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The Affects of Pregnancy and Age on the Physiological Changes in Blood Parameters and Weight in the First Trimester of Primigravida Women.

A Thesis submitted to the Faculty of Science, Al-Tahady University in partial fulfillment of the requirements for the degree of Master of Science in Biology (Zoology).

By

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بسم الله الرحمن الرحيم

(علم الإنسن ما لم يعلم)

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سورة العلق الآية (5)

الإهداء

العلماء شمس يستفاء بها

إلى روح د. مصباح العروي الطاهرة

أهدي ثمرة جهده ... واثر بصمته ......

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Introduction

Maternal adaptation to a conception starts before implantation. As pregnancy progresses, each system and every organ is affected but to different degrees and at different rates. Similarly recovery from these changes is not uniform. Some systems return to their non-pregnant state within days, others may take six months and a few do not revert to their nulliparous condition. The quality and degree of adaptation varies from person to person, being affected both by genetic factors in mother and in her fetus, and by environmental differences between individuals. If adaptation is not wholly physiological the mother or her attendants may interpret the changes in the mother as pathology. The proper management of pregnancy requires knowledge of the whole range of normality and of the consequences of physiological adaptation (Chamberlain 1995).

There are marked physiological changes in the composition of blood in healthy pregnancy. This study includes the blood changes of the first trimester of pregnancy in primigravida women. Gravidity is the most important determent of the mother's response to pregnancy. Inadequate physiological changes are most likely in the first pregnancy. First pregnancy is less physiological than subsequent one's, which is suggested by the reduced mean birth weight, increased rate of complications and raised preinatal mortality in primigravida. (James *et al.*, 1998).

Since the blood is developed from embryonic mesenchymal cells, the blood is considered a special type of connective tissue. Blood consists of cells and fluid (about five liters in an adult human female) within the closed circulatory system that flow in unidirectional movement, propelled mainly be the rhythmic contractions of the heart. It is made up of two parts the blood cells, and plasma. The blood cells are erythrocytes or red blood cells, platelets and leukocytes or white blood cells (Ghallab 1997).

It is well known that first trimester of pregnancy lies between (0) to (13) weeks. Although women experience some physical changes during this time, but there is no similarity between two pregnancy women in these changes (Karen and Mbbs 2001). Physiological and anatomical alteration develop in many organ systems during the course of pregnancy. Early changes are due, in part, to the metabolic demands brought on by the fetus, placenta and uterus, in parts, to the increasing levels of pregnancy hormones, particularly those of progesterone and estrogen. (Christopher et al., 1998).

The circulatory system undergoes marked changes during pregnancy. These include increased blood flow to the uterus, increased cardiac output, increased blood volume and decreased total peripheral resistance (Gibbs 1981). The expansion in total bloods volume about 45%. involves an increase in both plasma volume and red cell mass. This increase in total blood volume to combat the hazard of hemorrhage at delivery. There is a dramatic increase in plasma volume (50%) and an increase in red cell mass (18-25) These changes cause a dilution decrease in hemoglobin concentration called the (physiological anemia of pregnancy) (Chamberlain 1995).

The world health organization WHO (2000) recommends that the hemoglobin concentration should not fall below 11g/dL at any time during pregnancy. Anemia in pregnancy is defined as hemoglobin concentration below 11g/dl during pregnancy. The iron requirements during pregnancy as follows: first trimester 0.8mg daily, second trimester (4 - 5) mg daily, and third trimester 6-mg daily. The total iron requirement for normal pregnancy in average size women is approximately 1000mg to maintain iron balance (Joseph and Mercola 2001).

Pathological anemia of pregnancy is mainly due to iron deficiency. Over 90% of anemia are due to red cell iron deficiency associated with depleted iron stores and deficient intake (De leeuw et al., 1966). The folate deficiency is often a minor interacting component and is associated with iron deficiency due to the fact that they are both associated with a poor diet (Svanberg, 1975 and Fenton et al., 1977).

In pregnant women not taking iron, red cell volume shows an increase from 82-85-to 87-88 FL, whereas in, those supplemented with iron, with or without folic acid, it rises to 88-90 FL (Taylor and Lind 1976, and Chanarin et al., 1977). A possible advantage of these large red cells would be better transport of oxygen and carbon dioxide. The increased size of the red cells could be due in part to the fall in plasma oncotic pressure leading to increased red cell uptake of water. It could also be due to release of relatively immature cells from the bone marrow, which tend to be large. The bone marrow is hyperplastic with an increase in immature erythroid precursors (De leeuw *et.al.*, 1966).

The erythrocyte sedimentation rate (E.S.R) rises early in pregnancy due to the increase in fibrinogen and other physiological changes, and (100mm) in an hour is not uncommon in early pregnancy (Wallenberg and Vankessel 1978).

The white blood cells (W.B.C) do not show a uniform pattern of changes during pregnancy. They increase at the first trimester and continue to rise until (30) weeks, after which their count remains steady (Poloshuk et. al., 1970).

The Glucose passes freely across the placenta so its increased availability in the maternal circulation is of direct benefit to the fetus. As pregnancy progresses, insulin sensitivity changes. In the first half it increases and in the second half it decreases. In the first half fasting glucose level are lower, and the increase in blood glucose following a carbohydrate load is not so great as in the non pregnant (Lind et al., 1973). This increased sensitivity stimulates glycogen synthesis and storage, deposition of fat and transport of amino acids in to cell. It also produces a fall in glycosylated hemoglobin, glycosylation takes some weeks, to occur until early in the middle trimester but then is maintained until term. So pregnancy is potentially diabetogenic (Lind and Cheyne, 1979)

Vegetarian Hindu Indians have lower serum hpl and higher serum glucose than Europeans (Hutchinson et al., 1982). Well nourished Africa women have the same increase in insulin sensitivity as Europeans early in pregnancy but do not develop insulin resistance in the second half of pregnancy (Fraser et al., 1981).

Weight gain in pregnancy is usually in the range of 10-12 kg. It comprises increases in maternal body water, fat and other tissues but at terum 40% of the weight gained is in the fetus amniotic fluid, placenta and uterus (Hytten 1980). The rate of weight gain is fairly steady throughout. There many be a fall in weight during the first trimester because of nausea and vomiting, but this is usually made up quickly from about (15) weeks (Whitfied 1995).

Since there has been no study reganding the physiological changes in early pregnancy in primigravida in our province Sirte in Libya, it was considered useful to under take this study.

Aims of Study

This research aims at: -

1- Determining the main alteration, which occur in blood and its elements, iron, R.B.C, Hb%, p.c.v glucose and E.S.R during early pregnancy in primigravida with comparison with non-pregnant women.

2- Determining the mean age of primigravida in Sirte.

3-Determining the mean weight of primigravida in the first trimester in Sirte and comparing it with non-pregnant women.

4-To find out the criteria to improve the health of primigravida in early pregnancy, which will improve the pregnancy outcome.

Literature Review

The physiological, biochemical and anatomical changes that occur during pregnancy are extensive and may be systemic or local. It is well known that the blood is the most reliable indicator of body health condition of pregnant women and her embryo. The influence of maternal blood condition on fetuses has been of considerable interest. especially since the introduction of sensitive blood picture study techniques (James et al., 1994).

It has been suggested teleological alteration during pregnancy to maintain a healthy environment for fetus without compromising the mother's health. Thus, in most instances, physiologic activity is increased in pregnant women, to adapt for extra demand (Decherny and Pernoll 1994).

Perhaps the most striking maternal physiologic altemation occurring during pregnancy is the increase in blood volume, an outstanding features of pregnancy. The increase in maternal blood volume of bout 30-40 percent (e.g. form 4liters to 5 liters) (Gibbs 1981).

Blood volume, increases progressively from 6 to 8 weeks of gestation and reaches a maximum at approximately (32-34) weeks with little change thereafter. Most of the added volume of blood is accounted for by an increased capacity of the uterine, breast, renal, striated muscle and cutaneous vascular systems, with no evidence of circulatory overload in the healthy pregnant women. (Christopher et al., 1998).

The magnitude of the increase in blood volume varies according to size of women, the number of pregnancies she has had, the number of infants she had delivered. and whether there are one or multiple fetuses (Chesley 1972).

Plasma volume begins to expand within few weeks after conception and there is an increase of about 20% by (15) weeks (Arias 1992). For some time it was standard teaching that it reaches plateau between the 28^{th} and 35^{th} week of pregnancy when a small decline in plasma volume might occur towards term. However, dilution measurements have shown a steady increase to a sustained plateau between (30) and (40) weeks, representing an average increment of about 1250ml, i.e. 50%. (Pirani et al., 1973). There is considerable individual variation in these changes with attendance to larger increase in plasma volume in the older mutiparous women, when the fetus is large or especially in multiple pregnancies, while unusually small increases may occur in association with placental insufficiency fetal growth restriction or possible with folate deficiency (Hibbard 1964).

Wintrobe (1990). and (Williams 1990) have reported that the erythropoiesis is (30 to 35%) is greater in pregnant women than in non-pregnant women. In addition, (Chesley et al., 1965) found that the human placenta lactogen stimulates erythropoiesis in the mouse. The hormone is responsible for the increased red cell mass in the pregnant women. So the bone marrow becomes hyperplastic during pregnancy and there is gradual linear increase in the total red cell mass. The increase in red cell mass is augmented if supplemental iron is taken (Taylor et al., 1979), found normal increase of about {180 ml} (14%) without supplementary iron and 350 ml (28%) with iron and folic acid supplementary. Normally, the red blood cells have the same hemoglobin concentration and the same survival time as in the non-Pregnancy State (Pritchard and Adams 1960a).

The prepherential expansion of plasma volume compared with red cell mass causes progressive heamodilution which may reduce the hemoglobin concentration to 11gm/dl and heamatocrite to 37% which is called physiological anemia of pregnancy. It is well known that the average increase in blood volume at term is 30-40% Hypervolemia begins in the first trimester, increases rapidly in second trimester, and plateaus at about the 30th week of pregnancy (Gibbs 1981 and Glapp 1988).

The increase of blood volume is needed for extra blood flow to the uterus extra metabolic needs of the fetus, and increased perfusion of other organs, especially the kidneys. There is also extra blood to flow to skin, allowing dissipation of heat caused by the increased metabolic rate (Lind et al., 1997).

In addition, (Madkour 1994, and Reece et al., 1989) concluded that blood flow to kidney, uterus and breasts increases during gestation. The amount of increase depends on the stage of gestation. The increase in uterine blood flow is probably about 500ml/min, but may be as high as 700-800ml/min. The uterus and placenta have increase blood flow because their vascular resistance is lower than that of the systemic circulation. Renal blood flow increases approximately 400ml/min above non-pregnancy levels, and blood flow to the breasts increased approximately 200ml. Blood flow to the skin also increased, particularly in the feet and hand. Heat due to increases maternal metabolism and heat produced by the fetus are dissipated via increased blood flow to the skin (Tygart et al., 1986).

Anemia is a condition characterized either by decreased number of erythrocytes in the blood or by decreased concentration of hemoglobin. Whatever the cause, anemia decreases the blood's ability to transport oxygen to tissues, because tissues can not function at optimum level without adequate supplies of oxygen (Spence and Mason 1983).

It is well known (WHO, 1987,2000) that a primigravida is considered anemic if hemoglobin level falls below 11.0 gm/dL. Anemia is the commonest medical disorder to occur in pregnant women, it's incidence being particularly high in many underdeveloped tropical countries where it remains major contributing factor to maternal morbidity and mortality and it is also associated with high preinatal mortality rates. In developed countries, however, with better living standard and nutrition, usually smaller and better-spaced families and the widespread use of oral contraception, which usually reduces incidence of anemia. Anemia occurs when erythropoiesis is impaired, or when the marrow is unable to make up for an abnormal loss or destruction of red blood cells by hemorrhage or haemolysis. Anemia in pregnancy is usually due to defective erythropoiesis, most often from iron or folate deficiency or both together, although nutritional vitamin B_{12} deficiency may be important in some tropical countries (Arias 1992).

There is evidence indicating that preclapmsia and eclampsia occur more frequently in-patients with iron-deficiency or megaloblastic anemia. (Gatenby and Lillie 1966), than in non-anemic gravies. However, the relationship between anemia and preclampsia or eclamsia has not been clearified. It is possible that preeclampsia interferes with the gastrointestinal absorption of food, or causes hepatorenal dyes function thereby affecting the metabolism of folic acid or the production of erythropoiesis. Another maternal complication seemingly associated with maternal anemia is abruptio placenta. Studies in this area are contradictory. Some authors like (Herbert 1985) has found high correlation between folic acid deficiency and abruption, but others (Whalley et al., 1996). Studies have shown that anemia during pregnancy is associated with stillbirths and neonatal deaths. The incidence of stillbirths and preterm births decreases significantly when iron is given to anemic mothers before they reach (30) weeks of gestation. What constitutes the mechanism behind the association of fetal problems and maternal anemia is purely speculative. The association between anemia and preterm delivery is poor (Klebanoff et al., 1989). The expansion of plasma volume and the utilization by the fetus of substances necessary for the building of hemoglobin molecules patient will become markedly anemic, and patients with severe anemia will become symptomatic by the end of the second trimester (Chanarin 1977).

The additional demand for iron during pregnancy was well summarized by (Branes 1976). The fetus and placenta (or each fetus and placenta in multiple pregnancy) require about 500mg of iron, and similar amount is needed for the red cell increment. An average postpartum blood loss and lactation for six months each account for about 180mg. From this total of 1360mg may be subtracted about 350mg saved as a result of amenorrhoea to give an actual extra demand for about 1000mg. This is unlikely to be provided entirely by absorption of dietary iron, but it may be mobilized from full iron stores (about 1000mg). The requirements of a multiple pregnancy will outstrip the supply from even initially replete iron stores. Thus, it is the state of these stores that largely determines whether or not a pregnant women becomes anemic. The smaller her stores the earlier the anemia occurs and, without treatment, the more severe it becomes by term. Iron deficiency anemia at the start of pregnancy signifies already empty iron stores. Inadequate storage may reflect dietary lack, chronic menorrhagia or intestinal bleeding due to hemorrhoids or hookworm infestation, or simply an insufficient interval for replenishment between pregnancies. During pregnancy, the situation may be exacerbated by poor utilization of iron by the marrow when there is severe or chronic infection or possibly by impaired absorption (Whitifield 1995).

Iron deficiency anemia is most common form of anemia enchanted during pregnancy. The incidence is higher in poorly nourished women of low socioeconomic standard. (Joseph and Mercola 2001), but (AL-Akija 1996), found that multiparty effect on the development of anemia is well known other factors like illiteracy, high parity and those becoming pregnant below the age of (20) years may cause anemia as well.

Baintan (1973), and (Ghallab 1997) Concluded that the anemia may be caused by loss of blood (hemorrhage), in sufficient production of red cells by the bone marrow, production of red blood cells with insufficient hemoglobin, usually related to iron deficiency in the diet, or accelerated blood cell destruction.

It has also been found that %56 of pregnant women are anemic depending on geographic and sociocromic group. In this respect, poor antenatal care, poor dietary habits and multiparty are the major factors of iron deficiency anemia among pregnant women in sirte (Houchimi 1998).

It is well known (WHO 1996), that the factors associated with low hemoglobin are poor nutritional status of mother, history of previous abortions, shorter-birth intervals, poor medical history of mother e.g.-presence of diabetes, heart, chest or kidney disease and incidence of multiple pregnancy.

It has been suggest by (AL-Akija 1996), that anemia of pregnancy in primigravida women was found as non significant when compared with multigravida women. The prevalence was found to be affected by age, gestational age, education, body mass and topography of the Asir region.

Reece, *et.al.* (1989), found that the dietary iron supplements are usually given to pregnant women to maintain a hemoglobin concentration not less than 10.5mg/dL. The trace elements zinc, copper and iron are known to be essential for life, and health and reproduction and have vital role in fetal growth and development.

In addition, the serum iron concentration decreased significantly throughout the third trimester. This could be due to increase in both plasma volume and fetal needs. It is well known that the mature human fetus contains 375mg of iron this accumulates at the rate of about 0.4mg a day in the first two-thirds of pregnancy, and about (0.6) mg/day during the last third (Lee 1993).

In addition, (Svanbery 1975) demonstrated that the extent to which iron deficiency affects maternal and neonatal health is uncertain. Existing data suggest that maternal iron deficiency anemia may be associated with adverse out comes, including preterm delivery and higher maternal mortality. The 90% of the iron deficiency anemia are due to red cell, iron deficiency, associated with depleted iron deficient intake. The two main modalities of treating iron deficiency anemia are oral or parental iron. Ferrous hausmann (iron dextrin) is the latest iron preparation, which can be used for intravenous parenteral administration as a total does infusion (Singh et al., 1998).

It has been suggest that the pregnancy constitute major drain on the iron reserves of women of childbearing age. Each pregnancy results in an average loss to the mother of 680mg of iron. The equivalent of 1300ml of blood, and an additional 450mg of iron must be available to meet the needs of an expanded blood volume during pregnancy (James et al., 1994).

It is well known, that folic acid, together with iron has assumed a central role in the nutrition of pregnancy. The more active a tissue is in reproduction and growth, the more dependent it will be on the efficient turnover and supply of folate co-enzymes. Bone marrow and epithelial linings are therefore particularly at risk (Hallbery et al., 1966). Requirements for folate are increased in pregnancy to meet the needs of the fetus, placenta, uterine hypertrophy and the expanded maternal red cell mass. The placenta transports folate activity to the fetus even in the face of maternal deficiency, but maternal folate metabolism is altered early in pregnancy like many other maternal functions, before fetal demands act directly. Folic acid, like hemoglobin and iron, must be among the most studied substances in maternal blood, yet there are comparatively few serial data available. It is generally agreed, however, that plasma folate decreases as pregnancy advances, reaching roughly half non-pregnancy values by term. Plasma clearance of folate by the kidneys is more than doubled as early as the 8^{th} week of gestation and while some ascribe importance to urinary losses, it is unlikely that increased renal clearance results in a major drain of maternal resources. (Chanarin 1985).

The cause of megaloblastic anemia in pregnancy is nearly always folate deficiency. Vitamin B_{12} is only rarely implicated. A survey of reports from the UK over the past two decades suggests an incidence ranging from 0.2 to 5.0%, but a considerably great number of women have megaloblastic changes in their marrow which are not suspected on examination of the peripheral blood only (Sheldon et al., 1985). The incidence of megaloblastic anemia in other parts of the world is considerably greater and is thought to reflect the nutritional standards of the population. While there is much controversy at the moment about the requirement for folate, particularly during pregnancy, the (W.H.O) recommendations for daily intake are as high as 800ug in the prenatal period and 600ug during lactation. Food folates are only partially available. The amount of folate supplied in the diet is difficult to quantify. In the UK, folate intake in food stuffs ranges between 129 to 300ug, while the content of 24-h food collections in various studies in Sweden and Canada averaged 200ug (range70-600ug). Dietary folate deficiency megaloblastic anemia probably occur in about one-third of all pregnant women in the world, despite the fact that folate is found in nearly all natural foods. This is because folate is rapidly destroyed by cooking, especially in finely divided foods such as beans and rice (Herbert 1985). While green vegetables lose up to90% of their vitamin content during the first few minutes of boiling. The effects of dietary inadequacy may be further amplified by frequent childbirth, and several reports have shown a markedly increased incidence of megaloblastic anemia in multiple pregnancy (Chanarin 1985).

Both folate and vitamin B_{12} deficiencies may mask an iron deficiency. Red cell synthesis inhibited during the vitamin deficiency, available iron is under used, and increased saturation of transferrin occurs. As soon as therapy with folate or B_{12} is initiated, red cell synthesis starts again, use of iron is maximal, and iron deficiency becomes apparent (Arias 1992).

The circulating red cell mass increases by (20-30%) during pregnancy, the maximum rise occurs in those who take oral iron from the non-pregnancy by (240 ml) in those who do not take iron supplements and by (400ml) in those they do (Pritchard et al., 1984). In women expecting twins the increase is of about (680ml) and in triplets (900ml). The rise is due to an increase in the number and size of red cells, which have normal (120-day) lifespan. (Pritchard and Adams 1960b).

Since plasma volume increases faster earlier in pregnancy and faster than red blood cell volume, the hematocrit falls until the end of second trimester, when the increase in red blood cells, is synchronized with the plasma volume increase. The hematocrit then stabilizes or may increase slightly near term (Hyteen and Chmberlain 1981).

It is well known by (Spetz 1964), if the red mass did not change, a dilution anemia would result. Indeed reduction in hematocrit and hemoglobin concentration is evident by the 6 to 8 week of normal pregnancy.

It has been concluded by (Parker et al., 1993), Pritchard *et al.*, (1984) that values usually stabilize with the hematocrit at (32-34) and the hemoglobin at

11g/dl. Red cells remain normochromic and normocytic, unless deficiency of iron or folate supervenes. When the hemoglobin concentration less than 10.4 mg/dL- a true reduction in red cell mass is likely present, because of variations in the hyperemia.

Studies by (Decherney and Pernoll 1994) indicate impairment in polymorphonuclear leukocyte chemotaxis that appears to be a cell a ssociated defect. Pregnant women in the third trimester demonstrated a decrease in polymorphonuclear leukocyte adherence. These results may explain an increased incidence of infection in pregnant women. The total blood leukocyte count increases during normal pregnancy from perpregnancy level of (4300-4500ml) to (5000-12000ml) in the last trimester, although counts as high as (16.000 ml) have been observed in the last trimester. Counts as high as (25.000-30000ml) has noted in normal patients.

It is well known that the lymphocyte and monocyte numbers stay essentially the same throughout pregnancy, polymophonuclear leukocytes are the primary contributors to the increase (Leush and Futornyi 1990).

Pregnancy is potentially diabetogenic. Diabetes mellitus may be aggravated by pregnancy and clinical diabetes may appear in some women only during pregnancy. Consequently, considerable attention has been focused on the metabolism of carbohydrates in pregnant women. In healthy women, the fasting plasma glucose concentration falls somewhat during pregnancy. The effect of normal pregnancy on insulin level is disputed. Increased fasting levels of insulin have been reported by some investigators (Simpson et al., 1983) while others have found them to be unchanged. Taylor and Lind (1976) or even lower during pregnancy (Tyson et al., 1976).

Bleicher et al., (1964) presented the concept that the lower fasting glucose levels and the higher concentration of plasma free fatty acids found normally in pregnant women result from a state of accelerated starvation brought about by the host-parasite relation between mother and conspectus during pregnancy. There are safeguards that spare utilization of glucose by maternal tissues while allowing parasitization of glucose and gluconeogenic precursors by the fetus to continue. The placenta is known to synthesize and secrete a growth hormone. Like substance, placental lactogen. This hormone promotes lipolysis, bringing about an increase in plasma free fatty acids, and thereby provides alternative fuel substrates for the mother. The ability of placental lactogen to oppose the action of insulin results in increased maternal requirements for insulin during pregnancy. However, it should be pointed out that otherwise quite normal pregnancy outcomes have been achieved in the absence of detectable amounts of this potent hormone.

Estrogens, progesterone, and cortisol may also contribute to the diabetogenic predisposition apparent in pregnancy. Progesterone given to monkeys was shown by (Beck 1969) to produce a marked increase in the plasma insulin response to intravenous glucose similar to that noted in human pregnancy. (Packham et al., 1993) found that the potent synthetic estrogen, mestranol (ethinyl estradi -1-3 methyl ether) caused not only an increased plasma insulin response to intravenous glucose but also a decreased sensitivity to the hypoglycemic action of exogenous insulin. Only the subjects with limited ability to increase insulin production demonstrated decreased glucose tolerance after mestranol treatment, presumably because of failure to compensate for insulin resistance increase appreciably during pregnancy, but much of the increase represents hormone bound transcortin.

Insulinliasle activity has been found in the human placenta. It seems unlikely; however, that accelerated degradation of insulin by placental insulinase contributes appreciably to the degradation of radiolabeled insulin in vivo but does not appear to differ among pregnant and non-pregnant women (Bunt and Davidson 1974).

The role of glucagon during pregnant is not totally defined. (Kuhl et al., 1982) measured glucagon and insulin responses to a standard glucose stimulus in the same women late in normal pregnancy and again postpartum. The insulin response to glucose infusion was increased 3.8 times in late pregnancy. The glucagon suppression was similar in late pregnancy and the puerperium. These results are consistent with the view that B-cell sensitivity to a glucose challenge is significantly increased in normal pregnant women, but the α-cell sensitivity to a glucose stimulus is unaltered during pregnancy.

The frequent occurrence of glucosuria in healthy women during pregnancy results from increased glomerular filtration and less effective renal tubular absorption than in the non-pregnant state (Davison and Hytten 1975).

As a result of the physiologic changes of pregnancy, the normal fasting blood sugar is 65±9mg/dl. The mean non-fasting blood sugar level is 80± 10mg/dl. Postprandial elevations normally never exceed 140mg/dl (Lind and Cheyne 1979).

Most of the increase in weight that occurs during pregnancy, is attributable to the uterus and its contents, the breasts, and increases in blood volume and extra vascular extra cellular fluid. A smaller fraction of the increased weight is the result of metabolic alterations that result in an increase in cellular water and deposition of new fat and protein, so-called maternal reserves. Chesley, (1944), reported that the average total weight gain in pregnancy was (11kg). During the first trimester, the average gain was (1kg), compared to about to (5kg) during each of the last two trimester. There may be fall in weight during the first trimester because of the nausea and vomiting, but is usually made up quickly from about 15 week.

Material and method

This study was done in Sirte. Sirte province lies in middle of beloved Libya. Sirte gulf from the north, Eljofra province from the south, Benwaleed province from the western-south. Misurata province from the west and Ejdabia province from the east border. Its location is of strategic importance for it constitutes ajunction point for the roads that connect the Southern provinces with the eastern and western ones.

The area of Sirte is about (69) thousand square kilometers. The coast of this province extends to about 450 kilometers, and the province area represents (39%) of that of the whole great Jamahirya

The climate in Sirte, the mediterranean climate, which is warm rain in winter and hot in summer. Population of Sirte is. males: 70376, females: 66588, total: 138964-/population is 2,6% that of the great Jamahirirya.

It was prospective study in which (200) women, (100) samples of primigravida women in the first trimester period, and (100) samples of non-pregnant women (nulliparous), included in the study from antenatal clinic community health center and out patient in Ibn Sina Teaching Hospital Sirte.

Samples taken for hemoglobin, packed cell volume (P.C.V), red blood cell (R.B.C), white blood cell (W.B.C), erythrocyte sedimentation rate (E.S.R), iron level, and blood sugar and of patient was estimated and age, weihgt was confirmed.

Examination of blood samples: -

After taken blood sample from pregnant women during the first trimester period and from non-pregnant women. The blood samples were tested for R.B.C. W.B.C. P.C.V. Hb%. iron level. and sugar in the laboratory of Ibn-Sina Teaching Hospital (ISTH).

A-Test of R.B.C, W.B.C, P.C.V, and Hb%:

By using the Coulter model -T-series: - The Coulter used for counting red blood cell, white blood cell, hemoglobin level and packed cell volume.

Normal value of R.B.C in adult female from (3.9-5.6) million/mL, W.B.C from (4000-10000)/mL. P.C.V from (36-47%), and hemoglobin from (12-16) mg/dL.

Material used in the test:

1-Syringe (different sizes)
2-Plastic tubes (for sampling).
3-Complete blood count tube (CBC).
4-Blood mixer equipage.
5-Lyses two. Aston, acetone.
6-Clearing agent coulter cleans.

B-Test of erythrocyte sedimentation rate (E.S.R):

The material used in the test, a special capillary tubes. The normal value of erythrocyte sedimentation rate in adult female less than (25mm) in first hour

C -Test of iron: -

After taken the sample the calorimetric method was used.

Principle reaction: -

Ferric iron dissociated from its carrier protein, transferrin, in an acid medium and simultaneously reduced to the ferrous form. This one complexes with the chromogen, sensitive iron indicator, to produce ablue chromophore which absorbs maximally at 595nm.

PROCEDURE	Reagent Blenk	Sample	Standard
Buffer (Dimethyl Sulphoxide)	1ml	1ml	1ml
Reductant (Ascorbic acid)	0.1ml	0.1ml	0.1ml
Iron-free water	0.1ml	-	-
Standard	-	-	0.1ml
Sample	-	0.5ml	-

Mix. read initial absorbency of the sample and of standard against the reagent blend than, wavelength 595nm.

Chromogen	0.1ml	0.1ml	0.1ml

Mix incubates for 5min at 20-25°C. Read final absorbency against reagent blank. Subtract initial assurance form final absorbency to give ? A for sample and standard.

Calculation:-concentration of samples= ? Asample/? Astandard ×concentration of standard.

Normal values in serum (70-170ug/dl).

Using in the test of clinical system 700 (spectrophotometer)(BECMAN) mead in (U.S.A).

D-Test of glucose: -

After taken the sample, the calorimetric method was used. The glucose is oxidized by glucose-oxidize to gluconate and hydro peroxide, according to the following equation: -

Determination of glucose in serum or plasma. By enzymatic calorimetric methods

Principle reaction: -

$$glucose + O_2 + 2H_2O \xrightarrow{glucose oxidase} gluconate + H_2O_2$$

$$2H_2O_2 + Phenole + 4 - Amino - antipyrine \xrightarrow{peroxidase}$$
$$redeinonimin + 4H_2O$$

Procedure: -
Wavelength: Hg546 (492-550nm).
Temperature (25,30,37)°C.

	Blank	Standard	Sample
Warking regent	1ml	1ml	1ml
Standard	-	10μl	-
Sample	-	-	10μl

Mix well, measure of absorbency at (15min at 37°C or 30min at 25°C).
Within 60 min, read absorbency of sample and standard.

Calculation of results: ΔSample/ΔStandard × standard concentration
Standard concentration = 100m\dl or 5.55mmol/l
Normal value (80-120mg\dl) (fasting).
Using in the test of clinical system 700 (spectrophotometer)(BECMAN) mead in (U.S.A).

Questioner of study the physiological change some blood parameters during the first trimester of primiagarvid

1-Name...
2-Date...
3-Age...
4-Blood group...
5-Education level..
6-Weight..
7-Blood pressure..
8-Gestational age...
9-Fasting blood sugar...
10-Iron level...
11-Hemoglobin level..
12-R.B.C count..
13-W.B.C count...
14-P.C.V volume..
15-E.S.R ....
16-History of chronic disease..
17- Family history of congenital or hereditary disease.........................
18-Others..

RESULT

In (table 1) and (fig.1), the age distribution we found that the most common age groups are from (21-25) and (26-30). There is significant number of primigravida below the age of 20 years, which is risky group regarding the obstetrical complication and the inadequate physiological changes, leading to maternal and perinatal complication.

In (table2) and (fig.2) When comparing weight of primigravida with non-pregnant women, found to be non-statistically significant (t=1.27), (p=0.025) The mean in the pregnancy (M±SE = 71.08 ± 0.52) while non-pregnancy (M±SE = 64.17 ± 0.10), we found the mean weight of pregnant women more than the non-pregnant women. The weight is increased during the first trimester, weight gain is a normal part of pregnancy and is needed for baby's health. A woman who does not gain enough weight is more likely to have a low birth weight baby. The type and amount of food eaten affects the health and weight gain and baby. The amount of weight gained varies from woman to women and pregnancy to pregnancy. By the third month patent will have gained 3 to 4 pound. This weight gain is from increased breast size baby, blood for the placenta, some fat and extra fluid to support the growing baby.

The (table 3) and (fig. 3) shows the values of means, stander error, and t-test of R.B.C for the samples of primigravida and non-pregnant women. In study we found that it is statistically not significant (t = 0.006)(P = 0.025) (Fig4) shown the (M±SE = $3.6 \times 10^6 \pm 0.015 \times 10^9$) in primignavid, (M±SE = $3.5 \times 10^6 \pm 0.011 \times 10^9$) in non-pregnant women. The red blood cell in pregnant women more than non-pregnant women. The expansion in red cell mass is proportionally more than that in plasma volume during the first trimester, and reaches maximum at approximately (32 – 34) weeks, with little change thereafter. Incidence of primigravida with R.B.C count less than 3.5×10^6/cmm was 31%, while non-pregnant women 45%.

Table 1: Age distribution of primigravida and non-pregnant women.

Age	Primigravida	Non-pregnancy
20<	28	14
21-25	34	39
26-30	28	37
31-35	10	10
35>	0	0

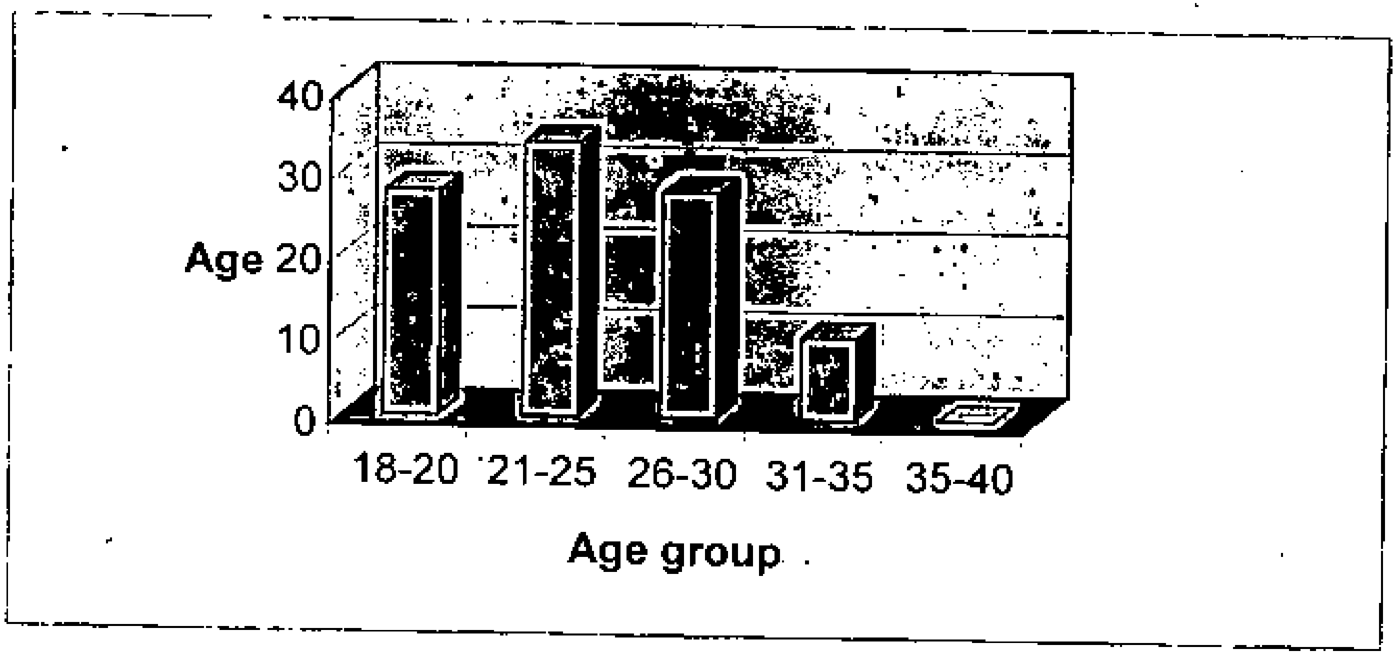

Fig. 1: The age distribution of primigravida

Table 2: The values of means, standard error, and t-test of weight (kgm) for the samples of primigravida and non-pregnant women.

Weight / Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means(M ± SE)	71.08 ± 0.52	64.17 ± 0.10		
Standard deviation(SD)	52.27	10.5	198	1.27
Size(N)	100	100		

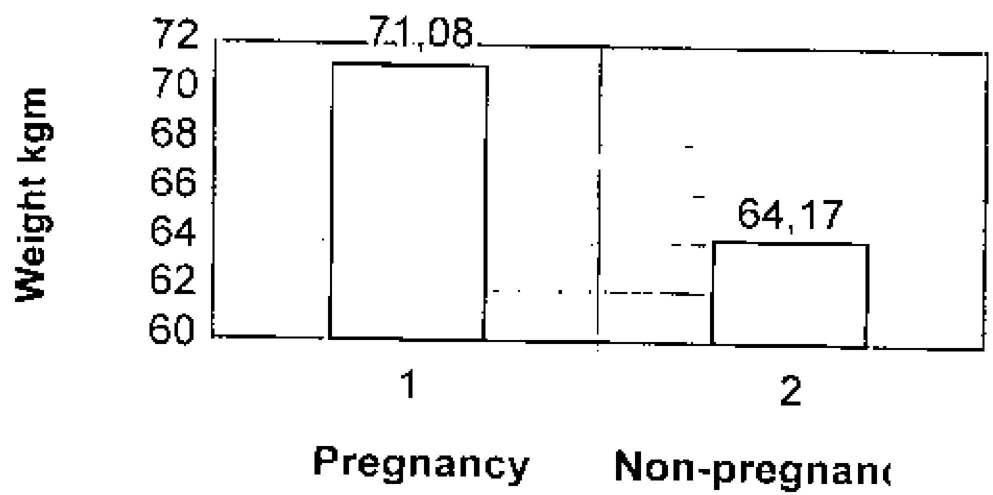

Fig. 2: The values of means of weight in the primigravida and non-pregnant women.

Table 3: The values of the means, standard error, and t-test of R.B.Cs,million/mL for the samples of primigravida and non-pregnant women.

R.B.C Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means(M ± SE)	$3.6 \times 10^6 \pm 0.015 \times 10^9$	$3.5 \times 10^6 \pm 0.011 \times 10^9$		
Standard deviation(SD)	1.5×10^9	1.1×10^9	198	.006
Size(N)	100	100		

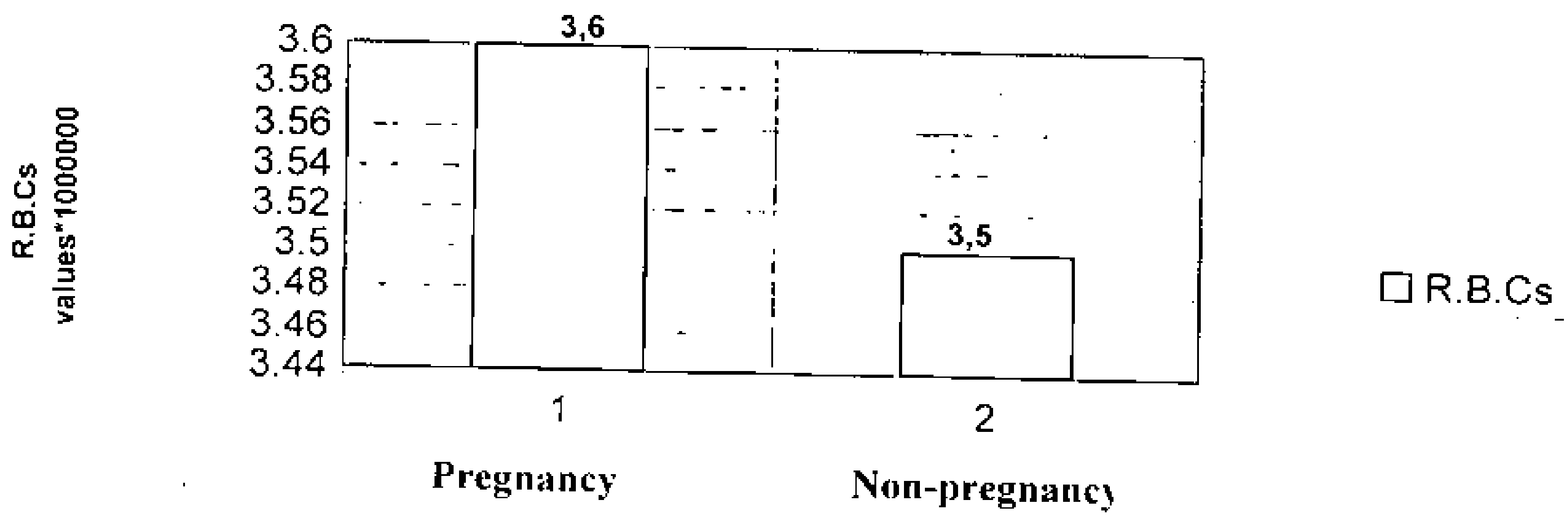

Fig. 3: The values of means of R.B.Cs in primigravida and non-pregnant women.

In (table 4) and (fig.4) shows the values of means, stander error, and t-test of Hb mg/dL for the samples of primigravida and non-pregnant women. Comparing hemoglobin in primigravida women to the non-pregnant women found to be statistically significant ($t = 2.81$, $P = 0.025$) in favor with pregnant women. The mean in primigravida (M±SE = 11.65 ± 0.0096) and (M±SE = 11.2 ± 0.0103) in non-pregnant women. This result can be explained by the adequate storage of iron good health of primigravida in our area, and also because dilutional anemia is more apparent in second and third trimester of pregnancy.

In table (5) and fig (5) which show the effect of age on anemia we found that anemia is very common (around 67.8%, 19 out at 28) in primigravida in the age group at 18-20 years, comparing with 22% of the total samples. Incidence of anemia (Hbmg/dL<11mg/dL) was 22% in primigravida. While non-pregnancy women was 29%.

In table (6) and fig (6) shows the values of means, stander error, and t-test of iron for the samples of primigravida and non-pregnant women. From the table we found the results to be statistically significant. The mean iron of primignavda (M±SE = 99.2 ± 0.104), but the mean iron of non-pregnant woman (M±SE = 90.13 ± 0.141). The normal iron in the female from (70 – 170mg/dL. The statistically significant was in favor with the pregnant women.

Pregnancy is a period associated with increased iron requirements due to demands for lean tissue synthesis and red blood cell formation. So we expect lower iron level in the primigravida but in our study it was higher than non-pregnant, which prove that our primigravida are in status of good iron move which was proved also in previous table. Iron level less than 70mg/dL was not found in our sample of primigravjda patients.

Table 4: The values of means, standard error, and t-test of hemoglobin (Hb mg/dL) for sample of primigravida and non-pregnant women.

Hb% Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means(M ± SE)	11.65 ± 0.009	11.25 ± 0.010		
Standard deviation(SD)	0.96	1.03	198	2.81**
Size(N)	100	100		

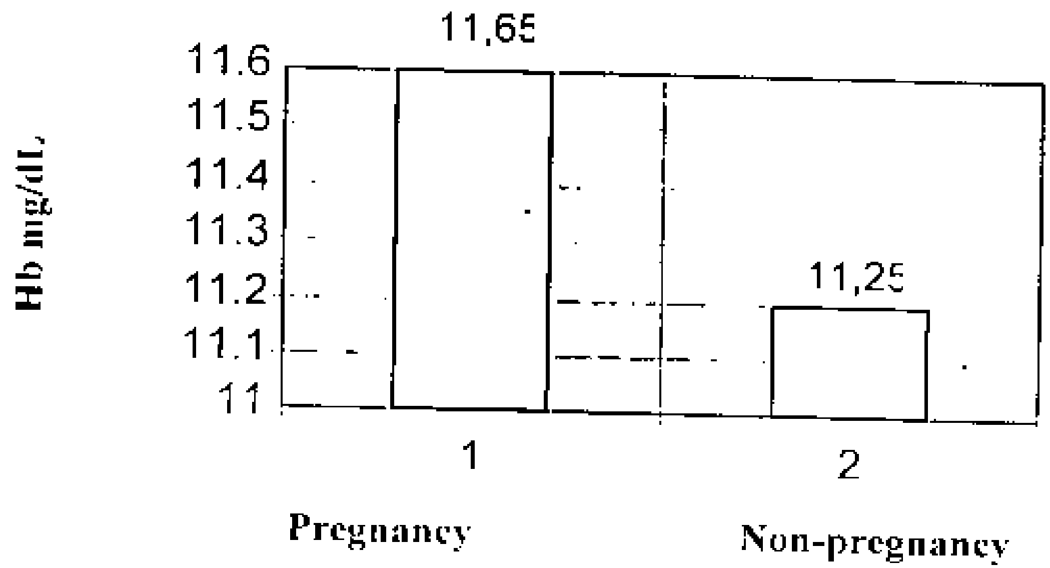

Fig. 4: The values of the means of Hbmg/dL in primigravida and non-pregnant women sample.

Table 5: The anemia in the primigravida at group (18-20)

Hemoglobin (Hb mg/dL)	<11	>11	Total
Total	9	19	28
Percentage(%)	32.2%	67.8%	100%

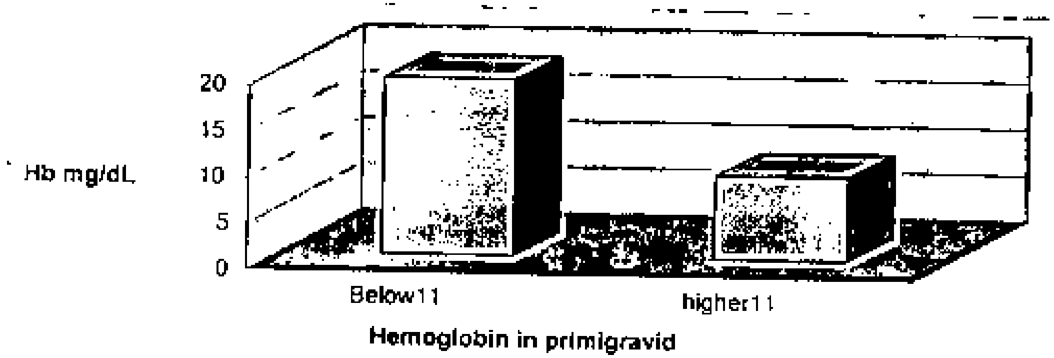

Fig. 5: The anemia in primigravida at group from (18-20)

Table 6: The values of means, standard error, and t-test of iron mg/dL for the sample of pregnancy and non-pregnancy

Iron Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means($M \pm SE$)	99.2 ± 0.104	90.13 ± 0.141		
Standard deviation (SD)	10.4	14.13	198	5.15**
Size(N)	100	100		

*It is value is significant at $\alpha = 0.01$.

**It is value is significant at $\alpha = 0.05$.

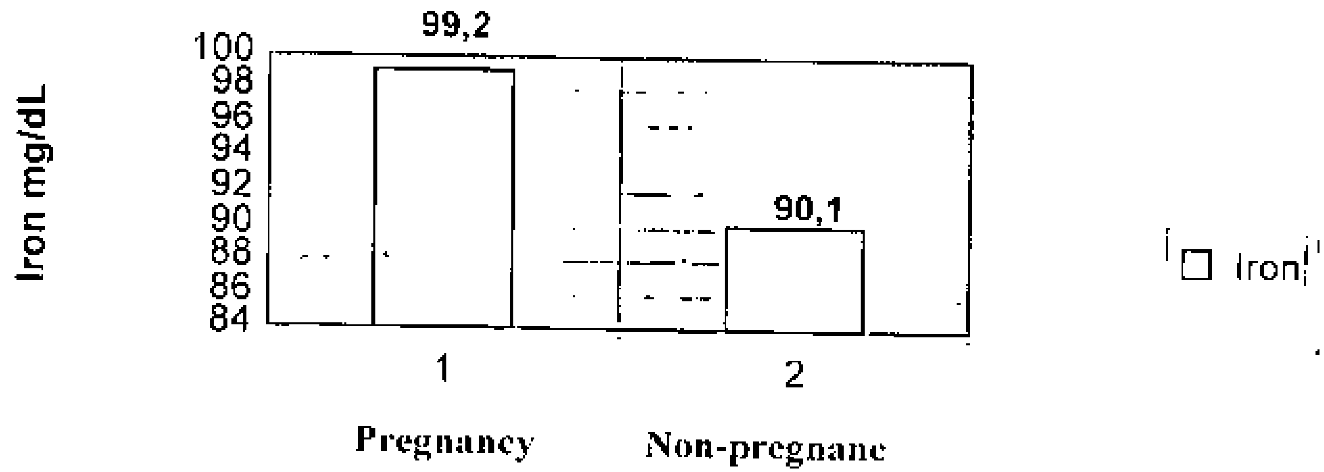

Fig. 6: The values of the means of ironmg/dL of the primigravida and non-pregnant women.

The result in this table (7) and fig. (7) shows the values of means. stander error, and t-test of P.C.V for the samples of primigravida and non-pregnant women. Was statistically significant in favor non-pregnant women (t = 2.67, P = 0.025) during compare P.V.C in pregnant and non-pregnant women. It showed that mean of pregnant (M±SE = 33.8 ± 0.031) and non-pregnant (M±SE = 34.5 ± 0.035).

Since haematocrit physiologically decreases during the first half of pregnancy, we wanted to know whether there is a significant decrease in haematocrit in our sample of primigravida. The volume of packed cell volume in the blood in females 37-47%, the expansion in red cell mass is proportionally less than that of plasma volume during the first trimester leading to a 10% decrease in heamatocrit resulting in hemodilution and a decrease in heamatocrit. In our study it was significantly reduced in primigravida than in non-pregnant women. Incidence of primigravida with P.C.V less than 37% was 86% of patients, while non-pregnant women 81%.

In table (8) and fig. (8) shows the values of means, stander error, and t-test of W.B.C for the samples of primigravida and non-pregnant women. It was found that (W.B.C) increase in pregnant women during first trimester and found to be statistically significant in favor with pregnant women (t = 6.8, P = 0.025). The mean of primigravida (M± SE=8001 ± 9.9) and (M± =6654 ± 18.6) in non-pregnant women.

The result in this table (9) and fig. (9) this shows the values of means, stander error, and t-test of E.S.R for the samples of primigravida and non-pregnant women. Was statistically non-significant (t = 1.6, P= 0.025) during compare E.S.R between primiagravida women and non-pregnant. The mean erythrocyte sedimentation rate in pirimigravida was more than non-pregnant the mean in primigravida (M± SE=43.3±0.20) While in non-pregnant women (M± SE=38±0.21). Incidence of E.S.R more than (25) mm1st hr was in 68% of primigravida while in 65% of non-pregnant women. Since the increase of erythrocyte sedimentation rate during pregnancy occurs because of increased plasma fibrinogen level during pregnancy also it was found that the speed of sedimentation of red cells is accelerated in many diseases.

Table 7: The values of means, standard error, and t-test of P.C.V% test for the samples of pregnancy and non-pregnancy.

P.C.V / Parameters	Pregnancy	Non-pregnancy	Degree of free	(t)
Means(M ± SE)	33.8 ± 0.031	34.58 ± 0.035		
Standard deviation(SD)	3.1	3.5	198	2.67**
Size(N)	100	100		

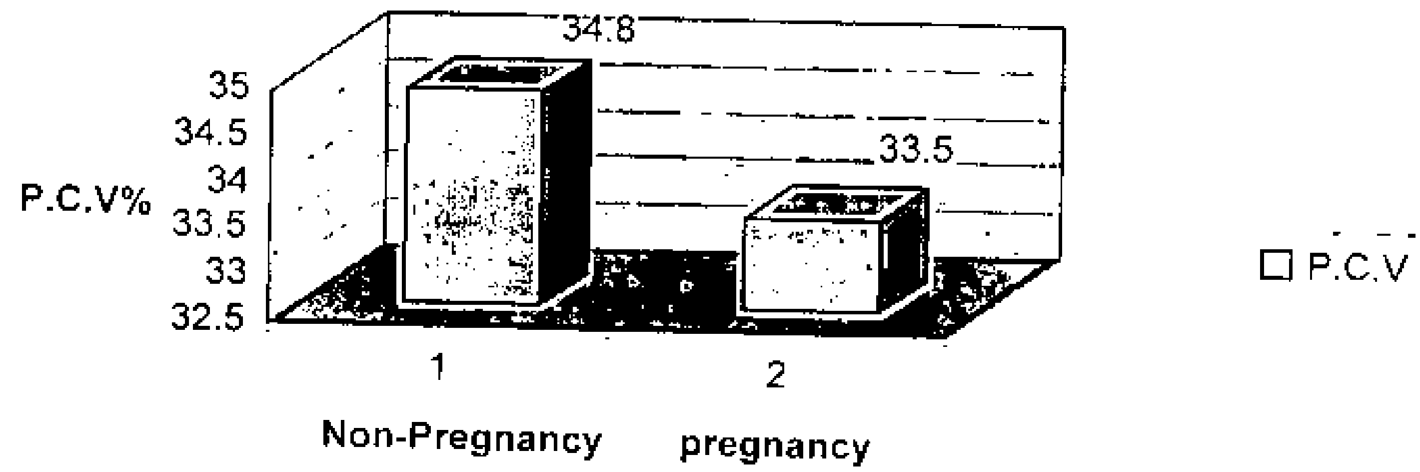
P.C.V%
35
34.5
34
33.5
33
32.5
34.8
33.5
1
2
Non-Pregnancy
pregnancy
P.C.V

Table 8: The values of the means, standard error, and t-test of W.B.Cs/mL test for the samples of primigravida and pregnant women.

W.B.C Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means($M \pm SE$)	8001.5 ± 9.9	6654.5 ± 18.6		
Standard deviation(SD)	992.08	1864.46	198	6.8**
Size(N)	100	100		

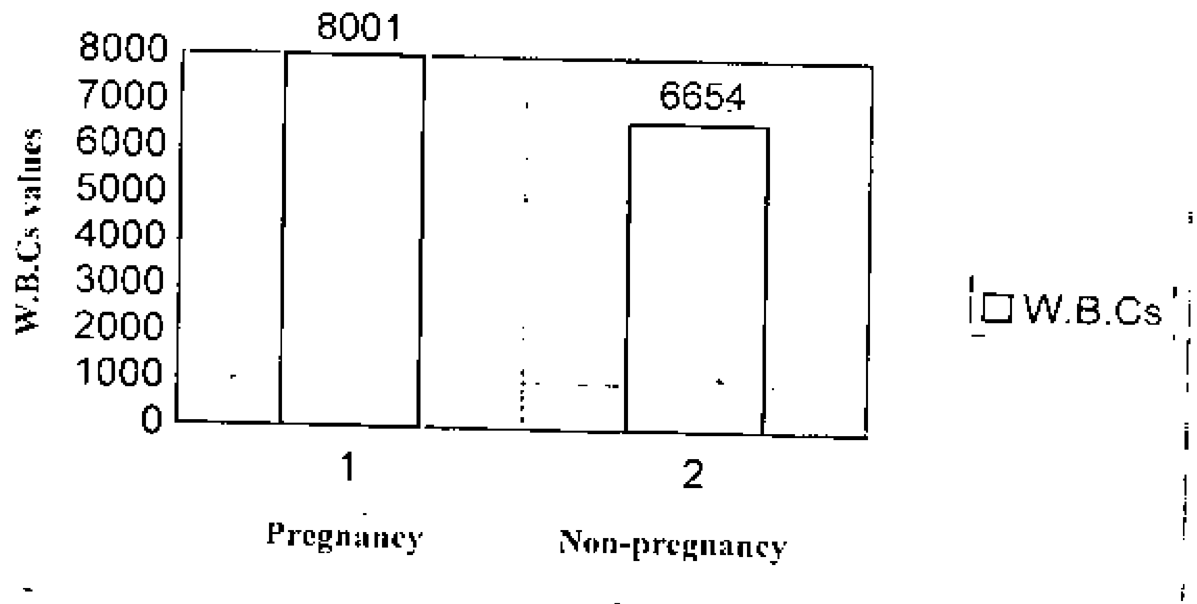

Fig. 8: The values of means of W.B.Cs/mL in the primigravida and non-pregnant women.

Table 9: The values of means, standard error, and t-test of E.S.R mm 1^{st}/hour test for the sample of Primigravida and non-pregnant women.

E.S.R Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means(M) ± SE	43.3 ± 0.20	38.6 ± 0.21		
Standard deviation(SD)	20.06	21.17	198	1.6
Size(N)	100	100		

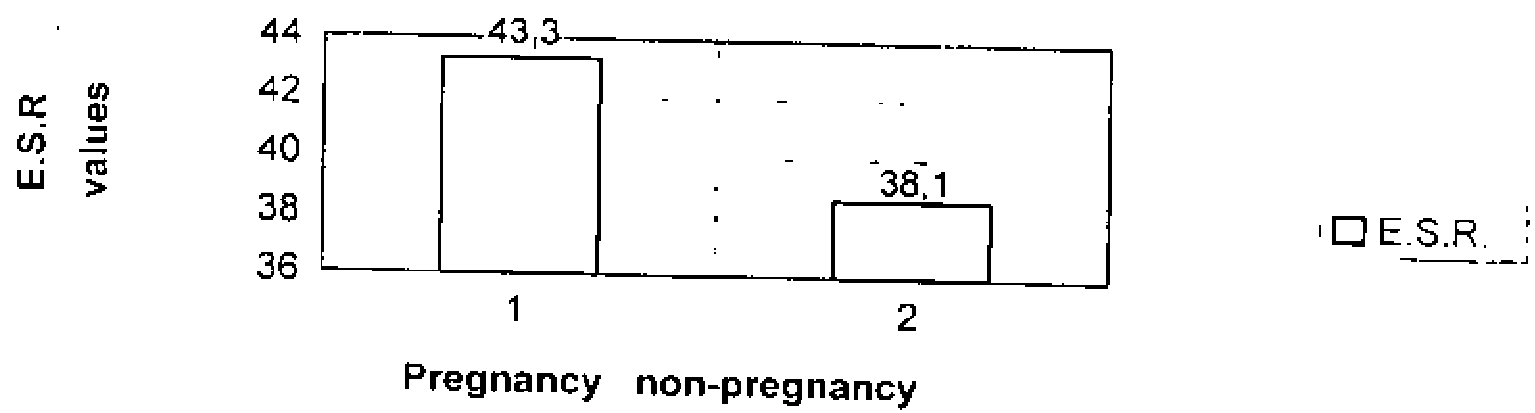

Fig. 9: The values of means of E.S.Rmm 1st/hour in the primigravida and non-pregnant women.

In Table (10) and fig. (10) shows the values of means, stander error, and t-test of F.B.S for the samples of primigravida and non-pregnant women. It was shown that fasting blood sugar is not statistically significant (t = 0.73, P = 0.025) comparing between pregnant and non-pregnant women but found the mean blood sugar in pregnant women more is than non-pregnant. Mean in primigravida (M± SE=84.25 ± 0.11) and (M± SE=83.31 ± 0.10) in non-pregnant. Incidence of primigravida with fasting blood sugar more than 100mg% was 6%, while non-pregnancy women was 2%.

From this table (11) and fig. (11) the blood group in primigrvida in Sirte found to be as fallows: the blood group (O) 54% blood group (A) 25%, blood group (B) 16% and blood group (AB) 5% shown (Fig 11).

Table 10: The values of means, standard error, and t-test of F.B.S mg /dLtest for the sample of primigravida and non-pregnant women.

F.B.S Parameters	Pregnancy	Non-pregnancy	Degree of freedom	(t)
Means(M) ±SE	84.25±0.11	53.13±0.10		
Standard deviation(SD)	11.24	10.17	198	0.73
Size(N)	100	100		

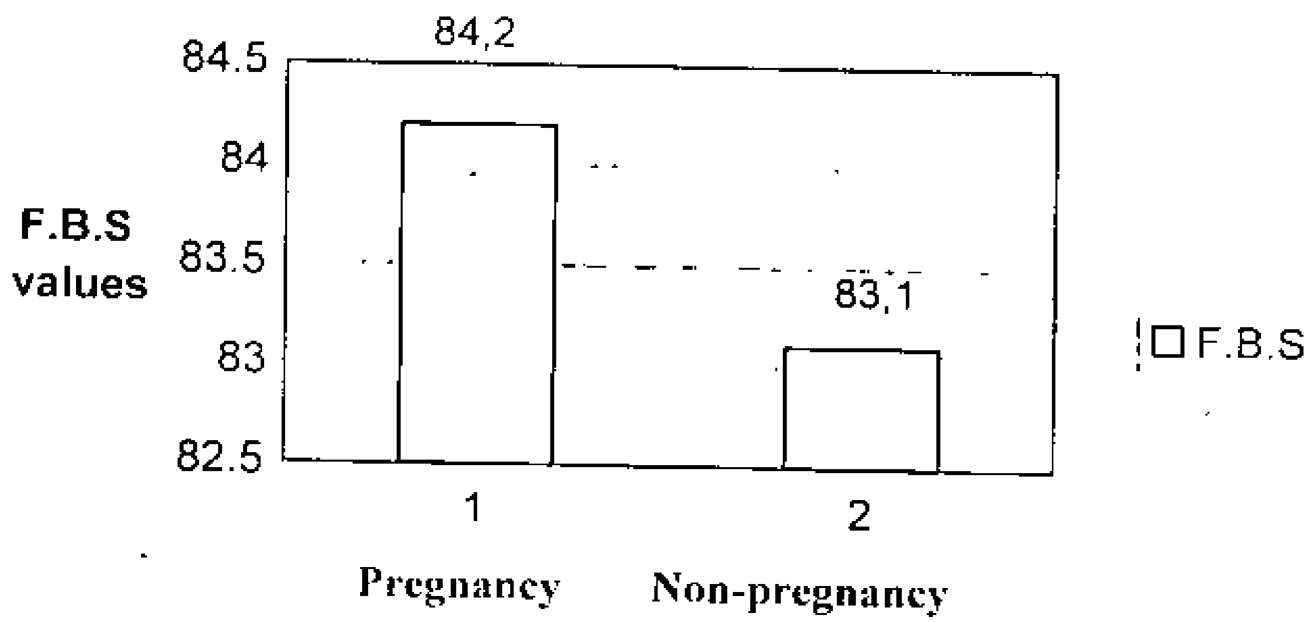

Fig. 10: The values of means of F.B.S mg/dL in the primigravida and non-pregnant women.

Table 11: Type of blood group in pregnant women.

Blood group Total	(O)	(A)	(B)	(AB)	Type
96	53	25	15	3	+
4	1	0	1	2	-
100	54	25	16	5	Total
100%	54%	25%	16%	5%	Percentage

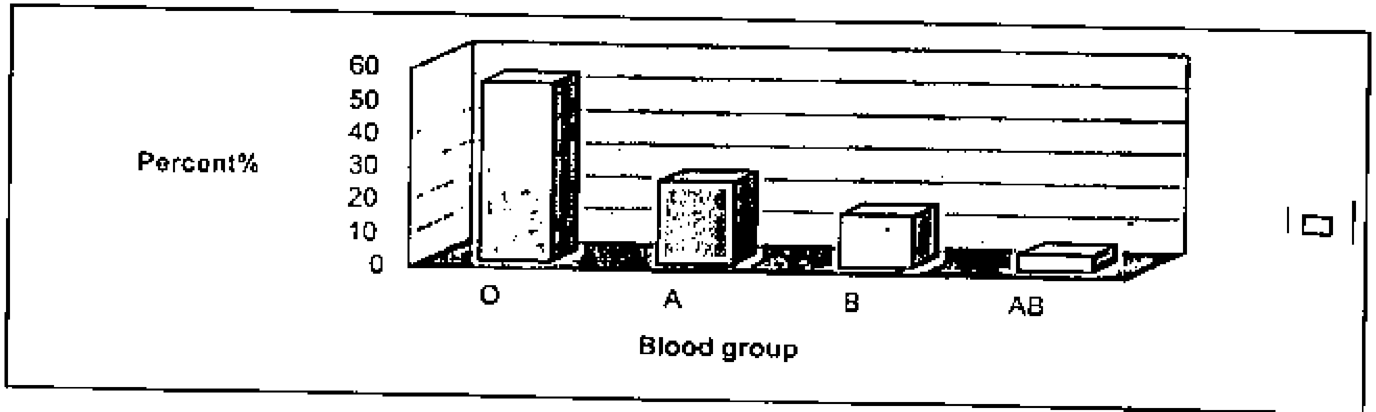

Fig. 11: The values of blood group in primigravida in pregnant women

Discussion

In our study we found from the first table that the most common age groups of primigravida from (21-25) and (26-30) years. There is no consistent evidence that a particular age is ideal for bearing the first pregnancy (Golding, 1990), although child bearing is least hazardous in women aged (20-29) years. The incidence of teenage pregnancy in our study was 28% of cases, which is considered a high percentage compared with other studies worldwide. In Netherlands it was 14 per 1000, where as is Sweden and England and Wales combined they are (35-44) per 1000 respectively and U.S.A it was 96 per 1000 (Bury 1985). Teenage pregnancies are associated with social problems rather than physical or medical problems. In western section, abortion note among adolescent women is quite high, also cigarette smoking, alcohol consumption and illicit drug use are common among pregnant adolescents (Mcanarney 1987), (Hambury et al., 1987) and (Davis et al., 1990). Adolescents who become pregnant are of particular risk of nutritional deficiencies (Mcanarny 1987 and Hardy et al., 1984). Medical complication associated with adolescent pregnancy include anemia, U.T.I, hypertension, perterm labour, and low birth weight and sudden infant death syndrome (Mcanarny 1987 and Babson and Clarke 1983). In our study also we found a high incidence of anemia around 67.8% in teenage primigravida compared with those above 20 years of age.

It has been suggested that competition for nutrients between the fetus and mother could affect pregnancy outcome in young pregnant women by interrupting the normal growth process (Moerman 1982). In our study there was no cases above 35 years of age. In 1958, the Council of the International Federation of *Gynecology* and *Obstetric* recommended that the age of 35 years should be accepted as the international standard for the elderly primigravida (Stein 1985). The proportion of primigravida aged 35 years and over varies from country to country. Advanced maternal age is associated with a number of pregnancy complication including miscarriage, chromosomal abnormalities, twins, uterine fibroids, hypertension disorder, gestational diabetes, prolonged labour, operative delivery, A.P.H, low birth weight, perterm delivery, ante and intra-partum fetal loss and neonatal mortality (Stein 1985, Tuck, Yudkin and Turnbull 1988, Mac-Gillivray 1983 and Spiekerman et al., 1986).

From the table number (2), we found that the mean weigh of pregnant women is more than non-pregnant women, but it was statistically, not significant. The total weight gain of a healthy nulliparous woman eating without restriction is about 12.5 kg (Hytten 1980). In western societies average total weight gain ranges from (10-16) kg (Anonymous 1991). Karen and mabbs (2001) suggested that the average weight in pregnancy is (10 to12) kg. This increase occur mainly gain in the second and third trimester at a rate of 350 – 400 mg/week, weight gain is composed of maternal tissues (breast, fat, blood and uterine tissue), and 5 k of fetus, placenta and amniotic fluid. Of this 11 Kg, 7 Kg are water, 3 Kg fat, and 1Kg protein. In this respect, amount of weight gained varies from woman to woman and pregnancy to pregnancy. The normal lean nulliparous women, who eats to appetite, gains only a little weight during the first trimester (o.65-1.1kg) by 10-weeks of pregnancy (Hytten 1991 and Raaij et al., 1987). There may be even a fall in the weight during the first trimester because of nausea and vomiting, but this is usually made up quickly (Whitifield 1995). For that there was non-statistically significant increase in mean weight of primigravida than non-pregnant women.

There are no uniform definitions for abnormal maternal weight. In this regard subjective criteria for initial body weight have been propagated, values of less than 45kg, have been used to describe underweight women and 85kg and over to describe over weight women. In our study only 6 cases (6%) of primigravida more above 85 kg and no cases was below 45 kg. So the problem of undernutrition is not significant in our society which has a negative effect on birthweight, because underweight women are more likely to give birth of infants who are small for gestational age (Dawes and Grudzinskas 1991, and Kramer 1987 and Spuy et al., 1988). They are also prone to anemia and preterms labor (Kramer 1987). Perinatal mortality in thin women is increased (Naeye 1990 and Barkan and Bracken 1987).

Obese women are more likely to have perinatal complication such as hypertension and gestational diabetes (Drife 1986). Other problems associated with obese women include urinary tract infection, postnatal hemorrhage abnormal presentation, and possible thrombophelebitis (Kliegman and Gross 1985). So obese patients in our study should be screened for these complications and followed regularly during antenatal period.

From the table (3) comparing number of R.B.C in primigravida and non-pregnant women, we found a statistically not significant increase, while the mean number in primigravida is more than non-pregnant, indicating an increase in red cell mass in the first trimester, which is more than the increase in plasma volume resulting in this increase in number in primigravida.

Taylor and Jind (1976), found that there is an average increase in red cell mass by 250 ml in those who do not receive iron supplementation, that means increase by about 18%. This increase starts early in pregnancy, but since plasma volume increase faster than red blood cell mass, so it will result in dilutional decrease in red blood cell count (Chamberlain 1995).

Joseph and mercola (2001) found that the erythrocytes decrease during pregnancy from 4.5-3.7 million/cmm^3. In our study, the results are different, because in our primigravida there is increase in R.B.C count, so R.B.C mass increase in the first trimester in these primigravida, more than the increase in plasma volume.

In table (4) comparing hemoglobin in primigravida and non-pregnant women, we found that the primigravida have a statistically significant higher hemoglobin than non-pregnant women. Plasma volume begins to expand within few weeks after conception and there is an increase of about 20% by 15 weeks (Arias 1992). There is also increase red cell mass as mentioned before. The preferential expansion of plasma volume compared with red cell mass causes progression heamodiultion, which may reduce the hemoglobin concentration to 11 gm/dl (Gibbs 1981), and this hypervolemia begins in the first trimester. (Christopher et al., 1998), found that, the increase in plasma volume (40 – 50%) in relatively greater than that of red cell mass (20 – 30%) resulting in hemodilution and a decrease in hemoglobin concentration, also (Bobak et al., 1989). found that physiological anemia due to the increase in plasma volume more than RBC volume. The total blood volume increases steadily from early pregnancy to reach a maximum of 35 – 45% above the non-pregnant level at 32 weeks (Lund and Donovan, 1967).

Anemia is the commonest medical disorder to occur in pregnancy, but (Al-Akija 1996) suggested that anemia of pregnancy in primigravida was found non significant when compared with multigravida women. The incidence of patients with Hb% less than 11 gm/dL in our study was 22% in primigravida and 29% in non-pregnant women. So, as we concluded before, this result can be explained by the good health of primigravida in our sample of patients and their regular follow up in the antenatal care units. WHO (2000) suggested. that factors that associated with low hemoglobin are poor nutritional status of mother, history of previous poor medical history of the mother e. g. presence of diabetes, heart, chest or kidney disease and multiple pregnancy. While Houchimi, (1998), found the anemia was 54.5% among pregnant women admitted to Ibn-Sina Teaching hospital, but most of his patients were multigravida with poor antenatal care and poor iron supplements

From table (5), we can find the effect of getting pregnant before the age at 20 years. Hb% level less than 11 gm/dl, was found in 67.8% of primagravida less than 20 years of age. This result is comparative with other studies like that done by (Al-Akija 1996) in Asir, because these patients still do not have a complete physical and anatomical development, and we have mentioned before the effect of teenage pregnancy on the mother and baby.

Table number (6) shown the iron level in primigravida and non-pregnant women, and results were statistically significant in favour with the pregnant women. There was no primigravida with iron level less than 70 ug/dl. Iron deficiency anemia is the most common form of anemia seen in pregnancy. and pregnancy constitutes a major drain on the iron reserve of the pregnant women. From our results we can find that primigravida in our society have good iron reserve, but iron requirements are more in the second and third trimester. According to two published estimates, the iron requirements during pregnancy are as follows, 1st trimester 0.8-mg daily. 2nd trimester 4 to 5 mg daily and 3rd trimester 6-mg daily. The total iron requirement for a normal pregnancy in average size women is approximately 1000 mg (Lori and Bastain, 1999 and Joseph and Mercola, 2001).

The average woman body contains about 2200-mg iron. The additional need for pregnancy and delivery averages 1000 mg. This is a large amount of iron to accumulate in a short period of time. Iron absorption increases by about 12th week of gestation, there are also fewer problems with nausea and vomiting at this time so tolerance of an iron supplement will likely be better. (Lee 1993). So we do not expect a significant change of iron level in the first trimester, and we recommend that serum ferritin level will be a better indicator for iron storage in the body than iron level.

Table (7) showed a comparison between the mean of P.C.V in primigravida and non-pregnant women and the result was statistically significant in favor with non-pregnant women. So from this study we found that heamatocrit (P.C.V) physiologically decrease in primigravida in the first trimester. This occurs mostly because plasma volume increases faster than the increase in red blood cell volume, early in pregnancy. (Chamberlain 1995), found that the heamatocrit (p.c.v) fall until the end of the second trimester, when the increase in red blood cells is synchronized with the plasma volume increase and the heamatocrit then stabilizes or may increase slightly at term. Also (Spetz 1964), found a reduction in heamatocrit as early as sixth to eighth week of gestation.

From table (8) we found that the mean W.B.C count during first trimester is statistically significant higher than non-pregnant women. (Poloshuk et al., 1970), found the increase in W.B.C starts in first trimester and cantions to rise until 30 weeks of gestation then remains steady. (Decherny 1994), found a high levels of W.B.C reaching $30000/mm^3$ in a normal pregnancy. (Bobak and Jenson 1989), found that it increase during pregnancy from ($4000-10000/mm^3$ to $9.500-10.500/mm^3$) and up to 16.000/mm3 during labour and the first week of pureperium. But in our study, although the mean W.B.C in primigravida was more than non-pregnant women, there was no primigravida with levels more than $11000/mm^3$ (higher normal level), and it may increase in the second and third trimester.

Table (9) shows the comparison between the mean of (E.S.R) in primigravida and non-pregnant women and it was statistically not significant. But in this study during comparing E.S.R between pregnant and non-pregnant we found that an increase of erythrocyte sedimentation rates during pregnancy. It is well known that there is an increased plasma fibrinogen level, which probably contributes to the increased erythrocyte sedimentation rate seen in pregnancy. Erythrocyte sedimentation rate increases from 12 to 50 mm/hour, (Lund and Donoran 1967). (Wallenbery and Vankessed 1978) found that a 100 mm/hour E.S.R is not uncommon in early pregnancy. Indeed, the addition of fibrinogen to normal plasma leads to a greatly increased sedimentation rate, the addition of other protein fractions to blood also leads to an acceleration of sedimentation, although their effect is less marked than that produced by fibrinogen (Lee, 1993). In our study also primigravida with E.S.R more than 25 mm/hour was seen in 68% of the patients, which is going with these studies.

From table (10), fasting blood sugar was not statistically significant comparing between pregnant and non-pregnant women but the mean blood sugar in the primigravida was more than non-pregnant women. The incidence of primigravida with fasting blood sugar more than 100mmg/dL was 6% compared with 2% in non-pregnant women. Those results are similar with the result of (Tyson et al., 1976) where he found that pregnancy is potentially diabetogenic and diabetes millitius may be aggravated by pregnancy and clinical diabetes may appear only during pregnancy. Most of placental hormones and enzymes are diabetogenic and has anti-insulin action, like human placental lactogen, insulinase. estrogens and progesterone, consequently a considerable attention has been focused on the metabolism of carbohydrates and insulin in pregnant women. (Bleicher et al., 1964) found that there is lower fasting glucose level and a higher concentration of plasma free fatty acids in pregnant women result from a state of accelerated starvation brought about by the host parasite relation between mother and conspectus during pregnancy. There are safeguards that spare utilization of glucose by maternal tissues while allowing parasitization of glucose and gluconeogenic precursors by the fetus. (Lind et al., 1973) also found that in the first half of pregnancy insulin sensitivity increases so the fasting blood sugar level is lower than non-pregnant and the increase in blood glucose following a carbohydrate load is not so great as in non-pregnant state. So our result are different from these last two studies which means that the diabetogenic effect of pregnancy in our patient is high and this effect should be evaluated properly in a further detailed, study.

From table (11), we found that the most common blood groups in primigravida were (O) positiv, fillowed by blood groups (A), then blood groups (B), and the least common is blood groups in nearly the same as the distribution of blood groups in most of the population worlwide.

Recommendation

The main recommendations of the present study are: -

Most of primigravida in study in good health in their first trimester and have physiological changes mostly within the normal ranges worldwide, with some variation explained in the study.

Irecommend also the improvement health education for these primigravida about the importance of antenatal care and the importance of iron and the folic acid supplementation during pergnancy inorder to maintain their good health throughout the pregnancy in the second and third trimester.

Irecommend also a special health adulation forprimigravida who get pregnant below the age at (20) years to attend aprepregnancy counselling clinics to improved their health and iron stores before getting pregnant as we found a significant number of primigravida (28%) below (20) years of age.

This study is considerable as initial study leading to further evaluation of each parameters (Hb%, iron, R.B.C count, W.B.C count, P.C.V, E.S.R, blood sugar, age and weight), to be studies in a separate study, and also for further studies for these parameters in the second and third trimester of pregnancy in primigravida.

Also I recommend a similar study for mulltigravida patients who constitutes a large part of our pregnant ladies and compared their physiological changes with the present study.

I recommend also the importance of improving the information system and data collection in our primary health care centers to facilitate further studies.

Summary

The present study was done in Sirte province to evaluate the physiological changes of some blood parameters during first trimester of pregnancy in primigravida.

The study included (100) sample of primigravida and (100) sample of non-pregnant women and samples were taken from outpatients in Ibn-Sina Teaching Hospital and Antenatal Clinic, Community Health Center.

The present study found that the most common age groups from (21-25) and (26-30). The incidance of age of below 20 years, was 28% which is risky group, due to obstetrical complication and the inadequate physiological changes, leading to maternal and preinatal complication. Anemia in the age group (18-20) year was 67.8%.

The mean weight of primigravida was (71.08kg) and non-pregnant was (64kg), the weight gain in pregnancy comprises increases in maternal body water, fat, uterus and other tissues, and weight gained in fetus amniotic fluid, placenta. There may be a fall in weight during the first trimester because of nausea and vomiting.

The mean red blood cell count was higher in pregnant than in non-pregnant, but statistically not significant, the mean of R.B.C in primigravida was (3.6×10^6 /cmm), but the mean of non-pregnant was (3.5×10^6 cmm). Incidence of primigravida with R.B.C count less than 3.5×10^6 /cmm was 31%, while non-pregnant women 45%.

The mean of hemoglobin was higher in primigravid than in non-pregnant and was statistically significant. The mean Hb% in primigravida was (11.6gm/dl). while in non-pregnant was (11.2gm/dl). Hemoglobin below 11gm/dl is considered as anemia. The factors associated with low hemoglobin, are mainly poor nutritional status of mother, history of previous abortion, and poor medical history of mother. Incidence of anemia (Hb<11mg/dL) was 22% in primigravida. While non-pregnancy women was 29%.

The mean of iron level was statistically significant higher in primigravida than in non-pregnant and the mean in primigravida was (99.2mg/dl) while in non-pregnant was (90.1mg/dl). The iron deficiency anemia is a common health problem among pregnant women. Dietary iron supplements are usually given to pregnant women to maintain a hemoglobin concentration not less than 11gm/dl. In our study it was higher in primigravida due to the good stares in them. There was no primigravida with iron level less than 70mg/dl..

The mean of packed cell volume (P.C.V) was higher in non-pregnant women than in pregnant lady which is in favor with the physiological *hemmodultion,* and the mean in primigravida was (33.8%) while in non-pregnant was (34.5%). Incidence of primigravida with P.C.V less than 37% was 86% of patients, while non-pregnant women 81%.

The mean of leukocyte count was in primigravida higher than of non-pregnant women and was statistically significant, the mean in primigravida (8001/cmm), while non-pregnant women (6654/cmm).

The mean of erythrocyte sedimentation rate (E.S.R) was higher in pregnant women that non-pregnant, but statistically non-significant. The mean in primigravida was (43.3mm/hour) while in non-pregnant was (38.6mm/hour). The E.S.R rises early in pregnancy due to the increase in fibrinogen and physiological anemia. Incidence of E.S.R more than (25-mm1st) hr was in 68% of primigravida which in 65% of non-pregnant women.

The mean of fasting blood sugar in pregnant lady which was higher than non-pregnant lady, but statistically non significant, the mean F.B.S in primigravida a was (84.2), while in non-pregnant was (83.1). Incidence of patients with fasting blood sugar more than 100mg% in primigravida was 6%, while non-pregnancy women was 2%.

The most common blood groups in our primigravida patinets was blood groups (O) 54%, than blood groups (A) 25%, then blood groups (B) 16%, than blood groups (AB) 5%.

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الخلاصة

أجريت هذه الدراسة بشعبية سرت لغرض دراسة وتقييم التغيرات الفسيولوجية لبعض مكونات الدم خلال مرحلة الحمل الأولي للنساء البكريات بالإضافة إلي تقييم العمر والوزن لهذه السيدات. وهذه الدراسة تضمنت 100 عينة للام البكرة و100عينة لغير الحامل,واخذت هذه العينات من مستشفى ابن سينا بسرت ومركز الرعاية الصحية الاولية.

وجد في هذه الدراسة إن اغلب الأعمار التي اخذت في العينة كانت محصورة مابين المجموعتين(21-25) و(26-30), والأعمار الأقل من (20) سنة, هي اكثر الأعمار عرضة للإصابة بمضاعفات الحمل والولادة, والتغيرات الفسيولوجية غير الملائمة وتؤدى أيضا إلى مضاعفات اللام قبل الولادة ومابعدها.

إما بالنسبة لمتوسط الأوزان في الام الحامل, كان (71.08) كجم وغير الحوامل(64) كجم وزيادة الوزن في الحمل تنتج من زيادة كمية الماء والدهن في جسم الام وزيادة في اغلب أنسجة الجسم , وكذلك الزيادة الناتجة عن السائل الامنيوسي والمشيمة في الجنين وأيضا زيادة في حجم الرحم, وفى بعض الاحيان يحدث نقص في وزن الام الحامل خلال مرحلة الحمل الأولى نتيجة للغثيان والتقيؤ وفقدان الشهية.

كما لوحظ في هذه الدراسة , إن متوسط كريات الدم الحمراء في الام الحامل أعلى منه في غير الحامل ولكن بدون دلاله إحصائيا , وكان متوسطها في الحوامل(3.6×10^6)/cm^3 بينما في غير الحوامل (3.5×10^6)/cm^3. كما وجدنا عدد الأمهات الحوامل التي تحتوى كريات دم حمراء اقل من المعدل الطبيعي تمثل (31%), بينما الغير حامل تمثل(45%).

إن متوسط الهيموجلوبين في الام الحامل أعلى منه في الغير حامل ويكون ذا دلاله إحصائيا, ومتوسطة في الام الحامل(11.6)gm/dL إما غير الحامل(11.2) gm/dL, وعندما تقل نسبة الهيموجلوبين عن 11mg/dL تعرف بفقر الدم (الأنيميا). ومن أهم العوامل التي ترافق انخفاض مستوى الهيموجلوبين, نقص التغدية الجيدة للام أو حدوث إجهاض سابق أو وجود أمراض أخرى.

كما وجدت نسبة فقر الدم (الأنيميا) في مجموعة الأعمار (18-20) حوالي 67.8% كما كانت نسبة الأنيميا للمجموعة بالكامل 22% في الام الحامل, أما غير الحامل 29%

وعند مقارنة نسبة الحديد وجدت في الام الحامل أعلي وكانت داله إحصائيا , ومتوسطها في الام الحامل mg/dL (99.2) بينما في غير الحامل mg/dL (90.13),و نقص الحديد(Iron deficiency anemia) من أهم المشاكل الصحية بين الحوامل, و يضاف الحديد لغذاء الام الحامل للمحا فظة على تركيز الهيموجلوبين بحيث لايقل عن (11 m g/dL).

إما بالنسبة لحجم كرات الدم الحمراء المرصوصة (P.C.V) ,فان متوسطها في الام الحامل %(33.8) , أما غير الحامل %(34.5), ومتوسطها في الام الحامل أعلى من الغير حامل . كما وجد إن الأمهات الحوامل التي تحتوى حجم كريات دم حمراء (P.C.V) اقل من المعدل الطبيعي تمثل86% إما في غير الحوامل تمثل 81%.

ومتوسط كريات الدم البيضاء في الحوامل أكبر منها في غير الحوامل, وكان متوسطها في الام الحامل (8001), غير الحامل(6654).

وفي متوسط معدل ترسيب كرات الدم الحمراء, يكون في الام الحامل أعلى من غير الحامل وغير دال إحصائيا , ومتوسطها في الام الحامل (34.3) غير الحامل (38.6), وتحدث هذه الزيادة في بداية الحمل نتيجة لزيادة في بروتين (Fibrinogen) والتغيرات الفسيولوجية الأخرى. كما وجد إن الأمهات الحوامل التي تكون نسبة E.S.R اقل من المعدل الطبيعي تمثل 32% إما غير الحامل تمثل 35%.

ومتوسط نسبة السكر في ألام الحامل أعلى يكون متوسطها (84.2), أما في غير الحامل (83.1), ولكن غير دال إحصائيا . كما وجد إن الأمهات الحوامل التي تكون نسبة السكر بها أعلى من 100mg تمثل 6% أما ألام غير الحامل تمثل 2%.

كما وجد في الدراسة إن اكثر فصائل الدم شيوعا عند ألام الحامل البكر هي (O) يليها (A) ثم (B) واقلها (AB).

جامعـــــة التحــــدي

كليـــة العلــــوم

قســم علــم الحيـــــــــــــوان

تأثير الحمل الأول والعمر على بعض مكونات الدم ووزن الجسم للمــرأة الحامل في المرحلـــة الأولى للحمـــل

قدمت هذه الأطروحة استكمالا لمتطلبات الإجازة العالية

(الماجستير في العلوم)

مقدمة من الطالبة

فتحية البغدادي احمد اسطيل

أغسطس2002

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جامعة التحـــــدي

كلية العلوم

قسم علم الحيـــــوان

تأثير الحمل الأول والعمر على بعض مكونات الدم ووزن الجسم للمرأة الحامل في المرحلة الأولى للحمل

قدمت هذه الأطروحة استكمالاً لمتطلبات الإجازة العالية

(الماجستير في علم الحيوان)

مقدمة من الطالبة

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