

## INCREASED THE RISK OF FIRST TRIMESTER MISCARRIAGE WITH VITAMIN D DEFICIENCY

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### ABSTRACT

Vitamin D is a steroid vitamin from a group of soluble fatty hormones. A family of vitamin D compounds that include: vitamin D1, vitamin D2, and vitamin D3, can be found naturally in very few foods, as well as in the form of a dietary supplement. It is also made in the human body when the human body is exposed to ultraviolet radiation with the presence of food leads to the synthesis of vitamin D, used by the body as a supplement to improve health. Health experts advise people to be exposed to sunlight between 10 am and 2 pm or 3 pm, which is the best time to absorb vitamin D3 in the body and avoid them being exposed to the lack of vitamin D3 in their bodies. The normal range of the total 25(OH)D level is 20-100 ng/mL.[1] But Serum 25(OH)D levels do not indicate the amount of vitamin D stored in body tissues. Vitamin D is an important component of healthy body organs to function in a healthy and healthy manner. It is important for good, strong and healthy bones. It is also an important factor in the work of muscles, heart, lungs and brain well and also supports resistance to infection. Vitamin D, which gets the body from the skin after exposure to sunlight or through dietary supplements after being changed several times within the body to manage the amount of calcium in the blood and bones and intestines and to help cells all over your body to communicate properly. More study is now showing that vitamin D may be very important in treating and preventing a number of serious long term health problems. Vitamin D is different from other vitamins after entering the body turns into a hormone, This hormone is sometimes called "activated vitamin D" or "calcitriol. Vitamin D is very important to absorb minerals as calcium and phosphorus. Even if you eat foods that contain a lot of calcium and phosphorus, without enough vitamin D, you can't absorb them into your body. The FNB established a Recommended Dietary Allowances (RDA) for vitamin D representing a daily intake that is sufficient to maintain bone health and normal calcium metabolism in healthy people. RDAs for vitamin D are listed in both International Units (IUs) and micrograms (mcg); the biological activity of 40 IU is equal to 1 mcg. Even though sunlight may be a major source of vitamin D for some, the vitamin D RDAs are set on the basis of minimal sun exposure. Analytic cross sectional study was carried out during the period from 3rd of January to 31st of Jun of 2017 (two month for each center) at three obstetric department of hospitals in Baghdad city (alkarkh, alyarmok and Almahmodea hospitals). The hospitals were selected randomly by simple random methods. One of the hospitals was from rural area, the other from urban area and the one was teaching hospital have a cases drainage from mixed area (rural and urban). The pregnant women (or care taker) of each participants' (mother or other member of the family) was interviewed by the researcher using a special questionnaire form constructed for this study which was revised by the supervisor. Data regarding socioeconomic status, family size were obtained from the participants, information about prior abortion, smoking, alcohol consumption, sunscreen usage, have any diseases, medications and use of food supplements. Before filling the questionnaire was informed about the nature and the aims of the study and the pregnant was included in the study according to the inclusion criteria. The current study included 160 pregnant women, 80 of them with spontaneous abortions (group A) and other 80 women with normal pregnant status (group B), in both groups the most prevalent age group was 18-30 years as (65%), while the least age group was 31-46 years (35%) and no significant difference in age was shown between two group. The current study showed the relation between study sample and season of vit D test, we founded that high prevalence of vitamin D deficiency was observed in women who their have more abortion but without any significant association between season and group A or group B. Regarding to life style (covered and uncovered women) and their relation with vitamin D level in this study, it was found that more than half of the participant suffered from deficiency because 62% of total sample women were covered as compared to only 38% of uncovered women with significant association ( $p < 0.001$ ). Also the study show the women that have more multivitamin drugs nearly equal to women that not administration to multivitamin drugs as (56%, 44%) respectively and did not show any significant association between multivitamin administration and health of pregnancy. Regarding to sun exposure, our result founded more than half of women that suffered from abortion (group A) were not exposed more time to sun light as compared to healthy pregnant women (group B) as (34%, 21%) respectively with significant association ( $p = 0.01$ ).

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## INTRODUCTION

Vitamin D is a steroid vitamin from a group of soluble fatty hormones. A family of vitamin D compounds that include: vitamin D1, vitamin D2, and vitamin D3, can be found naturally in very few foods, as well as in the form of a dietary supplement. It is also made in the human body when the human body is exposed to ultraviolet radiation with the presence of food leads to the synthesis of vitamin D, used by the body as a supplement to improve health (Ross, 2011). Health experts advise people to be exposed to sunlight between 10 am and 2 pm or 3 pm, which is the best time to absorb vitamin D3 in the body and avoid them being exposed to the lack of vitamin D3 in their bodies (Sriram, 2009). The normal range of the total 25(OH) D level is 20-100 ng/mL. (Ross, 2011). But Serum 25(OH) D levels do not indicate the amount of vitamin D stored in body tissues. Vitamin D is an important component of healthy body organs to function in a healthy and healthy manner. It is important for good, strong and healthy bones. It is also an important factor in the work of muscles, heart, lungs and brain well and also supports resistance to infection. Vitamin D, which gets the body from the skin after exposure to sunlight or through dietary supplements after being changed several times within the body to manage the amount of calcium in the blood and bones and intestines and to help cells all over your body to communicate properly. More study is now showing that vitamin D may be very important in treating and preventing a number of serious long term health problems (Cranney, 2007) Vitamin D is different from other vitamins after entering the body turns into a hormone, This hormone is sometimes called "activated vitamin D" or "calcitriol." (AHRQ, 2007). Vitamin D is very important to absorb minerals as calcium and phosphorus. Even if you eat foods that contain a lot of calcium and phosphorus, without enough vitamin D, you can't absorb them into your body (AHRQ, 2007). The FNB established an Recommended Dietary Allowances (RDA) for vitamin D representing a daily intake that is sufficient to maintain bone health and normal calcium metabolism in healthy people. RDAs for vitamin D are listed in both International Units (IUs) and micrograms (mcg); the biological activity of 40 IU is equal to 1 mcg. Even though sunlight may be a major source of vitamin D for some, the vitamin D RDAs are set on the basis of minimal sun exposure (Ross, 2011).

### Sources of Vitamin D

**Food:** Foods that naturally contain vitamin D are mostly of animal origin. For example, fatty fish is rich in vitamin D. Eggs, liver, meat and milk products also contain small amounts. The best sources that contain vitamin D is the fish liver oil added to fatty fish meat (such as salmon, tuna and mackerel) (Uush, 2014). Vitamin D in these foods is primarily in the form of vitamin D3 and metabolite 25 (OH) D3 (Gebhardt, 2008). Some mushrooms provide vitamin D2 in variable amounts Mushrooms with improved levels of vitamin D2 from UV exposure under controlled conditions are also available.

**Sun exposure:** People get some of their vitamin D needs through exposure to sunlight Working UV penetrates human skin to convert 7-dehydrocholesterol to Previtamin D3, which in turn becomes vitamin D3. There are also factors controlling sun exposure such as season, time of day, day length, cloud cover, and melanin content, which therefore controls the

manufacture of vitamin D, there are many opportunities to form vitamin D (and store it in the liver and fat) from exposure to sunlight during the spring, summer and autumn months (Ross, 2011). The full cloud cover reduces UV energy by 50%; the shadow reduces by 60% (Food and Drug Administration, 2016). Exposure to sunlight through glass does not produce vitamin D, because ultraviolet rays do not penetrate the glass (Miles, 2010). Sunscreens with a sun protection factor (SPF) of 8 or more appear to block vitamin D-producing UV rays, although in practice people generally do not apply sufficient amounts, cover all sun-exposed skin, or reapply sunscreen regularly, therefore skin likely synthesizes some vitamin D even when it is protected by sunscreen as typically applied (Wolpowitz, 2006). Some researchers have suggested in vitamin D for example that approximately 5-30 minutes of exposure to sunlight between 10 am and 3 pm at least twice a week on the face, arms, legs or back without sun protection Usually leads to an adequate amount of vitamin D (Holick, 2002). Frequent exposure to UV rays on the skin is liable to cause dehydration and other cosmetic changes. The American Academy of Dermatology recommends using sunscreen, when exposed to the sun. As well as general health concerns about skin cancer, and there are no studies to determine whether vitamin D can be produced by ultraviolet radiation without increasing the risk of skin cancer (International Agency for Research on Cancer Working Group on Artificial Ultraviolet (UV) Light and Skin Cancer, 2007).

**Dietary supplements:** Vitamin D in dietary supplements and fortified foods have two forms, D2 (ergocalciferol) and D3 (cholecalciferol). Vitamin D2 is manufactured by the ultraviolet rays of ergosterol in the yeast, Vitamin D3 is synthesized by a 7-dehydrocholesterol radiation of lanolin and a chemical conversion of cholesterol, firm conclusions about any different effects of these two forms of vitamin D cannot be drawn. However, it appears that at nutritional doses vitamins D2 and D3 are equivalent, but at high doses vitamin D2 is less potent. The American Academy of Pediatrics (AAP) recommended all children and adolescents that not eat or drink dairy food that contain more vitamin D, most take 400 vitamin D supplements daily, also pregnant women that have baby with breastfeed exclusively, take 400 IU / day of vitamin (Rovner, 2008).

**Vitamin D Deficiency:** Vitamin D deficiency is caused by a variety of reasons, including inadequate food intake, absorption and use. The amount of intake is less than the recommended levels over time. Exposure to sunlight is limited. The kidney cannot convert 25 (OH) D to its active form, or vitamin D absorption from the digestive system not enough (Wagner, 2008). In children who suffer from rickets due to deficiency of vitamin D, which leads to bone defects and structural malformations due to failure of bone tissue in mineralization correctly.12 In adults, vitamin D deficiency leads to osteoporosis and weakness, and some symptoms, such as bone pain and muscle weakness, may indicate a low vitamin D level (Holick, 2002). Vitamin D deficiency may also contribute to the development of certain cancers, especially breast, prostate, and colon cancers (International Agency for Research on Cancer Working Group on Artificial Ultraviolet (UV) Light and Skin Cancer, 2007).

### Symptoms of vitamin D deficiency

- Getting sick or infected more often.
- Fatigue.

- Painful bones and back.
- Depressed mood.
- Impaired wound healing.
- Hair loss.
- Muscle pain.

#### **If Vitamin D deficiency continues for long periods of time it can result in**

- Obesity
- Diabetes
- Hypertension
- Depression
- Fibromyalgia
- Chronic fatigue syndrome
- Osteoporosis
- Neurodegenerative diseases, such as Alzheimer's disease.

#### **Groups at Risk of Vitamin D Inadequacy**

**Pregnant women:** Vitamin D deficiency in pregnant women is associated with increased risk of obstetrical complications, such as preeclampsia, bacterial vaginosis and the associated preterm delivery, gestational diabetes mellitus, and small-for-gestational age births. It seems that vitamin D induces the necessary immunological changes to prevent pregnancy loss (Bailey, 2010).

**Breastfeed infants:** Breast milk alone may not provide all that the baby needs of vitamin D, It provides <25 IU / L to 78 IU / L. Vitamin D content of milk depends on what the mother possesses of the vitamin (Trixie, 2013). A Canadian study found that the incidence of rickets in children was 2.9 per 100,000 children who relied on breastfeeding for their nutrition. Although the sun is a potential source of vitamin D, AAP advises that infants be protected from direct sun exposure and protective clothing (Trixie, 2013).

**Older adults:** As for older people, they are at increased risk of vitamin D deficiency. As age progresses, the skin cannot form vitamin D efficiently. As many as half of older adults in the United States with hip fractures could have serum 25(OH)D levels <30 nmol/L (<12 ng/mL) (Trixie, 2013).

**People with limited sun exposure:** For people who are not as bright as the sun, women who wear long robes and headscarves for religious reasons, and people with sun exposure, it is better to use vitamin supplements and vitamin-rich foods to meet their vitamin needs (Wolpowitz, 2006).

**Dark skin person:** Greater amounts of the pigment melanin in the epidermal layer result in darker skin and reduce the skin's ability to produce vitamin D from sunlight. Various reports consistently show lower serum 25(OH) D levels in persons identified as black compared with those identified as white (Holick, 2002).

**Fat malabsorption and Inflammatory bowel disease:** Because vitamin D is a fat-soluble vitamin, its absorption depends on the gut's ability to absorb dietary fat. Individuals who have a reduced ability to absorb dietary fat might require vitamin D supplementation (Ward, 2007). Fat malabsorption is associated with a variety of medical conditions, including some forms of liver disease, cystic fibrosis, celiac disease, and Crohn's disease, as well as ulcerative colitis when the terminal ileum is inflamed. In addition, people with some of these conditions

might have lower intakes of certain foods, such as dairy products fortified with vitamin D (Ward, 2017).

**Health benefits of vitamin D:** Vitamin D for healthy bones: Vitamin D is vital for bone health and plays an important role in the regulation of calcium and maintenance of phosphorus levels in the blood, those two factors are important for maintaining healthy bones. It helps in absorb calcium from intestines and control calcium that would otherwise be excreted through the kidneys. In children deficiency of vit D can cause rickets disease, that characterized by a severely bow-legged appearance due to softening of the bones (Pappa, 2008). In adults, vitamin D deficiency manifests as osteomalacia (softening of the bones) results in poor bone density and muscular weakness. and Osteoporosis is the most common bone disease among post-menopausal women and older men (Pappa, 2008).

- Vitamin D deficiency effect in immune system such as rheumatoid arthritis, and Hashimoto's thyroid gland, Graves, but normal concentration of vit D protects against infections such as colds and tuberculosis. Due to strengthen the immune system (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2011).
- Vitamin D inhibits the Renin Angiotensin Aldosterone System (RAAS) Therefore, it can prevent hypertension, kidney disease and heart failure. increased risk cardiovascular disease like hypertension, has also been associated with Vitamin D deficiency (Conti, 2016)
- Vitamin D affects the normal function of the skin and therefore can be helpful in the treatment of skin disorders such as Psoriasis (Dong, 2010).

Vitamin D affects the health of the teeth and therefore can play an important role in preventing many dental problems (Sriram, 2009).

**Reduced risk of diabetes:** Most researches have shown an inverse association between blood concentrations of vit D in the body and risk of type 2 DM. In person with type 2 DM, insufficient vitamin D levels may negatively affect insulin secretion and glucose tolerance. According to several study, infants who received 2,000 International Units per day of vitamin D had an 88% lower risk of developing type 1 diabetes by the age of 32 (Searing, 2010).

**Healthy infants:** When Children given 2,000 International Units (IU) per day had normal blood pressure by significantly lower arterial wall stiffness after 16 weeks compared with children who were given only 400 IU per day. Vitamin D deficiency associated with a higher risk and severity of atopic childhood diseases and allergic diseases, like asthma, eczema and atopic dermatitis. Vitamin D may enhance the anti-inflammatory effects of glucocorticoids, making it potentially useful as a supportive therapy for people with steroid-resistant asthma (Dong, 2010).

**Healthy pregnancy:** Increase risk of preeclampsia, gestational diabetes mellitus and a cesarean section will be more in Pregnant women with deficient in vitamin D. also Poor vitamin D status is associated with bacterial vaginosis in pregnant women. It is also important to note that high vitamin D levels during pregnancy were associated with an increased risk of food allergy in the child during the first 2 years of life. (Pittas, 2006). Expecting mothers need to make sure they get the recommended amounts of vitamin D during pregnancy for

both their own well being and the healthy development of their baby. The most significant compounds for human development are D2 and D3. A recent study found women taking 4,000 IU of vitamin D daily had the greatest benefits in preventing preterm labor/births and infections, and the study confirmed vitamin D at this level is not only safe for you, but for your baby, and the researchers from this study now recommend this daily dosage of vitamin D for all pregnant women. The average prenatal vitamin only contains 400 IU of vitamin D, so additional supplementation should be taken daily (Wagner, 2010). Vitamin D is beneficial for your own personal health. Vitamin D now has extensive research supporting its role in immune function, healthy cell division and bone health. Vitamin D is necessary for the absorption and metabolism of calcium and phosphorus. Many studies are finding a connection between low serum vitamin D levels and an increased risk of certain types of cancers, autoimmune disease, neurological disease, insulin resistance, and cardiovascular disease (De-Regil, 2012). Vitamin D invests in the well-being of your baby by supporting healthy bone development. Deficiency with vitamin D is also related to preeclampsia. At this time, 40-60% of the entire U.S. population is vitamin D deficient, including pregnant women. The reasons for this widespread deficiency are many, and to begin to unfold this issue you can start with understanding there is a very short list of foods that contain vitamin D (Wagner, 2010).

**Miscarriage:** It is loss of fetus spontaneously before the 24th week of pregnancy which is also known as 'spontaneous abortion' or miscarriage. The fetus actually stopped developing or died without any feel from mother, this called a 'missed abortion' because the baby has died, but has not been expelled from the womb (Robinson, 2011).

#### The main symptoms of miscarriage is (Kelsey, 1996)

- Bleeding from the vagina, often containing clots
- Blood in the vaginal mucus
- Abdominal pain and/or cramping
- Back pain

**Types of miscarriage (Stirrat, 1999)** Miscarriage classification according to causes of your miscarriage and stage of your pregnancy:

- **Blighted ovum**, when a fertilized egg implants into your uterine wall, and without any fetal development.
- **Complete miscarriage**, complete expelled the products of conception from your body.
- **Incomplete miscarriage**, rupture in membranes and dilated in cervix.
- **Missed miscarriage**, died of fetus without knowledge of mother and without concept it.
- **Recurrent miscarriage**, return three or more consecutive in first-trimester miscarriages.
- **Ectopic miscarriage**: when the egg implants out of than your uterus, usually in your fallopian tubes.
- **Threatened miscarriage**: Bleeding and cramps indicate potential future abortions.

**Causes of miscarriage:** 50% of miscarriages causes are due to chromosome issues, damaged egg or sperm cell and any Problems with the placenta can also lead to a miscarriage. Examples of these chromosome abnormalities include: Intrauterine fetal demise, blighted ovum, molar pregnancy and partial molar pregnancy. Also there are External health

conditions that causes miscarriage like lifestyle habits, and underlying conditions may also interfere with the fetus' development, especially in the second trimester. In addition to Working affect the fetus that exposed to radiation and harmful chemicals. some situation that can effect on fetus' development include: drug and alcohol use, poor diet, or mother malnutrition, infection, obese mother ,sever trauma , endocrine disease, food poisoning and preeclampsia (Greenwold, 2002).

**Risk factors:** Most miscarriages are due to natural and unpreventable causes. However, certain risk factors can increase your chances of having a miscarriage. Like drinking alcohol, certain medication ,exposure to radiation and smoking (Robinson, 2011).

**Vitamin D may be useful as immunotherapy in treatment of recurrent miscarriage.** Vitamin D3 consider as new immunomodulatory agent in the resent researches treatment of recurrent miscarriage. Different mechanisms have been proposed to account for the immunosuppressive effect of 1alpha, 25-dihydroxy-vitamin-D3. Portion of the vitamin D activity involves the down regulation of IL-2, IFN-gamma and TNF-alpha genes transcription. Because immunomodulatory effects of vitamin D are very similar to IL-10 effects, acting of vitamin D in immunotherapy of recurrent miscarriage syndrome, preeclampsia and eclampsia pregnancy, as well as pregnancy-induced hypertension, is very reasonable. We propose using of vitamin D as immune-therapy or adjuvant therapy in combination with classic immune-therapies of endangered pregnancies.

**Vitamin D reduces inflammation associated with miscarriage:** Elevated placental pro inflammatory cytokine release is associated with miscarriage, preterm labor and preeclampsia. Specifically, tumor necrosis factor-alpha (TNF-alpha)-induced cytokines may threaten pregnancy outcome. Since trophoblasts produce calcitriol, a hormone with strong immunosuppressive properties, we assessed the effects of this secosteroid on inflammatory cytokines induced in trophoblasts by challenge with TNF-alpha. Vitamin D inhibited the expression profile of inflammatory cytokine genes in a dose-response manner. 4000 IU Vitamin D daily lowers rates of infection, preterm labor and preterm birth. Researchers randomized 494 pregnant women at 12-16 weeks' gestation into three treatment groups. Group one received 400 International Units (IU) of vitamin D a day until delivery; group two received 2,000 IU and group three received 4,000 IU. The women were evaluated monthly to ensure safety. No adverse events related to vitamin D dosing were found in any of the three arms of the study. Women replete in vitamin D had lower rates of preterm labor and preterm birth, and lower rates of infection. The greatest effects were seen among women taking 4,000 IU of vitamin D per day. Therefore, the researchers recommend this daily regimen for all pregnant women.

**Aim of study:** Determine the relationship between maternal vitamin D & the risk of spontaneous abortion before 20 weeks.

## MATERIALS AND METHODS

**Design & Setting of the study:** Analytic cross sectional study was carried out during the period from 3rd of January to 31st of Jun of 2017 (two month for each center)at three obstetric department of hospitals in Baghdad city (alkarkh , alyarmok

and Almahmodea hospitals). The hospitals were selected randomly by simple random methods. One of the hospitals was from rural area, the other from urban area and the one was teaching hospital have a cases drainage from mixed area (rural and urban).

**Sampling of the study:** To obtain the required sample size, Each hospitals were visited 5 days a week, 4-6 hours a day (starting from 8:00 a.m.) for about two month. A convenient sample include 160 women from those visiting hospitals for routine care aged 18years up to 45 years. 60 women from each hospitals were chosen in this study depending on the time available for each health center and the number of patients visited the gynecology and obstetrics department in the visited days and after excluding those not me the criteria of inclusion.

**Inclusion criteria:** Pregnant women included in the study sample should meet the following criteria:

- Aged 18 -45 years as identified from card.
- **Group A:** pregnant women with recurrent abortion (two consecutive or at least three non-consecutive miscarriages) who had been referred to the Clinic of Gynecology and Obstetrics of Hospital for termination.
- Women carrying singleton fetuses at < 20 week gestation reporting unexplained vaginal bleeding, after being diagnosed with an intact gestational sac with no embryo cardiac motion, matched for gestational age by ultrasound, were inducted into the A group.
- Normal pregnant women without any complication and women who were gestational matched to a group A of pregnancies with viable gestation at <20 weeks without displaying abnormal gynecological history were included in the group B.
- All gestational ages were determined by first day of the last menstrual period and confirmed with an ultrasound. all eligible patients.

#### Exclusion Criteria

- Pregnant women with a chromosomal or anatomic abnormality, luteal phase defect, known cardiac disease, renal dysfunction, confirmed peptic ulcer, SLE, kidney stones, rheumatoid arthritis diabetes mellitus, abnormal results of an oral glucose tolerance test, previous thromboembolism, known malignancy, malabsorption syndrome, sensitivity to aspirin, hypertension or current treatment with antihypertensive drugs, previous prednisone therapy, an abnormal chest radiographic result, or a positive result of a tuberculin skin test.
- All the pregnant women don't have regular menstrual cycles and had used hormones or vitamin D.
- Pregnant women with history of allergy to vitamin D3.

**Methods:** The pregnant women (or care taker) of each participants' (mother or other member of the family) was interviewed by the researcher using a special questionnaire form constructed for this study which was revised by the supervisor. Data regarding socioeconomic status, family size were obtained from the participants, information about prior abortion, smoking, alcohol consumption, sunscreen usage, have any diseases, medications and use of food supplements. Before filling the questionnaire was informed about the nature

and the aims of the study and the pregnant was included in the study according to the inclusion criteria.

The questionnaire form consists of four sections: [30]

The first section provides socio demographic characteristics for the participants' focusing on history taking, it includes:

- **Age:** The age of each participants' is taken from the family card or hospital recorder calculated in years.
- **Residency:** Asking about living in which area and deciding if its rural or urban area.
- **Reason of visit:** Asking why the pregnant women came to hospitals or seeking medical care for a disease.
- **Education level of the participants':** What is the level of education of parents of the child illiterate, read and write, primary, secondary or college and above.
- **Occupation of the participants':** occupation in governmental sector, housewife, or free works.
- **Type of clothing:** pregnant women covered or uncovered Covered (dressing style was defined as wearing dresses which cover body completely excluding hands and face whereas uncovered dressing style was wearing dresses exposing body to more sun light in a permissive manner.
- Consumption of milk and dairy products, (Consuming dairy products of at least 200 mL of milk or other milk products including cheese, butter, yoghurt 4-7 days/week was regarded as 'sufficient' milk consumption, whereas intake of dairy products three times a week or less was defined as 'insufficient' consumption use of multivitamin supplements,
- Time of Sunlight exposure (between 10 AM and 3 PM) and season of blood collection. into winter (Jan-march) and summer (April -Jun).

The second section provides information about pregnancy, it includes

- **Antenatal care:** Did the participants' go to any doctor or hospital during her pregnancy to check her or the baby condition.
- **Complications during pregnancy:** Asking if the participant had any complications or diseases.
- **Gestational age:** The time of pregnancy in weeks

**The third section:** provides information about it includes: Take from the participant approximately 5 ml whole blood was collected by venipuncture in a non-heparinized tube. The samples were centrifuged and serum extraction was done in the field and send to hospital laboratory for analysis. Afterwards, 25-hydroxy vitamin D (25(OH) D) level was measured using High Performance Liquid Chromatography (HPLC). The normal range for serum vitamin D (25(OH) D) was 20-80 ng/ml. Thus, 8-20 ng/ml and less than 8 ng/ml 25(OH)D levels were considered as severe vitamin D inadequacy and vitamin D deficiency, respectively. Examination (vital signs, abdominal and PV) and ultrasound had been done by specialized doctors and other investigations were taken from hospital records.

**Statistical Analysis:** Data of the study was analyzed using available statistical computer program of SPSS-20(statistical packages for social sciences).

The following measurement and tests were used:

- Mean and standard deviation (SD) with the ranges.
- Chi-square test for the assessment of the association between the qualitative variables studied.
- Student (unpaired) t-test for independent data was used to test the significance of the differences between the results of two means.

An association or difference was considered statistically significant if the probability value (P value) was less or equal to 0.05.

#### Ethical consideration

- Agreement of MOH-Iraq, and Baghdad Al Karkh directorate of health.
- The collection of data was kept confidential and not be divulged except for the purpose of the study.
- The Participant's agreement will be considered and they will be informed that the participation is voluntary and they can withdraw from the study after having agreed to participate.

## RESULTS

The current study included 160 pregnant women, 80 of them with spontaneous abortions (group A) and other 80 women with normal pregnant status (group B), in both groups the most prevalent age group was 18-30 years as (65%), while the least age group was 31- 46 years (35%) and no significant difference in age was shown between two group, with almost similar distribution as shown in figure 1, which illustrates that both groups had a median age of 28.5 years and ranged from 18 – 45 years.

## DISCUSSION

Regarding participant residency; the sample distributed as 105(66%) urban region and 55(34%) rural of the total, as well this dominancy was shown in both groups with no significant difference between them. Table 1. Maternal smoking did not show a significant association with the studied condition as only 15% of the group A women were smokers in comparison to 11% among the group B. Table 1. Regarding the education level, the recent study showed that; it was no significantly associated ( $p=0.776$ ) between two group as it was prevalent among 40% of total sample were university education in comparison to 29% of non-education women. Table 1. Concerning occupation women, it was found that 64% of the total women were employed in comparison to 36% of unemployed women and that pregnancy occupation is significantly associated with increased risk of abortion among pregnant women ( $p<0.003$ ), as well the percentage of abortion cases were 75% among employed pregnant women while the percentage of abortion cases were 25% among unemployed pregnant women.

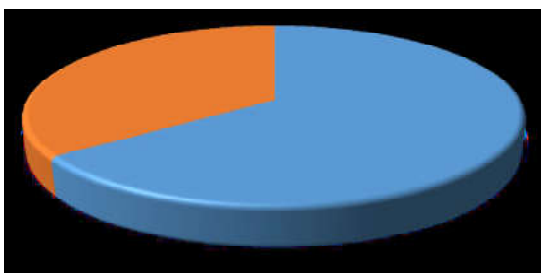


Figure 1. Percentage of the study sample according to their age, n=160

Table 1. Distribution of included pregnant women, according to their socio-demographic characteristics<sup>a</sup>=160

p-value	2 (df)	Group B NO.(%)	Group A NO. (%)	
Age				
0.185	1.758 (1)	48	56	18-30
32		24		31-46
Education				
0.776	0.571 (2)	21	25	Non
25		24		Primary and
34		31		secondary
Occupation				university
0.003	8.736 (1)	42	60	yes
38		20		no
Smoking				
0.482	0.348(1)	12		yes
71		68		no
Residency				
0.134	2.242 (1)	57	48	urban
23	32			rural

Pearson's chi-square, Fishers exact test \* Significant at 0.05 level

The current study also showed not any significant difference in pregnant body mass indices between two groups; as the mean body mass index of women with abortion was significantly lower than that in those of the normal pregnant women;

Table 2. Comparison of pregnant BMI between the study groups, n=160

	Group A (n=80) Mean±SD	Group B (n=80) Mean±SD	t-test	p-value
Pregnant BMI (kg/m <sup>2</sup> )	23.3±4.6	24.8±4.0	9.55	<0.451

Independent t-test, SD= standard deviation, \* significant at 0.05 (two tailed)

Table 3. Distribution of included study sample, according to vitamin D characteristic

	Group A (n=80)	Group B (n=80)	x	p-value
Vitamin D normal	14	34	11.905a	0.001
Vitamin D deficiency	66	46	Df=1	

Pearson's chi-square, SD= standard deviation, \* significant at 0.05

The results did not show any relation between the history of parity and causes of abortion, while the study showed high prevalence of abortion women were at first trimester of pregnancy (43%) in comparison to another group founded no difference between first and second trimester in contrast to that in abortion group with significant association ( $p=0.01$ ).

Table 4. Distribution of included study sample, according to obstetric characteristic

	Group A (n=80) No. (%)	Group B (n=80) No. (%)	χ <sup>2</sup> (df)	p-value
Gestational age				
1st trimester	68	43	6.961(1)	6.961(1)
2nd trimester	12	37		
Parity				
2	45	37	1.682(1)	0.206
>3	35	43		

Pearson's chi-square, \* Significant at 0.05 level

Regarding to Vitamin D deficiency during pregnancy the study was shown to have tremendous effect on their number of abortion in the past. as pregnant women that have 2-3 abortion were more vitamin D deficiency 49 (30.5%) with highly



significant association between frequency of abortion and deficiency of vitamin D.

**Table 5. Relation between history of abortion during previous pregnancy and vitamin D value, n=160**

Frequency of abortion	Vitamin D Normal. (%)	Vitamin D deficiency (%)	Total No. (%)
0 abortion	34	46	80
1 abortion	14	17	31
2-3 abortion	0	49	49

Pearson's chi-square = 30.453, df= 2, p-value= 0.001

The current study showed the relation between study sample and season of vit D test ,we founded that high prevalence of vitamin D deficiency was observed in women who their have more abortion but without any significant association between season and group A or group B Regarding to life style(covered and uncovered women ) and their relation with vitamin D level in this study, it was found that more than half of the participant suffered from deficiency because 62% of total sample women were covered as compared to only 38% of uncovered women with significant association ( $p < 0.001$ ). Also the study show the women that have more multivitamin drugs nearly equal to women that not administration to multivitamin drugs as (56%,44%) respectively and did not show any significant association between multivitamin administration and health of pregnancy . Regarding to sun exposure, our result founded more than half of women that suffered from abortion (group A) were not exposed more time to sun light as compered to healthy pregnant women(group B) as (34%,21%) respectively with significant association ( $p = 0.01$ ).

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