

Assessment of Health-care Professional's Knowledge Regarding the Comorbidities of Vitamin D Deficiency and its Relationship with Uterine Fibroids



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ABSTRACT

Vitamin D deficiency is a widespread global health issue, notably prevalent in the Middle East and more severe in women. Vitamin D deficiency increases the incidence of uterine fibroids in black and white women, the most frequent benign gynecologic malignancies. This study examined health-care providers' understanding of the relationship between vitamin D insufficiency and uterine fibroid at Sulaimani Hospitals in Kurdistan, Iraq. A quantitative design, cross-sectional-descriptive study (non-probability purposive sample) of 113 female nurses and gynecologists. Data were collected using a checklist through Google Forms. The results showed that the majority of the participants were nurses (88.5%), and the remaining (11.5%) were gynecologist. Two-thirds of them work in maternity teaching hospital while others work in smart hospitals and Faruq medical cities. The results revealed that the level of knowledge was significantly associated with the position of participants and level of education ($P < 0.05$). As well, the study demonstrated that the majority of the participants were not trained regarding uterine fibroid and vitamin D deficiency. The study concluded that nearly a quarter of the health-care professionals had a medium level of knowledge, while nearly a quarter (24.8%) of them had a high level of knowledge. The study recommended to the Ministry of Health giving opportunities to health-care professionals, especially nurses, to participate in training courses, workshops, and conferences regarding the relationship between vitamin D deficiency and uterine fibroid.

Index Terms: Assessment Knowledge, Nurses, Gynecologist, Maternity Teaching Hospital, Faruq Medical City, Smart Hospital, Uterine fibroid, Vitamin D Deficiency

1. INTRODUCTION

Vitamin D is crucial for calcium balance, metabolic functions, and immune system modulation. Its deficiency is associated

with an elevated risk of non-skeletal chronic diseases such as autoimmune conditions, cardiovascular issues, and certain cancers, emphasizing its pivotal role in overall health [1].

Results of a study indicated that elevated serum vitamin D levels are strongly linked to a reduced risk of uterine fibroids (UFs), offering a promising new option for clinical treatment [2].

Vitamin D is generated in the human skin by the photochemical conversion of 7-dehydrocholesterol to cholecalciferol

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(vitamin D₃). Subsequently, vitamin D₃ undergoes metabolism to form 25-hydroxyvitamin D (25(OH)D), the primary storage and circulating form. Further transformation to the hormonal form, 1,25-dihydroxyvitamin D, occurs through hepatic and renal enzymes [3].

The worldwide prevalence of vitamin D deficiency is currently characterized as an epidemic and a significant public health concern in numerous regions. Despite the sunny conditions in the Middle East, the region continues to grapple with a high incidence of hypovitaminosis D [4].

Dietary sources of vitamin D, like fatty fish and fortified dairy products, are limited. However, the human body can synthesize vitamin D through direct exposure to sunlight's ultraviolet B radiation on the skin [5].

The role of vitamin D in the biology and therapy of uterine fibroids has been well investigated [6].

A selective progesterone modulator has received approval for short-term therapy for addressing symptomatic fibroids [7].

The common symptoms associated with leiomyomas include menorrhagia, pelvic pain or pressure, and subfertility. These symptoms vary from one patient to another and do not necessarily correlate to the size of the fibroids. Abdominal-pelvic examination may be normal if the fibroids are small, but most patients with uterine fibroids are asymptomatic and require no treatment [8].

The purpose of this study was directed at:

1. Assess the socio-demographic characteristics of the study sample.
2. Assess the level of health-care professionals' knowledge regarding the relation between vitamin D deficiency and the occurrence of uterine fibroid in Sulaimani hospitals in the Kurdistan region of Iraq.
3. To detect an association between some socio-demographic data and the level of health-care professionals' knowledge regarding the relation between vitamin D deficiency and uterine fibroid.

2. PATIENTS AND METHODS

2.1. Study Design

A quantitative design, cross-sectional-descriptive study has been implemented to assess the health-care professionals' knowledge regarding the comorbidities of vitamin D deficiency and its relationship with several diseases, especially

uterine fibroids, in Sulaimani hospitals during the period of August 10–October 15, 2021.

2.2. Administrative Approvals

Approval letters were secured from the College of Nursing/ University of Sulaimani and the Sulaimani Directorate of Health for conducting the study at Maternity Hospital, Smart Hospital, Faruq Medical City, and Bakhshin Hospital (but Bakhshin Hospital rejected participation).

2.3. Setting of the Study

The study was conducted at Maternity Teaching Hospital, Smart Hospital, and Faruq Medical City. Maternity Teaching Hospital had three types of employment (governmental, voluntary, and contract) with a mix of institute- and university-graduated nurses. Smart Hospital and Faruq Medical City were private hospitals with contract employees.

2.4. Sample of the Study

A non-probability (purposive) sample included 113 female nurses and gynecologists working in obstetric and gynecological wards.

2.5. Inclusion and Exclusion Criteria

Inclusion criteria covered all female nurses and gynecologists with all educational levels and employment types, while exclusion criteria comprised health-care providers who refused to participate, male nurses, and all doctors except gynecologists.

2.6. Study Instrument

A questionnaire, developed from a literature review, covered demographic information, questions about uterine fibroids, and vitamin D deficiency.

2.7. Validity

Content validity was established by eight experts who checked the questionnaire of this study and gave us their opinions, resulting in modifications for clarity and relevance. The final instrument was deemed valid for data collection.

2.8. Pilot Study

A pilot study was conducted with 20 health-care workers from the main study sample during the period of July 20 to August 1, 2021.

2.9. Reliability

The reliability of the knowledge determined regarding vitamin D deficiency and uterine fibroids was determined

through the use of the internal consistency (split-half) approach and the Cronbach Alpha Correlation Coefficient. Yielding a high correlation coefficient ($r = 0.81$).

2.10. Methods of Data Collection

The study selected all female nurses who work in Maternity Hospital and each department of obstetrics and gynecology in Faroq and Smart hospital, but only 113 nurses and gynecologists agreed to participate in our study. Data were collected through a Google Form sent to participants via head nurses in their respective hospitals. The collection period started from August 10 to October 15, 2021. The questionnaire, covering demographic data and knowledge about deficiency of vitamin D and uterine fibroids from health-care professionals, took approximately 10–15 min per participant. The study included 113 health-care professionals due to non-participation and dropouts several health-care professionals.

2.11. Statistical Analysis

The data were organized and coded into computer files using the statistical package of social science (SPSS), version 26. The data were performed through the computation of frequency and percentage, inferential data analysis, and the Chi-square test. The P -value is considered to be high-significant ($P < 0.01$), significant ($P < 0.05$), or non-significant ($P > 0.05$).

3. RESULTS

Table 1 revealed that all participants (100%) were female; their mean age was 32 ± 65.3 . Nearly most of the participants in the current study were nurses (88.5%), and the remaining (11.5%) were gynecologists. More than three-quarters of them worked in the Maternity Teaching Hospital (77%) while 11.9% and 7.1% worked in Smart Hospital and Faroq Medical City, respectively. 56.7% of them had more than 5 years of experience at the hospital, and 93% and 94.7% of them did not train regarding uterine fibroid and vitamin D deficiency, respectively.

Table 2 demonstrated that more than half of the participants chose the correct answer in items 1, 7, and 8, while less than half chose the false answer in all other items, but more than half did not know the answer in items 4, 5, and 6.

Table 3 showed that more than half answered correctly in item 1, while only 15.9% (11%) answered correctly in items 4 and 6, which are negative questions. Only 58.4% (69.9%) of them chose the correct answer in items 2 and 9, respectively.

Table 4 indicated that more than half of the participants chose the correct answer in items (1, 2, 3, 5.a., 5.b., 5.d., 5.e., 5.f.).

Table 5 demonstrated that more than half of the participants answered correctly on all items except item 8, which dealt with the fact that uterine fibroids do not interfere with ovulation but impair fertility.

Table 6 revealed that more than half of the participants chose the correct answer only in items 1.a., 1.I., and 4.a., and nearly a quarter of them chose the false answer in items 1.b., 1.m., 1.n., and 2.

Figure 1 showed that nearly a quarter of the health-care professionals (74.3%) had a medium level of knowledge about uterine fibroid and vitamin D deficiency, while only 24.8% of them had a high level of knowledge.

Table 7 explores that the level of knowledge was significantly associated only with the position of participants and level of education, at $P < 0.05$.

4. DISCUSSION

The purpose of the present study is to analyze the health-care professionals about the association between uterine fibroid and vitamin D insufficiency in one government and two private hospitals in Sulaimani city. The great thing is that the current study is the first to analyze the health-care providers relating about uterine fibroid and vitamin D deficiency among Kurdish employees' women in the Kurdistan area of Iraq. A study by Guo *et al.* [2] demonstrated that a significant correlation has been established between a deficiency in vitamin D and the development of leiomyomas.

Therefore, administration of vitamin D3 may decrease the size of fibroids [9]. It seems that vitamin D supplementation is an effective strategy to treat it.

Regarding socio-demographic data, the current study showed that all participants were female. More than half of them were government employees, married, nearly half of them had (1-3) children, less than a quarter of them were gynecologists, and the majority of them were nurses' staff. Among this, nearly half of the nurses graduated from the Institute of Nursing, and more than half of them had more than five years of experience at the hospital. Nearly all of them lived in urban regions. Nearly all of them did not participate in training courses regarding uterine fibroid and vitamin D deficiency and their comorbidities.

TABLE 1: Socio-demographic data

Item	Classes	Frequency	Percentage
Gender	Female	113	100
Age	22–30	43	38
	31–41	36	32
	41–50	25	22
	Up to 51	9	8
	Level of education	Secondary School of Nursing	25
	Institute of Nursing	52	46
	College of Nursing	23	20.4
	Postgraduate (M.Sc. and Ph.D.)	13	11.5
Position	Nurse	100	88.5
	Gynecologist	13	11.5
Marital status	Single	26	23
	Separated	1	0.8
	Married	86	76.2
Number of children	Zero	34	30.1
	1–3	58	51.4
	4–5	20	17.7
	More than 5	1	0.8
Residential Area	Urban	110	97.4
	Sub-Urban	2	1.8
	Rural	1	0.8
Years of Employment	1985–1991	4	3.6
	1992–1997	11	9.8
	1998–2003	30	26.6
	2004–2009	27	23.8
	2010–2015	16	14.1
	2016–2021	25	22.1
Type of Employment	Contract employee	14	12.3
	Governmental employee	72	63.8
	Voluntary employee	27	23.9
Name of Hospital	Farq medical city	8	7.1
	Maternity hospital	87	77
	Smart hospital	18	15.9
	How many years do you work in this hospital?	<1 year	24
	1–5 years	25	22.1
	More than 5 years	64	56.7
Did you do a vitamin D investigation recently	Yes	64	56.7
	No	49	43.3
Number of training courses regarding uterine fibroids	No training	105	93
	1–3	7	6.2
	>3	1	0.8
Number of training courses regarding vitamin D deficiency	No training	107	94.7
	1	5	4.5
	20	1	0.8

TABLE 2: Some items regarding age, gender, obesity and uterine fibroid

No.	Items	True	False	I don't know
1.	The incidence of pathologically diagnosed fibroids increases with age	63 (55.8)	24 (21.2)	2 (23)
2.	Myomas occur rarely before puberty and their frequency decreases with menopause	46 (40.8)	32 (28.3)	35 (30.9)
3.	The rate of hospitalization for uterine leiomyomas increases by age	48 (42.4)	36 (31.9)	29 (25.7)
4.	The risk of developing a fibroid is few in white women than in black women.	22 (19.5)	26 (23)	65 (57.5)
5.	Black women are diagnosed earlier in life, fibroids in these women are often multiple, larger and cause more severe symptoms compared to other ethnic groups	26 (23)	21 (18.6)	66 (58.4)
6.	Black women are more than two times more likely to undergo a hysterectomy	23 (20.4)	25 (22.1)	65 (57.5)
7.	Genetic is one of predisposition to leiomyomas	94 (83.1)	4 (3.6)	15 (13.3)
8.	Reduced risk of uterine fibroids has been found in those women who lost weight	73 (64.6)	31 (27.5)	9 (7.9)
9.	Visceral fat is associated with the presence of uterine fibroids, while subcutaneous fat thickness was not significantly associated with it	54 (47.8)	30 (26.6)	29 (25.6)

TABLE 3: Some items regarding reproductive factors and uterine fibroid

No.	Items	True	False	I don't know
1.	Pregnancy (high parity) is a risk factor for developing uterine fibroids	24 (21.3)	75 (66.4)	14 (12.3)
2.	Breastfeeding has been found to have little to no influence on fibroid incidence	66 (58.4)	29 (25.7)	18 (15.9)
3.	There is an inverse association between early age at menarche and fibroid incidence.	33 (29.2)	26 (23)	54 (47.8)
4.	There is a strong relation between late age at menopause and risk for fibroids	38 (33.7)	18 (15.9)	57 (50.4)
5.	Progesterone acts primarily by increasing cell responsiveness to estrogen	23 (20.4)	20 (17.7)	70 (61.9)
6.	At the fibroid level, the number of progesterone receptors is elevated.	24 (21)	12 (11)	77 (68)
7.	Polycystic ovary syndrome is associated with a higher incidence of fibroids.	48 (42.5)	27 (23.9)	38 (33.6)
8.	Both in women receiving estrogens only and in those receiving combined therapy, a correlation with the growth of fibroids is shown.	33 (29.2)	13 (11.6)	67 (59.2)
9.	The use of oral contraceptives is the risk factor for the incidence of uterine leiomyoma	79 (69.9)	18 (15.9)	16 (14.2)
10.	Hyperinsulinemia may directly or indirectly influence the development of fibroids.	42 (37.1)	25 (22.1)	46 (40.8)

TABLE 4: Some items regarding the relation between lifestyle, diet and vitamin D

No.	Items	True	False	I don't know
1.	Vitamin D is a fat-soluble vitamin.	74 (65.4)	8 (7.1)	31 (27.5)
2.	Physical inactivity is involved in fibroids development and growth.	70 (61.9)	37 (32.8)	6 (5.3)
3.	Stress is involved in fibroids development and growth.	48 (42.5)	38 (33.6)	27 (23.9)
4.	Deprivation of some diets rich in vitamin D is involved in fibroids development and growth.	60 (53.1)	28 (24.8)	25 (22.1)
5.	These foods rich in vitamin D			
5.a	Fish oil liver	96 (85)	7 (6)	10 (9)
5.b	milk and egg	104 (92)	5 (4.5)	4 (3.5)
5.c	Some fish such as: salmon, sardine, and tuna.	95 (84)	9 (8)	9 (8)
5.d	Alcohol consumption	2 (1.8)	10 (88.5)	11 (9.7)
5.e	Caffeine consumption	1 (0.8)	108 (95.5)	4 (1.7)
6.	Childhood exposure to physical, sexual, and emotional abuse seems to increase leiomyoma risk.	19 (16.8)	56 (49.6)	38 (33.6)

TABLE 5: Some statements regarding signs and symptoms of uterine fibroid

No.	Items	True	False	I don't know
1.	Uterine fibroid is a benign tumor of the uterus	65 (57.6)	34 (30)	14 (12.4)
2.	The symptoms of fibroids are depending on the location of the fibroid	76 (67)	10 (9)	27 (24)
3.	The treatment of uterine fibroid is depending on the location of it.	81 (71.7)	11 (9.7)	21 (18.6)
4.	The main causes of uterine fibroids are unknown	82 (72.6)	18 (15.9)	13 (11.5)
5.	Most women who have uterine fibroids do not have any symptoms	72 (63.8)	31 (27.4)	10 (8.8)
6.	Fibroids that occur near the uterine lining can cause heavy or painful periods, longer periods, or spotting at other times.	97 (85.9)	1 (0.9)	15 (13.2)
7.	Large fibroids may cause pelvic pain and pressure on the bladder (causing frequent urination or blocking urination)	10 (89.4)	2 (1.8)	10 (8.8)
8.	Uterine fibroids do not interfere with ovulation but impair fertility	40 (35.4)	9 (7.9)	64 (56.7)

However, knowledge is indispensable for health-care professionals, as underscored in the influential study by Sharif *et al.* [10]. This research highlights the crucial role of knowledge, especially for nurses, who, being closest to patients, play a vital part in reducing stress and anxiety through education.

However, the importance of knowledge is described in many studies; one of them is the study of Sharif *et al.* [10], which mentioned that knowledge plays a crucial role for health-care professionals in general, especially for nurses, because the nurses are the nearest person for the patients

to teach them and decrease their stress and anxiety from their diseases.

Table 2 in the current findings revealed that more than half of the participants selected the correct answer (true) in items that deal with (genetic predisposition to leiomyomas, weight loss is associated with a decreased risk of uterine fibroids in women, and uterine fibroids are linked to visceral fat, but there's no significant association with subcutaneous fat thickness. On the other hand, the same table in the present study indicated that more than half of the participants did not know the answer to the items that were explained

TABLE 6: Some facts regarding deficiency, signs and symptoms and interaction of vitamin D with some medications

No.	Items	True	False	I don't know
1. Vitamin D deficiency can cause these diseases or conditions (frequency [%])				
1.a	Insufficient vitamin D, the intestine is unable to absorb calcium and phosphorus.	80 (70.8)	5 (4.4)	28 (24.8)
1.b	Associated with autoimmune diseases	54 (47.9)	24 (21.2)	35 (30.9)
1.c	Associated with multiple sclerosis	17 (15)	11 (9.8)	85 (75.2)
1.d	Associated with hypertension	22 (19.5)	45 (39.8)	46 (40.7)
1.e	Associated with cardiovascular diseases	29 (25.7)	40 (35.4)	(38.9)
1.f	Associated with cancer	21 (18.6)	41 (36.2)	51 (45.2)
1.g	Associated with type II diabetes mellitus	30 (26.6)	38 (33.6)	45 (39.8)
1.h	Bacterial vaginosis	17 (15)	54 (47.8)	42 (37.2)
1.i	Increased risk of respiratory infection for maternal health	22 (19.5)	38 (33.6)	53 (46.9)
1.j	Increased risk of asthma for maternal health	11 (9.8)	55 (48.6)	47 (41.6)
1.k	Increased risk of schizophrenia for maternal health	18 (15.9)	43 (38.1)	52 (46)
1.l	Associated with increased risks for osteomalacia and osteoporosis	104 (92.1)	0 (0)	9 (7.9)
1.m	May lead to miscarriage	49 (43.3)	27 (23.9)	37 (32.8)
1.n	Vitamin D deficiency influenced preeclampsia and gestational diabetes mellitus.	35 (30.9)	22 (19.5)	56 (49.6)
2.	Patients with vitamin D deficiency should receive oral vitamin D2, 50,000 IU/ week for 8 weeks	43 (38.1)	23 (20.3)	47 (41.6)
3. Signs and symptoms of vitamin D toxicity				
3.a	Nausea, vomiting	75 (66.3)	10 (8.9)	28 (24.8)
3.b	Pancreatitis	32 (28.3)	15 (13.2)	66 (58.5)
3.c	Vascular calcinosis	31 (27.4)	17 (15)	65 (57.6)
4. Interaction of vitamin D supplements with some medications				
4.a	Vitamin D supplements interact with cholesterol lowering statins such as atorvastatin	24 (21.2)	11 (9.8)	78 (69)
4.b	Vitamin D supplements do not work as well if taken high-dose vitamin D supplements, Thiazide diuretics	19 (16.8)	10 (8.9)	84 (74.3)
4.c	Could raise blood calcium level too high if taking vitamin D supplements and Steroids such as prednisone (Deltasone)	27 (23.9)	4 (3.5)	82 (72.6)

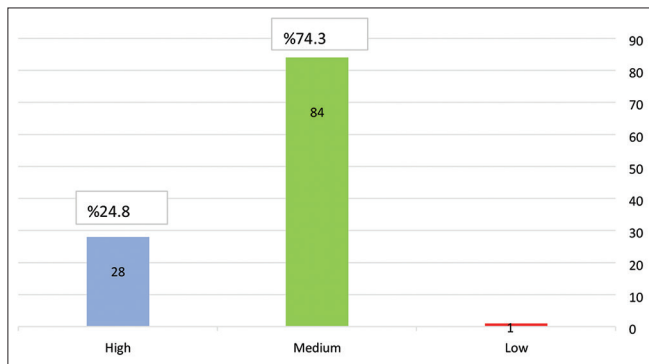


Fig. 1. Level of knowledge of the participants regarding uterine fibroid and vitamin D deficiency.

(fibroid risk is lower for white women compared to black women, black women are diagnosed with fibroids earlier, they often experience multiple, larger fibroids with more severe symptoms than other ethnic groups, and black women are over twice as likely to have a hysterectomy). Less than half of them chose the correct answer in the variables: myomas occur rarely before puberty, their frequency decreases with menopause, and the rate of hospitalization for uterine leiomyomas increases with age. Actually, women

of reproductive age have a considerably higher prevalence of uterine fibroids. This is owing to hormonal changes in females that lead to the tumor's origin. Estrogen and progesterone contribute to the progression and promotion of uterine fibroids [11]. It has increased with age during the reproductive years, reducing after menopause [12]. Especially, as noted, occur in black females [13]. Obesity is responsible for an increase in the conversion of adrenal androgens to estrogen and a lower hepatic synthesis of sex hormone-binding globulin, resulting in more unbound active estrogen. Thickness, or the expression of visceral fat, was connected with the existence of fibroids, but subcutaneous fat thickness was not substantially associated with the disease [14].

Regarding the items it deals with (there is a strong relationship between late age at menopause and risk for fibroids, and at the fibroid level, the number of progesterone receptors is elevated), less than a quarter replied properly, which is the (false) answer. More than half of them pick the correct answer in the items that are discussed (breastfeeding has been found to have little to no influence on fibroid incidence, and the use of oral contraceptives is the risk factor for the incidence of uterine leiomyoma). During the menopause

TABLE 7: Association between the level of knowledge and some socio-demographic data

Items	Classes	Knowledge level			Total	P-value
		High	Low	Medium		
Age	20–30	12	1	30	43	0.398
	31–40	12	0	23		
	41–50	6	0	20		
	>51	0	0	9		
	Total	30	1	82		
Level of education	Secondary School of Nursing	2	0	22	24	0.002
	Institute of Nursing	10	0	43		
	College of Nursing	11	1	11		
	Postgraduate (M.Sc. and Ph.D.)	7	0	6		
	Total	30	1	82		
Position	Nurse	23	0	77	100	0.001
	Gynecologist	7	1	5		
	Total	30	1	82		
Type of employment	Contract employee	4	0	10	14	0.151
	Voluntary	12	0	15		
	Government employee	14	1	57		
	Total	30	1	82		
Number of training courses regarding uterine fibroids	0	29	1	76	106	0.987
	1	1	0	4		
	2	0	0	1		
	>3	0	0	1		
	Total	30	1	82		
Number of training courses regarding vitamin D	0	28	1	73	102	0.944
	1	2	0	8		
	2	0	0	1		
	Total	30	1	82		

stage, the levels of key hormones are altered. For instance, follicle-stimulating hormone levels start to climb gradually, marking the end of reproductive years, whereas estrogen and progesterone gradually decrease [15]. According to a Chinese study by Ying *et al.* [16], which revealed that women of childbearing age with more than an equal body mass index and use of oral contraceptives are at risk of uterine leiomyoma.

Table 3 in the present study showed that less than half of the participants answered correctly regarding the items of polycystic ovary syndrome [PCOS] which is associated with a higher incidence of fibroids, both in women receiving estrogens only and in those receiving combined therapy. A correlation with the growth of fibroids is shown, but more than half of them answered correctly about the use of oral contraceptives as a risk factor for the incidence of uterine leiomyoma.

Low 25-hydroxyl vitamin D (25(OH)D) levels have been connected with endocrine disturbances in PCOS women. Moreover, vitamin D might alter the steroidogenesis of both estradiol and progesterone in healthy women, where low levels of 25(OH)D might be associated with infertility [17].

The usage of oral contraceptives and a body mass index $>25 \text{ kg/m}^2$ were the risk factors for the occurrence of uterine leiomyoma in Chinese women of reproductive age [16].

The outcomes of the current study showed that more than half of the participants chose the correct response regarding vitamin D in items that talk about (vitamin D is a fat-soluble vitamin, physical inactivity is involved in fibroids development and growth, deprivation of some diets rich in vitamin D is involved in fibroids development and growth, and foods rich with vitamin D such as fish oil, liver, milk, and eggs, some fish such as salmon, sardine, and tuna, alcohol consumption, and caffeine consumption. Whereas, less than half answered correctly concerning the involvement of stress in fibroids development and childhood exposure to physical, sexual, and emotional abuse). However, the incidence of clinical fibroids among premenopausal women is increasing due to the chronicity and severity of child and teenager physical and sexual abuse [18]. Although fewer than nearly half of them answered erroneously regarding this subject (49.6%).

Age is a crucial non-modifiable risk factor for fibroid development, with diagnoses peaking at 50 years. Myomas do not occur before puberty and decrease with menopause. The

development and growth of fibroids appear to be influenced by various modifiable risk factors, including physical inactivity, stress, and caffeine consumption. Regular exercise may protect against fibroids by lowering sex hormones, insulin, and circulating estrogen while increasing sex hormone-binding globulin levels. Women who exercise regularly have a lower risk of fibroids compared to those who don't. Stress is a potential factor in fibroids risk. Childhood abuse, including physical, sexual, and emotional abuse, increases leiomyoma risk, while supportive relationships can mitigate this. Stressful experiences are also linked to a higher body mass index and obesity [14]. Women 35 years of age in the highest risk categories of caffeinated coffee (≥ 3 cups/day) and caffeine intake (≥ 500 mg/day) were both associated with higher fibroid risk [19]. As well, a study found a positive link between event frequency and fibroid prevalence, especially in white women. Socioeconomic adjustments slightly reduced the effect. Stress intensity was correlated with fibroids in white women across all stress levels, compared to those without such experiences [20].

Concerning uterine fibroid, more than half of the participants accurately responded to variables regarding (uterine fibroid is a benign tumor of the uterus, the symptoms and treatment of fibroids are depending on the location of the fibroid, the main causes of uterine fibroids are unknown, most women who have uterine fibroids do not have any symptoms, fibroids that occur near the uterine lining can cause heavy or painful periods, longer periods, or spotting at other times, and large fibroids may cause pelvic pain and pressure on the bladder (causing frequent urination or blocking urination) but less than half of them were answered correctly regarding the item of (fibroids do not interfere with ovulation but impair fertility). The researchers returned this result to the lack of participation of health-care workers in training courses regarding uterine fibroid and vitamin D deficiency. As the current study detected, almost all of the participants did not participate in the training courses regarding vitamin D deficiency and uterine fibroid.

The present study revealed some diseases that are due to deficiency of vitamin D, such as lack of absorption of calcium and phosphorus by the intestine, autoimmune diseases, multiple sclerosis, hypertension, cardiovascular diseases, cancer, diabetes mellitus (DM), bacterial vaginosis, increased risk of respiratory infection, asthma, and schizophrenia for maternal health, osteomalacia and osteoporosis, miscarriage, preeclampsia, and gestational DM.

A study by Andersen *et al.* [21] demonstrated that there is a relationship between 25(OH)D and first-trimester

miscarriages, indicating vitamin D as a modifiable risk factor for abortion. A study indicated that vitamin D receptors are located in many different tissues, e.g., the brain, prostate, and immune system organs. Vitamin D is considered to lessen the risk of various chronic diseases, among them diabetes, cardiovascular diseases, and multiple sclerosis. Vitamin D has been proposed to reduce the incidence of breast, prostate, and colorectal cancers, presumably due to better regulation of cell differentiation, angiogenesis suppression, and apoptosis promotion [22].

Another study supported the idea that vitamin D is responsible for boosting intestinal absorption of calcium and phosphate, which is directly related to the preservation of the proper structure and function of the skeletal system. Vitamin D insufficiency is often linked to diabetes, cancer, and autoimmune illnesses [23]. Recently, vitamin D was suggested to prevent and treat autoimmune disorders such as rheumatoid arthritis, type 1 diabetes, and multiple sclerosis [24]. Vitamin D may inhibit uterine fibroid cells and reduce lesions, making it a potential anticancer agent. Vitamin D deficiency has been linked to uterine fibroids [25]. An observational British birth study found a linear connection between serum 25OHD content and a decreased risk of acute respiratory tract infection [26]. Many epidemiological studies link schizophrenia to vitamin D deficiency. In particular, two major studies linked infant vitamin D insufficiency to schizophrenia risk [27]. Vitamin D deficiency is linked to bacterial vaginosis and may explain its high racial inequality [28]. Preeclampsia women and their newborns had increased rates of 25(OH)D deficiency, while obesity did not affect levels. Obese pregnant women gave their fetuses less 25(OH)D [29]. The normal vitamin D range is 50–125 nmol/L [30]. The World Health Organization divided women into three groups based on 25-hydroxy vitamin D3 levels:

- Deficient vitamin D3: 25-hydroxy vitamin D3 < 10 ng/mL.
- Insufficient vitamin D3: 25-hydroxy vitamin D3 level 10–19.9 ng/mL.
- Vitamin D3: 25-hydroxy level ≥ 20 ng/mL: adequate [31]. Oral ergocalciferol (vitamin D2) at 50,000 IU/week for 2 months treats vitamin D insufficiency. After adjusting it, specialists recommended 800–1,000 IU of cholecalciferol (vitamin D3) from nutrition and supplements [32].

Regarding the signs and symptoms of vitamin D toxicity, which are nausea, vomiting, pancreatitis, and vascular calcinosis, more than half of the health-care professionals did not respond with the correct answers. Whereas hypercalcemia can cause acute pancreatitis if vitamin D levels

are too high [33]. Vitamin D intoxication causes nausea and vomiting [34]. Concerning the interaction of some drugs with vitamin D supplements, such as cholesterol-lowering agents such as atorvastatin, thiazide diuretics, and steroids such as prednisone, nearly three-quarters of them did not answer correctly. A study demonstrated that thiazide diuretics are used to treat blood pressure, edema, and kidney stones in hypercalciuria patients, but vitamin D supplementation may cause or worsen hypercalcemia. Prednisone, hydrocortisone, and dexamethasone are used for adrenal replacement, immunological suppression, and chemotherapy. Osteoporosis is a common corticosteroid side effect. Vitamin D metabolism changes may be a mechanism [35]. Activated and complicated, vascular calcification causes arterial and pulse wave velocity stiffness by depositing calcium in artery walls. Finally, cardiovascular illness diminishes artery elasticity and changes cardiovascular hemodynamic parameters, causing morbidity and mortality. End-stage arterial hypertension, cardiac hypertrophy, ischemic heart disease, or peripheral arterial disease dramatically increases mortality in people over 55. Calcium deposits in vessel walls are a major risk factor for severe ischemia episodes [36].

Concerning the level of knowledge of the participants regarding uterine fibroid and vitamin D deficiency, the present study showed that nearly a quarter of them had a high level of knowledge, while nearly three-quarters of them had a medium level of knowledge.

The findings were communicated to health-care professionals who did not actively participate in training courses regarding uterine fibroid and vitamin D deficiency. It's noteworthy that the predominant demographic in the data comprised nurses. However, around 25% of them had employment spans falling within the years 1998-2003, and over half had accumulated more than five years of experience in the department where they conducted vitamin D investigations.

Regarding the association between the level of knowledge and some socio-demographic data, there was no significant association between the level of knowledge and socio-demographic data except level of education and position of health-care professional (0.02, 0.02), respectively.

Nurses enhance medical teams by sharing information with patients, including discussions about expectations for quality of life. They must show understanding of patients' needs, communicate effectively using understandable language, and maintain awareness of boundaries in patient interactions [37]. The researchers identified a problem where health-care

professionals, lacking sufficient knowledge, faced challenges instructing and educating patients, resulting in complications for the patients. Therefore, this study suggests to the Ministry of Health in the Kurdistan Region of Iraq an increased focus on enhancing the scientific expertise of medical personnel. This can be achieved through their participation in training courses, seminars, workshops, and conferences, elevating their ability to provide practical and scientifically informed patient care.

5. CONCLUSION

In summary, the study showed that the risk of vitamin D deficiency leads to many comorbidities and diseases, including uterine fibroid. As well, the results of the current study indicated that nearly three-quarters of the participants had a medium level of knowledge and nearly a quarter of them had high-level knowledge, respectively, regarding the comorbidities of vitamin D deficiency and its relationship with uterine fibroids. And the level of their knowledge was only significantly associated with their position and level of education.

6. RECOMMENDATION

Health-care professionals need to participate in training courses, seminars, workshops, conferences, and booklets related to uterine fibroid and vitamin D deficiency in those hospitals that include obstetrics and gynecology departments. Collaboration is essential among health-care professionals, particularly gynecologists, who, due to their extensive knowledge and advanced studies, play a crucial role in partnering with other team members, including nurses.

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