajendra KC, SharadGautam, MadhabLamsal and NirmalBaral. Thyroid dysfunction and dyslipidemia in chronic kidney disease patients. *BMC Endocrine Disorders (2015) 15:65.*

25- Mohamed Mohamedali, Srikanth Reddy Maddika, AnixVyas, ViswanathanIyer and PramilCheriyath. Thyroid Disorders and Chronic Kidney Disease. *International Journal of Nephrology Volume 2014, Article ID 520281, 6 pages http://dx.doi.org/10.1155/2014/520281*

26- Selma Jusufovic, Emir Hodzic and Alma Halilcevic. Role of Renal Anemia in the Functional, Morphological and Autoimmune Thyroid Disorders in Patients on Chronic Hemodialysis. *MED ARH 2011; 65(4): 228-232.*

27- Benjamin Schairer, ViktoriaJungreithmayr, Mario Schuster, Thomas Reiter , HaraldHerkner, AloisGessl, *et al.* Effect of Thyroid Hormones on Kidney Function in Patients after Kidney Transplantation. *Scientific Reports (2020) 10:2156 https://doi.org/10.1038/s41598-020-59178-x*

28- Iglesias , J . J . and Diez , P. . Thyroid dysfunction and kidney disease . *European J. Endocrinol. 2009,106 : 503 – 515* .

29- Malyszko , J . S ., Pawlak , K . and Mysliwiec , M . . Thyroid function endothelium and inflammation in hemodialyzed patients possible relations . *J . Renal Nutrit . 2007, 17: 30-37.*

30- Juliana SoaresSevero, Jennifer Beatriz Silva Morais, TaynáhEmannuelle Coelho de Freitas, Ana Letícia Pereira Andrade, Mayara Monte Feitosa, Larissa Cristina Fontenelle et al. The Role of Zinc in Thyroid Hormones Metabolism. *Int J VitamNutr Res (2019), 1–9 https://doi.org/10.1024/0300-9831/a000262.*

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 5286 - 5300
Received 16 February 2021; Accepted 08 March 2021.

31- Rodrigo E., Defrancisco M., Escallada R., Ruiz C., fresned F., Pienera C. Measurement of renal function in pre ESRD patients kidney. *Int 2002; 8:11-17.*
32- Shamsidin S., Derrish S., Abdullahi H. and Fekri A. Creatinin, Blood Urea nitrogen and thyroid hormone levels before and after hemodialysis . *East Mid. Hel. J. 2006: 12(1-2):231-5*
33- Ian H. de Boer and Kristina M. Utzschneider. The kidney's role in systemic metabolism—still much to learn. *Nephrol Dial Transplant (2017) 32: 588–590 doi: 10.1093/ndt/gfx027.*
34- Zoccali C. , Tripepi G. , Cutrupi S. , Pizzini P. and Mallamaci F. (2005). Low triiodothyronine: a new facet of inflammation in end-stage renal disease. *Am.J. Society of Nephrology 2005;16: 2789–2795.*
35- Yi Chen , Wen Zhang, Ningjian Wang , Yuying Wang, Chiyu Wang, Heng Wan and Yingli Lu. Thyroid Parameters and Kidney Disorder in Type 2 Diabetes: Results from the metal Study. *Journal of Diabetes ResearchVolume 2020, Article ID 4798947, 11 pages https://doi.org/10.1155/2020/4798947.*
36- Maria L. Mace , Klaus Olgaard and EwaLewin. New Aspects of the Kidney in the Regulation of Fibroblast Growth Factor 23 (FGF23) and Mineral Homeostasis. *Int. J. Mol. Sci. 2020, 21, 8810; doi:10.3390/ijms21228810.*
37- ObeaguEmmanueIfeanyi and ObeaguGetrudeUzoma. Erythropoietin and Kidney Diseases: *A Review. J. Biol. Chem. Research. Vol. 33, No. 2: 760-792, 2016.*
38- Mojdehkar B., Lutzky B., Strum B. and Goldenberg H. *Am. J. soc.Nephrd. 2005; 15(6): 1648-1655.*
39- Ryan Zarychanski and Donald S. Houston. Anemia of chronic disease: A harmful disorder or an adaptive, beneficial response?. *CMAJ • August 12, 2008 • 179(4)*
40- Yasir A.H. Hakim, A. A. Abbas, Adil Khalil and Hameeda Ibrahim Ahmed Mustafa. The Effect of Hemodialysis on Hemoglobin Concentration, Platelets count and White Blood Cells Count in End Stage Renal Failure. *International Journal of Medical Research & Health Sciences, 2016, 5, 5:22-35.*
41- Dillmann , W. H . The thyroid in cecil textbook of medicine . edited by bennett . *J . C. Plum, F ., 1996; p : 1227 – 1245.*
42- Hussain, M. S., Hamid, N. M., Al-Ani, M. Q., Muden, B. K., Hamad-Allah, M. J., Sweed, O. H., &Sabbar, S. S. (n.d.). Hematological Changes in Blood of Smokers of Cigarettes and Nargyle. In Indian Journal of Forensic Medicine & Toxicology (Vol. 14, Issue 2).
43- John T. Daugirdas and Angelito A. Bernardo. Hemodialysis effect on platelet count and function and hemodialysis-associated thrombocytopenia. *Kidney International (2012) 82, 147–157.*