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Assessment of Maternal and Neonatal Vitamin D level in Erbil City

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ABSTRACT

Background: Adequate vitamin D concentration during pregnancy are necessary to maintain calcium homeostasis, bone maturation and mineralization. The aim of the study to show correlation between maternal and neonatal vitamin D level and its relations.

Subjects and Methods : A cross sectional study was done on mothers and their neonates on Maternity Teaching Hospital in Erbil-Iraq during the period from first of January to the 30th of July 2015.Data collected from all mothers about age, parity, mode of delivery, maternal diet, weight, gestational age, apgar score and vitamin D.

Results : The study show that most of mother age > 35 years, gravida 3 and more, Para 3 and more, normal BMI, wearing hejab, poor nutrition, no vitamin supplement during pregnancy and housewives are deficient maternal and neonatal vitamin D level and age < 35 years, gravida 1-2, parity 1-2, overweight BMI, not wearing hejab, traditional nutrition and employed are on safe range of maternal and neonatal vitamin D level.The results indicate that there was a statistically significant There were 25 cases of neonates on deficient range of vitamin D level, 22 cases (88%) of them are product of mothers with deficient range of vitamin D level, the p value < 0.001

Conclusion : It is concluded that there is parallel correlation between maternal and neonatal vitamin D level and the level of vitamin D in mother and neonate are important for health of both, and education the people about the factors that make the mother and neonate on safe range of vitamin D level.

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Introduction

Vitamin D: Refers to a group of fat-soluble secosteroids responsible for enhancing intestinal absorption of calcium, iron, magnesium, phosphate and zinc.(1).

In humans, the most important compounds in this group are vitamin D3 (also known as cholecalciferol) and vitamin D2 (ergocalciferol) Cholecalciferol and ergocalciferol can be ingested from the diet and from supplements.(1)(2)(3). Very few foods contain vitamin D, synthesis of vitamin D (specifically cholecalciferol) in the skin is the major natural sources of the vitamin. Dermal synthesis of vitamin D from cholesterol is dependent on sun exposure (specifically UV-B radiation.(Vitamin D physiology and functions : Vitamin D is produced after skin exposure to UVB radiation with the conversion of pre–vitamin D-3 to vitamin D3(cholecalciferol). This process accounts for 90% of vitamin D in the body in un supplemented(4).Very few foods contain vitamin D, and the main dietary sources include fortified milk or juice and fatty fish(5).. Sunshine deprivation and lack of adequate vitamin D intake have been reported in studies and reviews to account for the high prevalence of vitamin D deficiency in children(6) Vitamin D is transported to the liver where it is hydroxylated to 25-hydroxyvitamin D [25(OH)D6; calcidiol], which is the major circulating vitamin D used in assessing body vitamin D status. The 25(OH)D is hydroxylated in the kidney to produce the most active metabolite, 1,25 dihydroxyvitamin D (calcitriol), which is responsible for calcium and phosphorous absorption from the gut and resorption of calcium from bone to maintain calcium and phosphorous homeostasis and bone mineralization (3). It is now known that immune cells and express vitamin D receptors. Therefore, in addition to maintaining bone health, vitamin D may be important in immune-modulation and regulation of cell growth(7).

Aim and Objectives :

Aim of study : The aim of this study was to determine correlation between maternal and neonatal vitamin D level.

Objectives of study : The objectives of this study are:

- Identify correlation between maternal and fetal vitamin D level.
- Clarify whether the pregnant women need vitamin D supplement during pregnancy.
- Clarify whether the newborn need vitamin D supplement during infancy.

Material & methods

A cross section study hospital based was conducted in Maternity Teaching

Hospital, in Erbil-Iraq. Duration of the collection data of study was in period between 1st of January till 30th of July 2015. The study was approved by ethics committee ,and informed consent was obtained from all families before the neonates were included in the study. The study done on 75 pregnant women and their newborns immediately after delivery at Maternity Teaching Hospital.

The pregnant women and newborn were included and excluded from this study:

Inclusion criteria: All pregnant women at delivery in delivery room in Maternity Hospital.

Exclusion criteria:

- pregnant women who has chronic diseases because some diseases affect vitamin D directly or indirectly like renal diseases.
- pregnant women who taking drugs because some diseases affect vitamin D directly or indirectly like anticonvulsants.
- Family history of rickets because of familial rickets.
- congenital anomalies because many congenital anomalies affect vitamin D.
- low birth weight because of rickets of prematurity.
- preterm baby because of rickets of prematurity.
- Birth asphyxia because may affect ionized serum calcium

All cases are examined by senior house officer and pediatrician.

The data collection:A questionnaire was designed by the researcher, information were collected included: serial number, age of mother, parity, mode of delivery , maternal disease ,maternal BMI, covered or uncovered ,nutritional history ,vitamins intake during pregnancy, maternal job ,and if there is family history of vitamin D deficiency.(Appendix1).Regarding the neonate ,gender ,birth weight ,gestational age ,apgar score ,neonatal vitamin D level ,and maternal vitamin D level .(appendix1).All neonates after resustation were examined for any congenital abnormality, abdomen examined for any organomegaly or signs of umbilical infection because these may affect vitamin D directly or indirectly.

INVESTIGATION : Venous blood taken from 50 mothers before delivery and their 50 neonatesblood samples taken from umbilical cord immediately after delivery, about 1ml blood taken from mothers and 1ml from the neonates.Then the sample put the blood in special tubes which apply in the micro centrifuge (hematocrit H_1200 F) FOR 5 minutes at 5000-12000 round per minutes .then total vitamin D(25-OH vitD2) level measured by : COBAS E411 immunoassay analyzer.

Data analysis : Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 19). Chi square test of association was used to compare between proportions. When the expected count of more than 20% of the cells of the table was less than 5, Fisher's exact test was used. Student's t test was used to compare between means of two groups. Pearson correlation coefficient was calculated to assess the strength of correlation between two numerical variables. A p value of $\leq$ 0.05 was considered statistically significant.

Results

there were 19 cases (38%) age between 25-34 years, there were 28 cases (56%) gravida 1-2, there were 28 cases (56%) of them Para 1-2, there were 28 cases (56%) worker, there were 30 cases (60%) of them mode of delivery are caesarian section, there were 27 cases (54%) wearing hejab and same gender as shown in table 1.

Table 1. Distribution of sample by age, gravida, Para, occupation, mode of delivery, wearing hejab and sex of the baby.

		No.	%
Age (years)	< 25	17	34.0
	25-34	19	38.0
	34+	14	28.0
Gravida	1-2	28	56.0
	3-4	12	24.0
	5+	10	20.0
Para	1-2	28	56.0
	3-4	13	26.0
	5+	9	18.0
Occupation	Worker	28	56.0
	Housewife	22	44.0
MOD	Caesarean section	30	60.0
	Vaginal delivery	20	40.0
Hejab	Yes	27	54.0
	No	23	46.0
Sex of the baby	Male	25	50.0
	Female	25	50.0
Total		50	100

There were 45 cases (90%) of them nutritional histories are traditional, there were 37 cases (74%) of them have vitamin supplementations, there were 26 cases (52%) of them have safe range of maternal vitamin D level and there were 25 cases (50%) of neonates have deficient vitamin D level as shown in table 2.

Table 2. Distribution of sample by some nutritional variables.

		No.	%
Nutritional history	Traditional	45	90.0
	Poor	5	10.0
Vitamin supplementation	Yes	37	74.0
	No	13	26.0
Maternal vitamin D	Deficient	23	46.0
	Insufficient	1	2.0
	Safe range	26	52.0
Neonatal vitamin D	Deficient	25	50.0
	Safe range	23	46.0
	Excessive amount	2	4.0
Total		50	100

There were 11 cases (64.7%) of maternal age < 25 years on safe range of maternal vitamin D level, there were 12 cases (63.2%) of maternal age between 25-34 years on safe range of maternal vitamin D level, there were 10 cases (71.4%) of maternal age > 35 years on deficient range of vitamin D level, the p value 0.036 (significant).

There were 18 cases (64.3%) of gravida 1-2 on safe range of maternal vitamin D level, there were 7 cases (58.3%) of gravida 3-4 on deficient range of maternal vitamin D level, there were 6 cases (60%) of gravida > 5 on deficient range of maternal vitamin D level, the p value 0.117 (not significant).There were 18 cases (64.3%) of Para 1-2 on safe range of maternal vitamin D level, there were 8 cases (61.5%) of Para 3-4 on deficient range of maternal vitamin D level, there were 5 cases (55.6%) of Para > 5 on deficient range of maternal vitamin D level, p value 0.105 (not significant).

There were 16 cases (53.3%) delivered by caesarean section on safe range of maternal vitamin D level, there were 10 cases (50%) delivered by vaginal delivery on safe range of maternal vitamin D level, p value 0.637 (not significant). There were 18 cases (56.3%) of normal BMI on deficient range, there were 10 cases (76.9%) of overweight on safe range, there were 2 cases (40%) of obese on safe range, the p value 0.036 (significant). There were 17 cases (73.9%) of non wearing hejab on safe range, the p value 0.007 (significant) as shown in table 3.

Table 3. Association between maternal vitamin D and different variables.

		Maternal vitamin D						P
		Deficient		Insufficient		Safe range		
	N	No.	%	No.	%	No.	%	
Age (years)								
< 25	17	6	35.3	0	0	11	64.7	0.036*
25-34	19	7	36.8	0	0	12	63.2	
≥ 35	14	10	71.4	1	7.1	3	21.4	
Gravida								
1-2	28	10	35.7	0	0	18	64.3	0.117*
3-4	12	7	58.3	0	0	5	41.7	
≥ 5	10	6	60	1	10	3	30	
Para								
1-2	28	10	35.7	0	0	18	64.3	0.105*
3-4	13	8	61.5	0	0	5	38.5	
≥ 5	9	5	55.6	1	11.1	3	33.3	
Mode of delivery								
CS	30	14	46.7	0	0	16	53.3	0.637*
Vaginal	20	9	45	1	5	10	50	
Body Mass Index								
Normal	32	18	56.3	0	0	14	43.8	0.036*
Over-Weight	13	3	23.1	0	0	10	76.9	
Obese	5	2	40	1	20	2	40	
Wearing Hejab								
Yes	27	17	63	1	3.7	9	33.3	0.007*
No	23	6	26.1	0	0	17	73.9	
Total	50	23	46	1	2	26	52	

There were 26 cases (57.8%) of traditional nutrition on safe range of maternal vitamin D level, there were 5 cases (100%) of poor nutrition on deficient range of maternal vitamin D level, the p value 0.027 (significant).

There were 21 cases (56.8%) of vitamins supplement on safe range of maternal vitamin D level, there were 8 cases (61.5%) of no vitamins supplement on deficient range of maternal vitamin D level, the p value 0.506 (not significant).

There were 21 cases (75%) of workers on safe range of maternal vitamin D level, there were 16 cases (72.7%) of housewives on deficient range of maternal vitamin D level, p value < 0.001 (significant).

There were 14 cases (56%) of males on safe range of maternal vitamin D level, there were 12 cases (48%) of females on deficient range of maternal vitamin D level, there were 12 cases (48%) of females on safe range of maternal vitamin D level, p value 0.778 (not significant). as shown in table 4.

Table 4. Association between nutritional history, vitamin supplementation, occupation, and sex of the baby with maternal vitamin D levels.

	N	Maternal vitamin D						p
		Deficient		Insufficient		Safe range		
		No.	%	No.	%	No.	%	
Nutritional history								
Traditional	45	18	40	1	2.2	26	57.8	0.027*
Poor	5	5	100	0	0	0	0	
Vitamin supplement								
Yes	37	15	40.5	1	2.7	21	56.8	0.506*
No	13	8	61.5	0	0	5	38.5	
Occupation								
worker	28	7	25	0	0	21	75	< 0.001*
Housewife	22	16	72.7	1	4.5	5	22.7	
Sex of the baby								
Male	25	11	44	0	0	14	56	0.778*
Female	25	12	48	1	4	12	48	
Total	50	23	46	1	2	26	52	

*By Fisher's exact test

There were 11 cases (64.7%) of mothers age <25 years on safe range of neonatal vitamin D level, there were 11 cases (57.9%) of mothers age 25-34 years on safe range of neonatal vitamin D level, there were 12 cases (85.7%) of mothers age >35 years on deficient range of neonatal vitamin D level, the p value 0.003 (significant).

There were 17 cases (60.7%) of gravida 1-2 on safe range of vitamin D level, there were 7 cases (58.3%) of gravida 3-4 on deficient range of vitamin D level, there were 8 cases (80%) of gravid >5 on deficient range of vitamin D level, the p value 0.033 (significant).

There were 17 cases (60.7%) of Para 1-2 on safe range of vitamin D level, there were 8 cases (61.5%) of Para 3-4 on deficient range of vitamin D level, there were 7 cases (77.8%) of Para >5 on deficient range of vitamin D level, the p value 0.039 (significant).

There were 15 cases (50%) of neonates delivered by caesarian section on safe rang of vitamin D, there were 12 cases (60%) of neonates delivered by vaginal delivery on deficient range of vitamin D level, the p value 0.417 (not significant).

There were 17 cases (33.1%) of normal BMI mothers on deficient range of vitamin D level, there were 8 cases (61.5%) of overweight mothers on safe range of vitamin D level, there were 4 cases (80%) of obese mothers on deficient range of vitamin D level, the p value 0.02 (significant).

There were 19 cases (70.4%) of mothers wearing hejab on deficient range of vitamin D level, there were 16 cases (69.6%) of mothers not wearing hejab on safe range of vitamin D level, the p value 0.004 (significant) as shown in table 5.

Table 5. Association between neonatal vitamin D and different variables.

	N	Neonatal vitamin D						p
		Deficient		Safe range		Excessive amount		
		No.	%	No.	%	No.	%	
Mothers' age (years)								
< 25	17	6	35.3	11	64.7	0	0	0.003*
25-34	19	7	36.8	11	57.9	1	5.3	
≥ 35	14	12	85.7	1	7.1	1	7.1	
Gravida								
1-2	28	10	35.7	17	60.7	1	3.6	0.033*
3-4	12	7	58.3	5	41.7	0	0	
≥ 5	10	8	80	1	10	1	10	
Para								
1-2	28	10	35.7	17	60.7	1	3.6	0.039*
3-4	13	8	61.5	5	38.5	0	0	
≥ 5	9	7	77.8	1	11.1	1	11.1	
Mode of delivery								
CS	30	13	43.3	15	50	2	6.7	0.417*
NVD	20	12	60	8	40	0	0	
Body mass index of mother								
Normal	32	17	53.1	15	46.9	0	0	0.02*
Over-Weight	13	4	30.8	8	61.5	1	7.7	
Obese	5	4	80	0	0	1	20	
Mothers wearing hejab								
Yes	27	19	70.4	7	25.9	1	3.7	0.004*
No	23	6	26.1	16	69.6	1	4.3	
Total	50	25	50	23	46	2	4	

*By Fisher's exact test

There were 23 cases (51.1%) of traditional nutrition on safe range of neonatal vitamin D level, there were 5 cases (100%) of poor nutrition on deficient range of neonatal vitamin D level, the p value 0.069 (not significant).

There were 21 cases (56.8%) of vitamins supplement on excessive range of neonatal vitamin D level, there were 8 cases (61.5%) without vitamins supplement on deficient range of neonatal vitamin D level, the p value 0.246 (not significant).

There were 20 cases (71.4%) of workers on safe range of neonatal vitamin D level, there were 18 cases (81.8%) of housewives on deficient range of neonatal vitamin D level, the p value < 0.001(significant).

There were 12 cases (48%) of males on deficient range of neonatal vitamin D level, there were 12 cases (48%) of males on safe range of neonatal vitamin D level, there were 13 cases (52%) of females on deficient range of neonatal vitamin D level, there were 11 cases (44%) of females on safe range of neonatal vitamin D level, the p value 1 (not significant) as shown in table 6.

Table 6. Association between nutritional history, vitamins supplementation, occupation, and sex of the baby with neonatal vitamin D levels.

	N	Neonatal vitamin D						p
		Deficient		Safe range		Excessive amount		
		No.	%	No.	%	No.	%	
Nutritional history								
Traditional	45	20	44.4	23	51.1	2	4.4	0.069*
Poor	5	5	100	0	0	0	0	
Vitamins supplementation								
Yes	37	15	40.5	1	2.7	21	56.8	0.246*
No	13	8	61.5	0	0	5	38.5	
Occupation								
Worker	28	7	25	20	71.4	1	3.6	< 0.001*
Housewife	22	18	81.8	3	13.6	1	4.5	
Sex of baby								
Male	25	12	48	12	48	1	4	1*
Female	25	13	52	11	44	1	4	
Total	50	25	50	23	46	2	4	

*By Fisher's exact test

There were 23 cases of neonates on safe range of vitamin D level, 22 cases (95.7%) of them are product of mothers with safe range of vitamin D level.

There were 25 cases of neonates on deficient range of vitamin D level, 22 cases (88%) of them are product of mothers with deficient range of vitamin D level, the p value < 0.001 (significant) as shown in table 7.

Table 7.Association between maternal and neonatal vitamin D level

	N	Maternal vitamin D						P
		insufficient		deficient		Safe range		
		No.	%	No.	%	No.	%	
Neonatal vitamin D								
Safe	23	0	0	1	4.3	22	95.7	< 0.001*
deficient	25	0	0	22	88	3	12	
Excessive	2	1	50	0	0	1	50	
Total	50	1		23		26		

*By Fisher's exact test

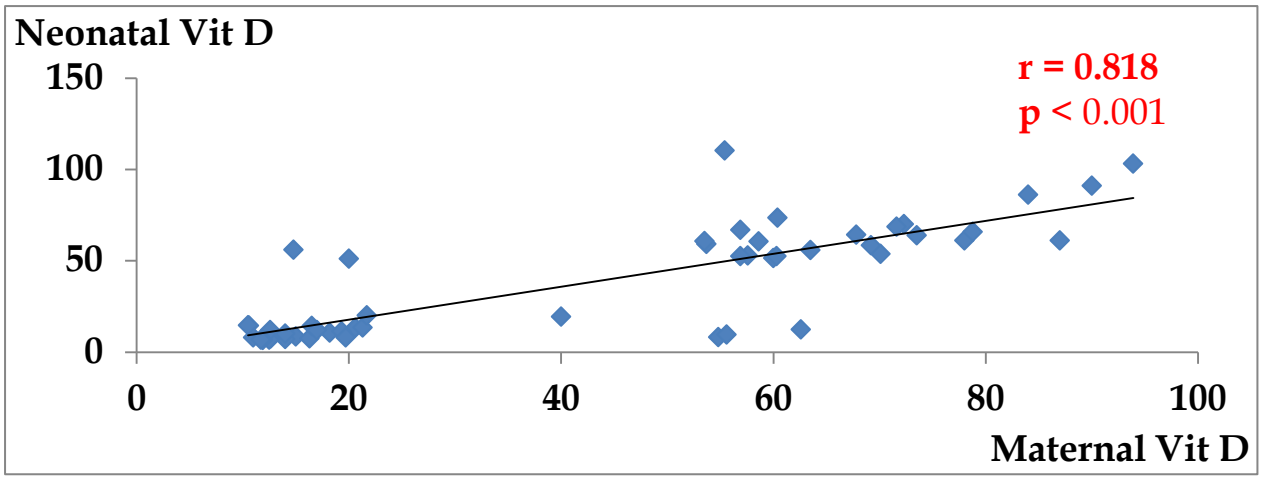

Fig.1 Correlation between maternal and neonatal vitamin D

Discussion:

Vitamin D deficiency affects more than 1 billion people and is now recognized as a major public health problem . Important biological functions involving growth and developmental outcomes have been attributed to vitamin D, and deficiency during pregnancy may result in important health consequences for both mother and child Maternal vitamin D readily crosses the placenta, and maternal levels strongly correlate with infant vitamin D concentration at birth. The major supply of vitamin D is through synthesis in the skin, following exposure to ultraviolet light. Dietary intake makes only a small contribution to vitamin D status. Adverse maternal and neonatal outcomes have previously been described in association with antenatal vitamin D deficiency, including increased risk of pre-eclampsia, gestational diabetes, caesarean section, as well as low birth weight and small for gestational age infants. Vitamin D is also thought to effect bone formation and density and modulation of the immune system. More recently, maternal vitamin D deficiency has been associated with impaired infant language development in school-aged children, and has been suggested as a possible environmental risk factor for autism spectrum disorder, highlighting the important role of vitamin D in brain development, neuronal function and gene regulation.

1.Distribution of sample by maternal demographic variables:

Most of study cases (38%) were between 25-34 years old, this due to the fact that this age range is the most common age of presentation in many studies as it is the reproductive age

among women. Most of the mothers were multigravida (56%), as the most multigravida mothers attend the antenatal clinic, while primigravida attend private doctor as this trained as present in our locality.

Most of the mothers were workers (56%),this due to that the most of the mothers at our study were worked out side house because of economic reasons. Most of the mothers were had caesarean section (60%) mode of delivery, this is goes with Scholl TO study(65), as during the last years there were increase in the incidence of caesarean section among the mothers either emergency or elective cases.

Most of the mothers were wearing hejab (54%) this due to cultural and regional back ground among the locality were where the study done by which most of the mothers wearing hejab when they gate out of the house.

2.Distribution of sample by some nutritional variables:

Most of the mothers on traditional nutritional history (90%) which maintain good nutritional supplement for the mothers during pregnancy this is due to the fact that the trained at out locality and the World Health Organization (WHO) recommend-dations (66,67).regarding nutritional supplement of the mothers during pregnancy is that the mothers need good nutrition, vitamin and iron supplementation from the 2nd trimester till delivery and folic acid supplementation for the mother 3 months before pregnancy and continued throughout whole trimesters as good nutrition for the mother will maintain good nutrition for the neonates for its rapid growth state during pregnancy and it will decrease the incidence of congenital anomalies related to poor nutrition like spinal cord defect.

Regarding the maternal vitamin supplement during pregnancy most of the mothers had vitamins supplement (74%) during whole pregnancy period this is goes with the UNICEF/WHO/UNU (1999) Composition of a multi-micronutrient(68), which stated that the most of the mothers had iron, folic acid and vitamin supplementation this is due to the same reason mentioned above regarding the importance of vitamin supplement during pregnancy.

3.Maternal vitamin D status:

Most of the mothers had vitamin D status in safe range (52%) and to less extend had deficient range (46%) of vitamin D status, this due to that the fact that vitamin D supplement as part of multivitamin supplement for mothers during pregnancy is well established by doctor weather they are at the primary health care centre or at private clinic as well as the regular visit of mother to the dentist as a part

of dental care during pregnancy who also advise the mother regarding vitamin D supplementation, the reason why some mothers had deficient vitamin D status is that either they do not attend the antenatal care regularly or may be due to some mothers believed that pregnant should not take any drugs during pregnancy even tonics.

4.Neonatal vitamin D status: Most of the neonates have deficient range (50%) of vitamin D level and to lesser extent they are in safe range(46%) this is goes with Aghajafari F study(69), the reason why most of neonates have deficient range of vitamin D level is that either they were a product of mothers with poor vitamin D level due to non supplementation during pregnancy on the other hand the neonates of safe range of vitamin D level indicate that they are product of mothers with safe range of vitamin D level. The reason why 2 neonates had excessive range of vitamin D level may be due to lab error.

5.Association between maternal vitamin D and different variables:

Most of the mothers in safe range were < 25 years old (64.7%) and between age of 25-34 years old (63.2%) the reason why due to sample character in which these ages were most common ages attending the antenatal care as mentioned above the p value 0.036 which is significant.

This also true for the gravida status in which most of mothers of safe range (64.3%) of vitamin D level were multipara due to sample characters, the p value 0.117 which is not significant. Most of the mothers with safe range of vitamin D level were overweight (76.9%) according to BMI this goes with other study Nguyen HT, von Schoultz B, Nguyen TV, Dzung DN, Duc PT, et al(70).in which good nutritional status mothers have good storage of vitamin D that important for mothers and her neonates throughout pregnancy, the p value 0.036 which is significant.

Most of the mothers of safe range of vitamin D level were not wearing hejab (73.9%) this may be due to that sun exposure for uncovered mothers might be additional natural supplement of vitamin D as compare to covered mothers, the p value 0.007 which is significant.

Most of mothers with safe range of vitamin D level were on traditional nutrition (57.8%) this goes with Nguyen HT, von Schoultz B, Nguyen TV, Dzung DN, Duc PT, et al(70), this due to the fact that our traditional nutrition is good supplement for all nutrients including vitamin D, the p value 0.027 which is significant.

Most of mothers with safe range of vitamin D level have vitamins supplement (56.8%) this goes with other study, UNICEF/WHO/UNU

(1999) Composition of a multi-micronutrient(68),by which mothers who take vitamins supplement indicate that the mother take care about herself and listing to advise regarding good nutrition, vitamins supplement and sun exposure, the p value 0.506. Most of mothers of safe range of vitamin D level were workers (75%) while most of deficient vitamin D level mothers were housewives (72.7%) this may be due to that workers mothers have good economic state compared to housewives mothers which provide her good nutrition supplement and more exposure to sun light, the p value < 0.001 which is significant.

6.Association between neonatal vitamin D and different variables:

Most of neonates of safe range of vitamin D level were product of mothers < 35 years old and this may be due to the study sample characters.

Most of neonates with safe range of vitamin D level were product of mothers with overweight (61.5%) this goes with other study Nguyen HT, von Schoultz B, Nguyen TV, Dzung DN, Duc PT, et al(70)., this due to the same reason mentioned above in that good nutrition state mother delivered baby with safe range of vitamin D level, the p value 0.02 which is significant.

On the other hand neonates with safe range of vitamin D level product of mothers who were not wearing hejab (69.6%) this due to same reason mentioned above in regard to vitamin D status among mothers who wear or not wear hejab, the p value 0.004 which is significant.

Most of neonates with safe range of vitamin D level were product of mothers with traditional nutrition (51.1%) while all neonates with deficient range (100%) of vitamin D level were product of mothers with poor nutritional history, due to good nutrition by the mothers were sufficient supply her babies with good vitamin D status, the p value 0.069 which is not significant.

On the other hand most neonates were had deficient range of vitamin D level even in vitamin supplemental mothers (61.5%),the reason why most of the neonates have deficient range of vitamin D level even in supplemental mothers is that may be the mothers have poor nutrition or wearing hejab or not take supplement regularly, the p value 0.246 which is not significant.

In regard to neonatal vitamin D status among the worker mother is that most of safe range of vitamin D level neonates were product of worker mother (71.4%) this is due to same reason mentioned above regarding the benefit of working among the mother at the study sample, the p value < 0.001 which is significant.

Correlation between maternal and neonatal vitamin D status:

There were a parallel correlation between maternal and neonatal vitamin D status(71), as the number of mothers with safe range of vitamin D level increase there will be increase in the number of neonates with safe range of vitamin D level this is goes with the reason why behind this parallel correlation due to the fact that good vitamin D.

status mother deliver a good vitamin D status neonates due to the fact that vitamin D storage by neonates occur during third trimester of pregnancy and as all the cases included in study were full term neonates (were all preterm neonates excluded from study) so all neonates with good maternal vitamin D level have good storage for vitamin D during third trimester which has seen as a good vitamin D status among the studied neonates.

Conclusion :

It is concluded that there is parallel correlation between maternal and neonatal vitamin D level and the level of vitamin D in mother and neonate are important for health of both, and education the people about the factors that make the mother and neonate on safe range of vitamin D level.

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