Study some biochemical parameters in pregnant women with hypertension

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Abstract
This study includes a comparison among some important biochemical changes in the hypertensive pregnant women and normotensive pregnant women during different periods of pregnancy. Blood samples were collected from 60 hypertensive pregnant and 30 normotensive pregnant (control group; G3) from different departments of AL-Diwaniyah hospital in Iraq. The hypertensive pregnant women were divided into two groups according to the trimester of pregnancy, G1 refers (the first twelve weeks) and G2 refers (twenty eight weeks) of pregnancy. Serum was analyzed for alkaline phosphatase (ALP), Total protein, Total cholesterol and serum calcium. The results showed significant differences (p<0.05) in serum ALP activity between hypertensive pregnant during the first trimester (16±2.1 K.A.U/100 ml) and (8±0.3 K.A.U/100 ml). While the hypertensive women during the third trimester was showed (30±5.5 K.A.U/100 ml) a significant increase (P<0.05) compared to the other two groups. It was also found that non-significant differences (p<0.05) in the serum total protein activity between hypertensive pregnant women (G1, 7.3±1.2 gm/dl) and (G2, 7.0±1.3 gm/dl) than control group (G3). It was showed significant differences (p<0.05) in the serum total cholesterol between (G1, 186±22 gm/dl), (G2, 218±11.5 mg/dl) and (G3, control group, 150±11.3 mg/dl). The with G3 (2.2±0.5 mmol/l) as a control. Whereas, there were non-significant differences between G1 (3.5±0.7 mmol/l) compared with G2 (2.4±0.6 mmol/l) evaluation of calcium level also expressed significant differences in G1 (3.5±0.7 mmol/l) compared with G2 (2.4±0.6 mmol/l).

1. Introduction
Blood pressure (BP) is the "pressure of circulating blood on the walls of blood vessels". Used without additional requirement, the "blood pressure" is usually mentions to the pressure in big arteries of the systemic circulation. High blood pressure is usually does not reason any symptoms.[1] Blood pressure (BP) is typically expressed in the terms of the systolic pressure" (maximum during one heart beat) "over diastolic pressure (minimum in among two heart beats) and can be measure in millimeters of mercury (mmHg), above the surrounding atmospheric pressure. [1]. Long-term high blood pressure, is a major danger reason for "coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease", and dementia.[2,3]

High blood pressure is confidential as the either primary high blood pressure or secondary high blood pressure.[4] the about 90–95% of cases are, definite as primary high blood pressure owing to genetic factors and nonspecific lifestyle.[4][5] Lifestyle factors that growth the danger for hypertensive such as excess salt in the diet, and increase the body weight,, the smoking, and alcohol use.[6] The residual 5–10% of cases are considered as the secondary of high blood pressure, owing to the identifiable cause, for example "chronic kidney diseases, and the endocrine disorder, a narrowing of the kidney arteries, or the use of birth control pills.[4]
Blood pressure is communicated by the two measurements of the diastolic pressures and systolic, which are the maximum and the minimum pressures, correspondingly.[6] For maximum adults, normal blood pressure at break is within the range of 100 to 130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic.[7] High blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg, for the greatest adults[4][7].

Different numbers apply to children, ambulatory blood pressure is monitoring over a 24-hour period appears more precise than office-based blood pressure (BP) measurement[8].

Hypertensive disease of the pregnancy, also recognized as a motherly hypertensive complaint, is a group of diseases that includes gestational hypertension, preeclampsia, and chronic hypertension[9]. Maternal hypertensive grievances happened in around 20.7 million women in 2013.[10] In addition, almost 10% of pregnancies globally are complicated by the hypertensive diseases.[11] Around 8% to 13% of pregnancies in the United States hypertensive disease of pregnancy affect.[12]

Preeclampsia is a major reason of preterm birth and an early marker for the future metabolic disease and cardiovascular. Whereas preterm delivery is related with the instant neonatal morbidity and have been linked to metabolic diseases and distant cardiovascular in the original born[13]. This bleak clinical picture and its big economic burden have been known for periods motionless, even in the current millennium the hypertensive disorders of pregnancy women remain between the greatest substitutes areas and one of the lowermost recipient of research funds likened with other of the diseases in the terms of the incapacity attuned life years[14]. This dearth of the research progress is a major factor and underscoring decades of the controversies that surrounded of the organization, analysis, and the management of the hypertensive illness of the pregnancy women[15]. Pregnancy is the hemodynamic ally considered and reduced peripheral vascular resistance and an increased cardiac output due to a number of physiological variations relate to morphological and biochemical mechanisms at the level of the vessels of arterial resistance [16,17]. The calcium homoeostasis in the pregnancy women have extensively been studied in both hypertensive pregnancies and normal[18,19].

Though virtually all metabolic studies show as decline in total serum the calcium level through the sequence of normal as well as hypertensive pregnancy. Disagreement motionless exists as to the variations in serum calcium ionized and parathyroid hormone[20]. This study is aim to determine some biochemical markers among hypertension in pregnancy and normnotensive al pregnancy

2. Materials and Methods:-
Blood samples were collected from 60 pregnancy suffers from blood pressure and 30 normal pregnancy (control group) aged (20-40) years during 25 days. The subjects were divided into three groups: *G1 (the first twelve weeks), patients n=30,*G2 (twenty eight weeks to term), patients n=30,*G3 (the normotensive pregnant) control group n=30

3. Blood sample collection:-
About 5ml of venous were obtained the cubital veins which were gently transferred into a clean dry "plain of tubes' plastic". They were allowed to a clot at 37°C for 15 mins before centrifugations at 3000rpm for 15 minutes after being sure that the serum did not show hemolysis. The clear serum amount was transferred to a clean plastic tube by micro pipette for the estimation concentration of S_ALP, S_total protein, S_cholesterol, and S_c Calcium.

Measurement of BP
"Blood pressure is frequently checked by the putting a wide band was called a cuff around your upper arm and the air is pumped into the cuff and the blood pressure is measured as the level air is let out of the cuff.[22]"
*The activity of alkaline phosphatase was measured spectrophotometric ally at 510 nm using kits supplied by bio Meraux [21,22].Calcium level were estimated using colorimetric method using o-cresolphateleine complex compound ,at alkaline pH[23,24].The concentration of cholesterol was measured spectrophotometer(type company more ---details about the instrument) at 500 nm using kits supplied by company Randox [25]. The concentration of protein was measured spectrophotometric ally at 546nm using kits supplied by company Randox[27].

Statistical analysis:-
By using SPSS 23 . Student test (t-test) was used for the quantitative data.. The lowest level of significance was when the probability (p<0.05).

4. Result and Discussion:-

Alkaline phosphate activity (ALP)
Table (1A) shows the activity of ALP in the hypertensive pregnant women (first twelve weeks) and in controls .The levels of ALP were observed to be 16±2.1K.A.U/100ml in the hypertensive pregnant women (first twelve weeks) and 8±0.3 K.A.U/ml in the controls . There was a significant alteration in ALP levels in the G1 group compared with the control group(G3) figure1.

Table 1 A.(Blood pressure),the activity of ALP ,and total protein in the hypertensive pregnant women(the first twelve weeks) and normotensive pregnant women as a(control group).

| No | Bp     | ALP (K.A.U/100ml) Mean ±S.D | T test | Total protein gm/dl Mean ±SD | T test |
|-----|--------|----------------------------|--------|-------------------------------|--------|
| G1  | 30     | 16±2.1                     | p<0.05 | 7.3±1.2                       | P>0.05 |
| G3  | 30     | 8±0.3                      |        | 7.1±1.3                       |        |

B: Activity of Total cholesterol, Ca^{2+} concentration in the hypertensive pregnant women (the first twelve weeks) and normotensive pregnant women (control group).

| No | Total cholesterol mg/dl Mean ±S.D | T test | Ca^{2+}mmol/dl Mean ±S.D | T test |
|-----|----------------------------------|--------|--------------------------|--------|
| G1  | 30 | 186±22 | p<0.05 | 3.5±0.5 | p<0.05 |
| G3  | 30 | 150±11.3 |        | 2.2±0.2 |        |
Figure 1. The activity of the enzyme ALP in the hypertensive pregnant women and control group. There was a significant alteration in ALP levels in the G1 group compared with the control group (G3) (G1, 16±2.1, G2, 30±5.5, G3, 8±0.3)

Table 2 A. Bp Activity of ALP, and total protein in the hypertensive pregnant women (at twenty eight week to term) and normotensive pregnant women as a (control group).

|       | No | BP       | ALP K.A.U mean±S.D | T test | Total protein gm/dl mean±S.D | T test |
|-------|----|----------|--------------------|--------|----------------------------|--------|
| G2    | 30 | 159/100  | 30±5.5             | P<0.05 | 7.0±1.3                    | P>0.05 |
| G3    | 30 | 115/75   | 8±0.3              |        | 7.1±1.3                    |        |

B: Activity of Total cholesterol, Ca^{2+} in the hypertensive pregnant women (twenty eight week to term) and normotensive pregnant women as a (control group).

|       | No | Total cholesterol Mg/dl | T test | Ca^{2+} mg/dl | T test |
|-------|----|--------------------------|--------|---------------|--------|
| G2    | 30 | 218±11.5                 | P<0.05 | 2.4±0.6       | P>0.05 |
| G3    | 30 | 150±11.3                 |        | 2.2±0.5       |        |
Table 3 A. Bp activity of ALP, and total protein values in the hypertensive pregnant women (The first twelve weeks) and hypertensive pregnant women at (twenty eight weeks).

| No | Bp        | ALP (K.A.U) | T test | Total protein gm/dl | T test |
|----|-----------|-------------|--------|---------------------|--------|
| G1 | 30        | 148/95      | 16±2.1 | P<0.05              | 7.3±1.2 | P>0.05 |
| G2 | 30        | 159/100     | 8±0.3  |                     | 7±1.3  |

B: The concentration of Total cholesterol, Ca^{2+} measurements and in the hypertensive pregnant women (The first twelve weeks) and normotensive pregnant women (at twenty eight week).

| No | Total cholesterol mg/dl | T test | Ca^{2+} mmol/dl | T test |
|----|-------------------------|--------|-----------------|--------|
| G1 | 30                      | 186±22 | P<0.05          | 3.5±0.7 | P<0.05 |
| G2 | 30                      | 218±11.5 |         | 2.4±0.6 |

The levels of serum ALP were significantly higher (P 0.05) in the hypertensive pregnant women (twenty eight week to term (30±5.5) K.A.U/100ml compared with the control group (8±0.3K.A.U/100ml) table2A, figure1 and the first trimester group (16±2.1 K.A.U/100ml) table3A, figure1 .The cut of fatty liver of pregnancy, intra hepatic, ruptured liver hematoma ,cholestasis of pregnancy were other of infrequent but the simple complications was related with mortality and marked maternal morbidity [28].The serum of ALP is found in to be significantly high is such women lengthwise with the other liver of markers such as ALT ,AST, prothrombintini etc, so, the steady work up the liver damage may show to the bean sensible step to decrease and prevent the liver complications in women with hypertensive disorder of pregnancy. Hypertensive disorders of the pregnancy are usually associated with the decrease in the renal meaning owing to damage done by the hypertension and the extensive spread endothelial dysfunction .The glomeruli undergo construction a variations with the pronounced endothelial cell swelling vacuolization and the plasma of hypertrophy or ganelles known as "glomerular endotheliosis". The net belonging is reduced renal blood flow [29,30].

Total cholesterol(TC)

The concentration of TC in the hypertensive in the first twelve week and controls group are (186±22 mg/dl) and (150±11.3 mg/dl) respectively as shown in table1B. It was also found that women in the second group have value (218±11.5mg/dl) as shown in Table2B. There was significant difference p 0.05 in the levels of TC among control and hypertension in the first group and third trimester which was showed in Table3B, and Figure2. In hypertension group, the total cholesterol concentrations were displayed a significant different compared with normotensive group .In the pregnant women and pregnancy period , the all levels of lipid fractions increase in parallel to the increase in the pregnant women ages .This increase is described to be the secondary to the increase in levels of estrogen and progesterone during the pregnancy period . This increase of lipids concentrations in hypertensive
pregnant women compared with the normotensive pregnant women, the human placental lactogenic (HPL) is an important protein for fetus growth and which is concealed from the placenta. High density lipid (HDL) increase the plasma free fatty acid via, increasing lipolysis and increase the glucose uptake and the inhibits, the gluconeogenesis. It also have an insulogenic result that is related to fetal synthesis of protein [31].

**Figure 2.** The activity of the total cholesterol in the hypertensive pregnant women and control group (G1, 186±22; G2, 218±11.5; G3, 150±11.3)

**Total protein activity**

The activity of the total protein was measured in the hypertensive during different the periods of pregnancy. Table 1A, Figure 3, was demonstrated that the levels of total protein in the hypertensive of the first trimester G1 and in controls G3. The concentration of the serum of total protein in the hypertensive pregnant women of the first trimester (7.3±1.2 gm/dl) did not show a significantly different (P 0.05) compared with to the control group (7.1±1.3 gm/dl). Total proteins levels was shown a significantly different in the third trimester group (7.0±3.1 gm/dl) than the control group (P 0.05), Table 2A and Figure 3. This observation is similar to that of Belfield [22].
Figure 3: The activity of the total protein in the hypertensive pregnant women and control group (G1, 7.3±1.2; G2, 7±1.3; G3, 7.1±1.3)

**Total calcium activity**

The activity of total calcium was measured in the hypertensive during period of pregnancy, Table 1B, Figure 4. The serum calcium level in the hypertensive pregnant women of the first trimester (3.5±0.7 mmol/l) did not demonstrate significant different (P 0.05) compared to the control group (2.2±0.5 mmol/l). Level serum of calcium ion was in the third trimester group (2.4±0.2 mmol/l) than control group (2.2±0.1 mmol/l) P 0.05, Table 2B and figure 4. Levels serum of calcium ion were in the hypertensive of the first trimester (3.5±0.7 mmol/l) than in the third trimester group (2.4±0.2 mmol/l) P 0.05, Table 3B, as shown, Figure 4. Serum calcium level differences were statistically significant in the three group groups (P 0.05), most studies on this issue confirm that higher level of serum calcium in pregnancy can lead to the decreased frequency of the preeclampsia[32], the result of calcium ion by prescribing variant types of the calcium comprised diets in pregnant women. It was noted that such a dietary routine can be current in reducing blood pressure and hypertensive disorders in pregnancy[33].
Figure 4: The activity of the Ca^{2+} in the hypertensive pregnant women and control group (G1, 3.5±0.7; G2, 2.4±0.6; G3, 2.2±0.5)

5. Conclusion
Our data indicate that some biochemical parameters in stages pregnant women with hypertension and ALP and cholesterol levels increase in different stages in hypertensive women, while the total protein and calcium ion, we shown no significant different in stages pregnant women with hypertension

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