

Association between Vitamin D Deficiency and Bacterial Vaginosis among First Trimester Pregnant Women in Erbil Maternity Hospital

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Abstract

Background: Bacterial vaginosis (BV) is a polymicrobial clinical syndrome characterized by changes in vaginal flora, with replacement of normally abundant Lactobacillus species by high concentrations of anaerobic bacteria among reproductive age women. Studies have different aspects on the effect of vitamin D on BV.

Objective: To find out the prevalence of BV, vitamin D deficiency in early pregnancy and to examine association between BV and vitamin D deficiency.

Patients and Methods: A cross-sectional study was carried out during July 2017 till October 2018 among 100 pregnant women at first trimester pregnancy, aged 18-35 years old at Erbil Maternity Hospital.

Results: At enrollment the prevalence of BV was (53%), about (73%) of our clients suffering from homogenous white greyish vaginal discharge, (57%) were with elevated vaginal PH and fishy odor, clue cells was found among (53%) of them. Vitamin D deficiency, defined as 25 (OH) D concentration below 20 ng/ml, was found in (67%) of women. Insufficiency of the vitamin D 25(OH) D concentration between 20-30ng/ml was present in (29%) of the women. Sufficient level of 25 (OH) over (30 ng/ml) was found in (4%). The incidence of Vitamin D pattern among women with BV were (49.3%), (62.1%) and (50%) respectively for each vitamin D deficiency, Insufficiency and sufficient vitamin D. No significant association was found between Vitamin D deficiency and BV.

Conclusion: High occurrence of BV and vitamin D deficiency were found. Vitamin D was not associated significantly with increased BV incidence. We suggested that pregnant women should check and manage their level of vitamin D and BV additionally they must not depend only on vitamin D for curing BV.

Keywords: Bacterial Vaginosis (BV), Vitamin D, First Trimester Pregnancy, Erbil.

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Introduction

Bacterial vaginosis (BV) is a polymicrobial clinical syndrome characterized by changes in vaginal flora, with replacement of normally abundant *Lactobacillus* species by high concentrations of anaerobic bacteria among reproductive age women [1]. BV results from replacement of H₂O₂-producing *Lactobacillus* species with high concentration of anaerobic bacteria, the decrease in *Lactobacilli* and increase other organism considered as important indicator for subsequent BV development [2], as the result of products of bacterial metabolism (polyamines) being volatilized by vaginal fluid produced foul-smelling discharge, that often described by fishy odor [3]. Mild vulvar itch possibly some burning may occur with BV [4]. BV infection affects nearly 1 in 3 reproductive-aged women [5]. BV is a serious problem, because it is associated with a number of gynecologic conditions and adverse pregnancy outcomes [6]. There are many factors that may increase the risk for BV development including, socioeconomic status, decrease of immunological resistance of body, poor nutritional status, using intrauterine device, prior infection, multiple sexual partner [7] and Subclinical low levels of serum vitamin D may have been independently associated with prevalence of BV [8,9]. Vitamin D may reduce the risk of bacterial infections through induction of cathelicidin and defensins [10]. However, in our population estimation of the vitamin D status in relation with bacterial vaginosis among pregnant women in Erbil has not yet been performed. The adverse effect of BV on

pregnancy outcome led us to investigate bacterial vaginosis and its occurrence with the vitamin D status among pregnant women. Our objectives were to find out prevalence of bacterial vaginosis, vitamin D deficiency in early pregnancy, and finding association between Bacterial vaginosis and vitamin D deficiency.

Patients and Methods

A cross-sectional study was conducted at Erbil Maternity Hospital during July 2017 till October 2018. Questionnaire was designed to investigate the clinical syndrome about bacterial vaginosis, demographic characteristics and gestational age of pregnancy were included. Ethical permission was taken through a formal consent from hospital and from each pregnant woman during working. Blood and vaginal swab from 100 pregnant women who were participated in the study were taken. Kit for serum vitamin D detection includes Serological kits to test blood Vitamin D level, by using Cobas method. Additionally BIO Lab Diagnostic Gram stain kit, PH paper and KOH were used for diagnosis of BV by Amsel's criteria.

Diagnosis of BV

Diagnosis of BV based on the criteria proposed by Amsel and co-workers; as following

Amsel's criteria

Since 1980, Amsel with his co-workers proposed these criteria, to increase the accuracy of the diagnosis of BV. It is the most clinically used, involving assessing four clinical conditions [4]. Three of the following

four conditions must be present for the diagnosis of BV [11, 12] as followings:

1-Homogenous vaginal discharge, thin garish-white homogenous discharge that adhere to the vaginal wall.

2-Elevated vaginal pH > 4.5

PH of the vagina was tested using a pH paper (Qualigens Fine Chemicals, India) by dipping it in the secretions pooled in the posterior This was compared with a standardized colorimetric reference chart to estimate the actual pH.

3- The demonstration of clue cells on wet mount or Gram stain, they are vaginal epithelial cells coated with bacteria and have darkened by the presence of numerous small bacteria adhering to their surface.

4-Fishy odor: - depending on history of fishy discharge, or when vaginal fluid combined with Potassium hydroxide called "Whiff test". Whiff test: A drop of the vaginal fluid was taken on a grease free glass slide; to this one drop of 10% KOH was added. An intense, putrid, fishy odor indicates positive reaction [13, 14].

Vitamin D status

This was determined by the concentration of 25-(OH)D (ng/ml), and was measured in ng/ml by the Total Vitamin D II, MODULAR ANALYTICS E170 Cobas (ROCHE) method. Vitamin D status was categorized into three categories; deficient (below 20ng/ml), insufficient (20-30ng/ml) and sufficient (>30ng/ml) for additional analysis [15].

Ethical consideration

The study approved by the research ethics committee of the college of Nursing of Hawler Medical University, and a verbal informed consent was taken from each participant before being enrolled in the study.

Statistical analysis

The data were analyzed through using SPSS software for statistical analysis Version 20, for calculating descriptive statistical analysis (frequency and percentage) and inferential statistical analysis (Fisher's exact test) to determine the association between bacterial vaginosis and vitamin D.

Results

Table (1): Demographic characteristics of first trimester pregnant women.

Demographic characteristics		NO.	%
Age group/years	18-23	67	67
	24-29	29	29
	30-35	4	4
Residence	Rural	66	66
	Urban	34	34
Level of education	High	30	30
	Low	45	45
	Medium	25	25
Total		100	100

Table (1) showed demographic characteristics of first trimester pregnant women. Regarding age group highest percentage (67%) of study samples were between ages 18-23 years old. The frequency of each age group 24-29 and 30-35 were

(29%) and (4%) respectively. More than half (66%) of them were from rural area and only (34%) were from urban area. According to the level of education (45%) of them were having low, (30%) were high and (25%) were with medium level of education.

Table (2): Results of Amsel's diagnostic criteria for bacterial vaginosis among first trimester pregnant women.

Diagnosis of (Bacterial Vaginosis) by Amsel's criteria		No.	%
Vaginal Discharge	Yes	73	73
	No	27	27
Elevated Vaginal PH >4.5	Acidic	43	43
	Alkaline	57	57
Demonstration of Clue Cells in Gram Stain.	Yes	53	55
	No	47	45
Fishy Odor (Whiff test)	Yes	57	57
	No	43	43

* p value= 0.08

Table (2) presented diagnostic criteria of BV by Amsel's criteria symptoms include four criteria. Generally about half of our study samples were positive for Amstel's criteria symptoms Majority (73%) of patients were complain about having vaginal

discharge, with fishy odor among (57%) of them also large numbers (57%) having elevated vaginal PH >4.5 and final diagnostic examination was done by gram stain for vaginal swab for detection of clue cell which have been found among (53%) of

participants. Our result found that (27%), (43%), (47%) and (43%) consequently were negative for Amsel's criteria symptoms (not having Amsel's criteria).

Table (3): Prevalence of bacterial vaginosis and vitamin D levels among pregnant women.

Bacterial vaginosis	Result	No. (%)	Total
	Positive (Amsel's criteria)	53(53%)	100
Negative (Amsel's criteria)	47 (47%)		
Vitamin D	Deficiency 25(OH)D < 20ng/mL	67 (67%)	100
	Insufficiency 25(OH)D >20-30ng/mL	29 (29%)	
	Sufficiency 25(OH)D >30ng/mL	4 (4%)	

Table (3) Showed distribution of BV and vitamin D among pregnant women, among totally 100 first trimester pregnant women large number (53%) of them suffering from BV and (47%) were not having BV. Referring to vitamin D ranging from 25(OH)

D < 20ng/mL defined as deficiency found among (67%) of them, While Insufficiency of vitamin D [25(OH) D >20-30ng/mL] was detected in (29%) and safe rang which is Sufficiency level [25(OH) D >30ng/mL] were found in only (4%) of patients.

Table (4): Association between bacterial vaginosis and vitamin D.

Vitamin D level	Bacterial Vaginosis				P-Value
	Positive		Negative		
	No.	%	No.	%	
Deficiency	33	49.3	34	50.7	0.51 NS
Insufficiency	18	62.1	11	37.9	
Sufficiency	2	50	2	50	
Total	53		47		100

Table (4) Demonstrated association between vitamin D and BV high number (49.3%) of first trimester pregnant women

were positive (suffering from both BV and vitamin D deficiency) and (50.7%) were negative. While (62.1%) of them were

having BV with insufficiency vitamin D and other (39.7%) were not having BV and with insufficient vitamin D. While (50%) of women were having BV and sufficient vitamin D. According to our finding no significant relation (P- value= 0.51) was found between vitamin D and BV.

Discussion

BV is most common cause of vaginitis in reproductive age women with prevalence 16-69% [16]. BV has been suggested to associate with Vitamin D deficiency [17]. Many studies concluded that vitamin D has no effect on BV [18].

This study revealed that high prevalence of BV (53%) was among first trimester pregnant women, this may be due to the fact that our study sample age were among 18-35 which is reproductive age also many other factors affect the BV prevalence like residential area, especially in rural which occurs among (66%) of our clients, additionally majority of our study sample were with low (45%) or medium (25%) educational level. The last to factors highly related to vaginal hygienic condition.

Out of the total of (53%) of BV suffering pregnant women, our result found that most common symptoms of BV was homogenous white to grey vaginal discharge with fishy odor which present among (67%) of the study sample which was more than the total

number of BV suffering women may be due to the other vaginal infection.

The result showed that number of pregnant women who were vitamin D deficient at a level 25(OH) D concentration below 20 ng/ml (67%) higher than vitamin D sufficient at a level 25(OH) D concentration 20-30 ng/ml women (29%), the deficiency of this vitamin may due to the fact that fetal development require vitamin D through placenta during first trimester of pregnancy this may lead to the decreasing below their optimal level and result in insufficiency and deficiency in these women, several other factors may affect the level of vitamin D like: insufficient vitamin, low intake fortified food, life style, seasonal change, skin color, country of residence and inadequate exposure to sun,[19,20,21].

This study showed that (49.3%) of women suffering from BV were also deficient in vitamin D, while (50.7%) were negative for both, additionally over (62.1%) were insufficient to vitamin D and having BV, this may be because vitamin D has a number of aspect of the immune system so it may have great impact on BV [22]. In this study the prevalence of each BV and vitamin D status and their association in a representative sample of first trimester pregnant women also investigated and

showed no significant relation between vitamin D and BV ($P=0.51$), this result is consistent to those done by Turner and his coworkers, their result did not support association between vitamin D and BV [23]. Other similar results were found by another two different studies on pregnant women in clinical trial they did not found the effect of daily vitamin D supplants on BV prevalence neither support association between them [24, 25]. Other study was in agreement to those found by current study; they reported that vitamin D insufficiency is associated with BV in pregnant women [26].

Conclusions

High occurrence of BV and vitamin D deficiency was found among first trimester pregnant women. No significant association was found between BV and Vitamin D deficiency. We suggested that pregnant women should check and manage their level of vitamin D and BV in health care centers in early pregnancy because both vitamin D and BV have adverse effect on pregnancy outcome on each mothers and babies; additionally they must not depend only on vitamin D for curing BV.

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