

▪ **Basic Research**

Influence of Vitamin D Level on Self-Perceived Fatigue, Body Mass Index and Health Related Quality of Life among Female Nurses in Two Governorates.

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Abstract

Context: Vitamin D deficiency has been combined with fatigue, headache, musculoskeletal pain, weakness, as well as depression. Fatigue is a popular complain among nurses due to working on difficult settings, Low serum vitamin D is more prevalent among obese people; increase of BMI which lead to diminish nurses` self-confidence and feeling of failure. Nurses, who feel fatigue, increase BMI could not be good caregivers to the patients. **Aim:** the study aimed to examine influence of vitamin D level on self-perceived fatigue, Body Mass Index, and health related quality of life among female nurses. **Methods:** A cross-sectional study was conducted among 400 female nurses working in the main university hospital, Alexandria University and El-Kaser El-Any Obstetric hospital, Cairo University. Four tools were used for data collection. Tool I: a Structured interview questionnaire, to assess socio-demographic characteristics; Tool II: assessment of two parts: Body mass Index calculation and 25-hydroxyvitamin D to determine level of serum vitamin D; tool III: SF-12 to measure general health status and well-being; and tool IV: Fatigue assessment scale was used to assess the perceived fatigue level among female nurses. **Results:** the highest percent of nurses in both Alexandria and Cairo nurses had insufficiency level of 25-OHD. A statistically significant inverse correlation between vitamin D level and increase BMI, nurses` self-perceived fatigue level was observed while statistically significant direct correlation was found between vitamin D and quality of life.

Conclusion: High prevalence of fatigue, obesity and decrease level quality of life among nurses could be attributed to vitamin D deficiency.
Recommendation: study recommended periodic vitamin D check-ups in hospitals and setting of national health policies for screening and prevention of vitamin D deficiency to nurses in Egypt to prevent its complications.

Keywords: body mass Index; health related quality of life; nurses; Self-perceived fatigue; Vitamin D.

1. Introduction

Vitamin D plays a crucial role in decreasing the risk of several diseases. However, the indoor activities and contemporary dietary habits is lower than the recommended (Holick 2012). Vitamin D deficiency has been combined with fatigue, headache, musculoskeletal pain, weakness as well as depression. (Kerr 2015; Witham 2015). Other studies found relation between low serum D is linked with muscle fragility and inadequate physical function as well as an increased risk of falls among older adults (Wilhelm-Leen, 2010; Mason, 2016).

Mechanism of the storage of vitamin D; depend on the fat-soluble secosteroid hormone, and the skin area exposed sunlight. In addition, cutaneous production of vitamin D is markedly altered by application of sunblock, increasing age and seasonal effects due to location (Cheng, 2010).

Fatigue is a common medical problem in primary care centers in developed and developing countries. Fatigue can result in loss of productivity time as well as impaired quality of life (Ricci et al; 2007). Fatigue is a is a popular feeling among nurses due to working on strenuous settings for instance oncology, or emergency departments. Caring of incurable patients and working in three shifts lay a noticeable physical, psychological, and spiritual pressure upon nurses (Eldevik et al., 2013). In addition, twelve hours shift work is

associated with physical and psychophysiological health complications (Saleh, 2018). Chronic Fatigue Syndrome (CFS) is believed as being the extreme of fatigue. It is approximately (0.3) to (1%) in public, while it is practically twice among nurses (Abdi, 2008). Nurses steadily felt that they could not work with patients and deliver care duties which diminish their self- confidence and causes a feeling of failure (Abdi, 2008).

World Health Organization (WHO) (2019) defined obesity as “a Body Mass Index (BMI) of 30 kg/m or more is pandemic”. Obesity means an extreme accumulation of body fat and causes a real threat to health. The prevalence of females’ obesity is (39.1%). Increased body weight had increased the chance for preventable health conditions; additionally, co-occurrence associated absenteeism and losses in productivity (Ku, Phillipsb & Fitzpatrickc, 2019). Low serum vitamin D is more widespread among obese individuals than normal weight peers with an increase of (1%) of BMI is linked with a (5%) decrease in serum vitamin D levels possibly compounding the health risks associated with obesity (Al-Malki, Al-Jaser & Warsy , 2003; Holick , 2012; González-Molero et al, 2013; Jawad & Baiee , 2020). Nurses are crucial providers of healthcare and many are overweight or obese (Kaur & Walia, 2008 ; Peplonska, Bukowska & Sobala , 2015).

Nurses are knowledgeable regarding the importance of health-promoting activities that affect perceived quality of life such as healthy eating, physical activity, sleep, and maintaining healthy relationships. They are in a key position to counsel their patients regarding the importance of engaging in healthy lifestyle behaviour's such as eating a nutritious diet, on the other hand knowledge that nurses possess regarding health-promoting behaviour's may not

translate into nurses' own self-care (Rahnavard et al, 2018). The association between vitamin D status and QoL was tested among various populations including elderly subjects, unhealthy populations of various ages (Rafiq et al, 2014) (Ohta et al, 2014). The association between levels of vitamin D and QoL has not been tested in healthy

Long 12 hours shifts provide little exposure to sunlight, change eating behaviours and may have its subsequent effect on deficiency of vitamin D. The present study examined the relation between perceived nurses' fatigue, BMI, their effect on health quality of life and vitamin D levels in female nurses working in Alexandria and Cairo in 2020.

2. Significance of the study:

There were a lot of researches regarding the relation of vitamin D level and fatigue which yielded varied findings. Moreover, these researches are primarily on patients with different chronic illnesses, while the relation between vitamin D and complaining of fatigue among healthy individuals has not been investigated adequately (Jawad & Baiee , 2020).

Vitamin D deficiency in Egypt has reached epidemic proportions. Females are the most affected members of Society. A large proportion of healthy adult Egyptian females have low vitamin D levels. The prevalence of vitamin D deficiency in 2017 was as follows: 72.6% of the lactating group; 54% of the pregnant group; 72% of the childbearing group; 39.5% of the elderly group; and 77.2% of the geriatric group (Batros et al, 2019).

The American Nurses Association (ANA) (2020) has increased alertness about nurse wellbeing. Unfortunately, Nurses fatigue owing to the nature of their profession that provides little exposure to sunlight.

Understanding the levels of vitamin D and prevalence of vitamin D deficiency in nursing and its effect on self-perceived fatigue, increase of body mass index and health related quality of life can inform public health attempts to reduce vitamin D deficiency and ensure improved nursing care and population health outcomes.

3. Aim of study: Current study aims to examine influence of vitamin D level on self-perceived fatigue, body mass index and health related quality of life in female nurses.

4. Research questions:

- What is the level of circulating 25-OHD among female nurses?
- What are the levels of BMI among female nurses?
- What is the score of perceived fatigue of female nurses?
- What is the score of health-related quality of life of female nurses?
- Is there a relation between level of circulating 25-OHD and BMI among female nurses?
- Is there a relation between level of circulating 25-OHD and score of self-perceived fatigue among female nurses?
- Is there a relation between level of circulating 25-OHD and score of nurses' health related quality of life?

5. Subjects and Methods

5.1. Research design: A correlational study (“type of descriptive study that analyzes data from a population, or a representative subset, at a specific point in time”) (*Schmidt & Kohlmann , 2008*) to examine the relation

between BMI, fatigue and quality of life with 25-OHD levels in female nurses.

5.2.Setting: This study was performed at two-health setting: the main university hospital, Alexandria University and El-Kaser Elany Obstetric hospital, Cairo University.

The Kasr Al Ainy Obstetrics and Gynecology is one of Cairo university hospitals. Hospital is a major national and regional referral centre providing state-of-the-art medical service. The Departments in the Ob & GH contain 400 beds, receive 250 women daily on average, and assist around 36,500 deliveries per year.

The main hospital is one of Alexandria university hospitals, it has a total number of 3497 beds; Hospital houses the departments of general and special medical and surgery. There were 186857 admissions, 54936 operations and 835376 out-patient visits each year.

5.3.Subjects: A cross section sample of 400 female were selected based on **Epi info7** program, were randomly allocated using computer-generated randomized table (Random Number Generator; 2018) (*Stat 2018*) from the main university hospital, Alexandria University and Obstetric hospital El-Kaser Elany Obstetric hospital, Cairo University; which divided into two equal study groups 200 female nurses for each group. Nurses were interviewed to explain the purpose of study and get a written informed consent of them. if any nurse was unwilling to participate and did not meet the inclusion criteria of the study, another one was carefully chosen randomly till 200 female nurses completed each group.

- Epi info 7 program used to estimate sample size using the following parameters:

- A. Total number of populations was 2877 (female nurses active working in two hospital between December 2019-March 2020).
- B. Expected frequency 50 %
- C. Maximum margin of error 10%
- D. Confidence coefficient 95%
- E. Estimated sample size was 339.

The inclusion criteria:

Nurses who have no history of chronic illness such as thyroid disorders, diabetes, cancer, coronary heart diseases or depression. Working as a minimum one year in the mentioned hospitals and did not take vitamin D supplements for past one month, they did not participate of any program of education about vitamin D.

5.4. Tools of the study: Four tools were used:

5.4.1. Tool I: Structured interview questionnaire

The researcher developed it after reviewing literature (Alavi et al , 2016) (Yousef, Alsayed & Al Nagshabandi , 2016) to assess socio-demographic characteristics and clinical conditions of nurses. It consisted of two parts:

Part1: It included questions regarding socio-demographic information of nurses such as age, educational status, marital status, income.

Part2: Health Lifestyle information such as working hours, duration of sun exposure, using makeup frequently, eating foods containing vitamin D.

5.4.2. Tool II: clinical data assessment:

Physical examination tool that included two parts:

Part 1: Body mass Index (BMI) calculation: it is nurse's "weight (Wt) in kilograms divided by the square of height (Ht) in meters".

BMI = Wt (kg) /Ht (m)². The value of BMI categorized as normal level (18.5-24.9), overweight (25- 29.9), obese (30-34.5), and severely obese (35-39.9) (Peplonska et al , 2015).

Part 2: measuring of “25-hydroxyvitamin D (25(OH) D) level in blood”. Levels of it categorized as severe deficiency (≥ 10 ng/mL), deficiency (10-20 ng/mL), insufficiency (21- 29 ng/mL), and normal level (≤ 30 ng/mL) (Rajebi et al, 2016).

5.4.3. Tool III: Health related quality of life (SF-12) Questionnaire

SF-12 (self-reported outcome measure and assessing the impact of health on an individual's everyday life) questionnaire was used to measure the health-related quality of life. It included 12 items; eight domains of functioning and well-being including “physical functioning (PF): 2 questions, role limitations due to physical problems (RP): 2 questions, bodily pain (BP): 1 question, general health perceptions (GH): 1 question, energy and vitality (VT): 1 question, social functioning (SF): 1 question, role limitations due to emotional problems (RE): 2 questions, and mental health (MH): 2 questions” (Fleishman, Selim & Kazis , 2010). Cronbach’s α was 0.81 for the Physical Component Summary (PCS) and 0.83 for the Mental Component Summary (MCS) (Cheak-Zamora, Wyrwich & McBride, 2009).

5.4.4. Tool IV: Fatigue assessment Scale:

Fatigue Assessment Scale (FAS) adopted from (Drent, Lower & De Vries, 2012; Michielsen et al, 2003). It is a five-point Likert scale: never (1), sometime (2), regularly (3), often (4) to Always (5) but question 4 and 10 are revers score. The total score ranged from 10-50. It used to evaluate the perceived fatigue

level among female nurses. It is 10 questions including “5 questions reflect physical fatigue and 5 questions (questions 3 and 6-9) reflect mental fatigue”. It ranks the greater score indicating higher feeling fatigue.

5.5.Procedures

Tool content validity was established by a jury of seven expert professors from Medical-Surgical nursing and the necessary modifications were achieved. A Pilot study was conducted on 5 nurses for testing, clarity, feasibility and applicability of the study tools; and these nurses were excluded from the sample subjects.

The researchers interviewed the chosen female nurses and obtaining their written approval after explaining the purpose of the research. The researcher asked the participant to fill out tools I, III, and IV to assess the socio-demographic data, healthy lifestyle behaviors, SF-12 questionnaire, and fatigue assessment scale. After that, the researcher measured the participant's weight and height to calculate BMI. Lastly, a blood sample was taken and sent to the laboratory to assess 25 hydroxyvitamin D (25-OHD) level.

5.6.Data analysis:

All data were converted into a special format to be suitable with using Statistical Package for Social Sciences (SPSS) version 25. All statistical tests were completed to examine the relations between serum 25-hydroxyvitamin D, BMI, self-perceived fatigue, and health related quality of life. Frequency and percentage, mean and standard deviation was calculated. Chi-square and Fisher’s Exact test used to compare between Vitamin D level, BMI among Cairo, and Alexandria Nurses. Pearson's (r) correlation test was used to find

presence and extent of correlation between the vitamin D Level and Fatigue level, health related quality of life among the among Cairo and Alexandria Nurses. level of significance was chosen at 5 % where $p \leq 0.05$ was considered significant.

6. Result:

Table 1: Comparison of sociodemographic data among Cairo and Alexandria nurses

Socio-demographic characteristics	Alexandria nurses (n=200)		Cairo nurses (n=200)		Significance test
	Number (N)	Percent (%)	Number (N)	Percent (%)	
Age					
20-29	74	37.0	79	39.5	$\chi^2 = 0.306$ P = 0.857
30-39	90	45.0	85	42.5	
40-50	36	18.0	36	18.0	
Mean ± SD	33.31 ± 7.44		32.80 ± 7.42		T = 0.686 p= 0.893
Educational Level					
Technical	108	54.0	107	53.5	FET = 5.03 P = 0.27
Diploma	9	4.5	15	7.5	
Bachelor's degree	78	39.0	78	33.5	
Master	5	2.5	11	5.5	
Marital status					
Single	39	19.5	48	24.0	FET = 1.41 P = 0.723
Married	148	74.0	141	70.5	
Divorced	10	5.0	8	4.0	

Widow	3	1.5	3	1.5	
Income					
Enough	82	41.0	114	57.0	$\chi^2 = 10.24$ P = 0.002*
Not Enough	118	59.0	86	43.0	

FET = The Fisher's exact test * Significant difference at P level ≤ 0.05

Table 1: Regarding nurses' age, the mean \pm SD age was 33.31 ± 7.44 years and 32.80 ± 7.42 years for Alexandria and Cairo nurses', respectively with no statistically significant difference between both groups ($t = 0.279$ $p = 0.781$).

As regards the nurses' education, the highest percentage in both groups were technical education 54.0 % and 53.5 % respectively with no statistically significant difference between both groups (FET = 5.03 P = 0.27).

Concerning the marital status of the patients, the highest percentage in Alexandria and Cairo nurses were married (74.0 % and 70.5) respectively. On the other hand, the lowest percentages in both groups were widow 1.5 % for both groups.

In relation to income, the highest percentages (59.0%) in Alexandria nurses' group had not enough income while in Cairo nurses' group (57.0 %) had enough income. There was statistically significant difference between both groups ($\chi^2 = 10.24$ P = 0.002).

Table 2: Comparison of health lifestyle activities among Cairo and Alexandria universities nurses'

Health Lifestyle	Alexandria nurses (n=200)		Cairo nurses (n=200)		Significance test
	Number (N)	Percent (%)	Number (N)	Percent (%)	
Working hours					
6 hours	33	16.5	46	23.0	$\chi^2 = 27.27$ P = 0.000*
8 hours	46	23.0	10	5.0	
12 hours	121	60.5	144	72.0	
Mean ± SD	10.09 ± 2.45		10.42 ± 2.57		T = - 1.314 p= 0.190
Sun Exposure / week					
0-10 hours	31	15.5	94	47.0	$\chi^2 = 107.47$ P = 0.000*
11-20 hours	94	47.0	106	53.0	
21-30 hours	75	37.5	0	0.00	
Mean ± SD	17.40 ± 7.32		10.71 ± 3.50		T = 11.643 p= 0.000*
Use of makeup and sun block					
No	66	33.0	90	45.0	$\chi^2 = 6.05$ P = 0.018*
Yes	134	67.0	110	55.0	
Source Kge of Vit. D					
Complete	56	28.0	56	28.0	$\chi^2 = 3.310$ P = 0.199
Incomplete	135	67.5	126	63.0	
Unknown	9	4.5	18	9.0	

Fish eating					
No	9	4.5	56	28.0	$\chi^2 = 109.44$ P = 0.000*
Once a week	102	51.0	137	68.5	
2 times / week	77	38.5	7	3.5	
Monthly	12	6.0	0	0.00	
Milk					
No	51	25.5	56	28.0	FET = 6.55 P = 0.232
Daily	84	42.0	76	38.0	
2 times / day	25	12.5	23	11.5	
3 times /day	0	0.00	5	2.5	
Weekly	40	20.0	40	20.0	
Egg					
No	26	13.0	15	7.5	$\chi^2 = 8.26$ P = 0.232
Daily	14	7.0	14	7.0	
Once a week	38	19.0	57	28.5	
2 times / week	64	32.0	53	26.5	
3 times / week	39	19.5	38	19.0	
Monthly	14	7.0	16	8.0	
2 times / month	5	2.5	7	3.5	

FET = The Fisher's exact test

* Significant difference at P level ≤ 0.05

Table 2: In relation to working hours, the highest percentages in Alexandria nurses' and Cairo nurses' groups were working twelve hours (60.5 % and 72.0 %) respectively and the mean \pm SD working hours was 10.09 ± 2.45 years and 10.42 ± 2.57 years for Alexandria and Cairo nurses respectively

with no statistically significant difference between both groups ($T = -1.314$ $p = 0.190$).

For the duration of sun exposure per week, in the Alexandria group (47.0 %) had been exposed to sun from eleven to twenty hours per week while the Cairo group (47.0 %) had been exposed to sun about ten hours per week. the mean \pm SD Sun exposure hours during the week was 17.40 ± 7.32 years and 10.71 ± 3.50 years for Alexandria and Cairo nurses, respectively. A statistically significant differences were found between the Alexandria nurses' group and Cairo nurses' group in relation to associated diseases ($T = 11.643$ $p = 0.000$).

Regarding the usage of makeup, more than half (67.0 and 55.0 %) of the nurses in the Alexandria group and Cairo group respectively were using makeup. There was no statistically significant difference between both groups ($\chi^2 = 6.05$ $P = 0.018$).

In relation to knowledge of Vit D sources, more than half (67.5 and 63.0 %) of the nurses in the Alexandria group and Cairo group respectively had incomplete knowledge. There was no statistically significant difference between both groups ($\chi^2 = 3.310$ $P = 0.199$).

Regarding eating fish, there was statistically significant eating more fish in the Alexandria group than in Cairo group ($\chi^2 = 109.44$ $P = 0.000$). On the other hand, there were no statistically significant difference between both groups regarding drinking milk or eating egg (FET = 6.55 $P = 0.232$, $\chi^2 = 8.26$ $P = 0.232$) respectively.

Table 3: comparison of Body Mass Index among Cairo and Alexandria universities nurses'

BMI Level (kg/m ²)	Alexandria nurses (n=200)		Cairo nurses (n=200)		Significance test
	Number (N)	Percent (%)	Number (N)	Percent (%)	
Normal level (18.5-24.9)	29	14.5	30	15.0	FET = 1.44 P = 0.785
Overweight (25- 29.9)	122	61.0	130	65.0	
Obese (30-34.5)	48	24.0	39	19.5	
Severely obese (35-39.9)	1	0.5	1	0.5	
Mean ± SD	27.92 ± 2.63		27.91 ± 2.57		T = 0.039 p= 0.969

FET = The Fisher's exact test

Table 3: Regarding the incidence of BMI, 61.0 % and 65.0 % of the Alexandria nurses' group and Cairo nurses' group suffered from overweight no statistically significant difference between both groups (T = 0.039 p= 0.969).

Table 4: comparison of level of 25 hydroxyvitamin D (25- (OH)D) among Cairo and Alexandria universities nurses'

25-(OH)D Level ng/mL	Alexandria nurses (n=200)		Cairo nurses (n=200)		Significance test
	Number (N)	Percent (%)	Number (N)	Percent (%)	
Severe deficiency (> 10 ng/mL)	7	3.5	27	13.5	$\chi^2 = 15.36$ P = 0.002*
Deficiency (10- 20 ng/mL)	24	12.5	25	12.5	
Insufficiency (21- 29 ng/mL)	103	51.5	102	51.0	
Normal level (< 30 ng/mL)	66	33.0	46	23.0	
Mean \pm SD	26.41 \pm 7.63		23.98 \pm 8.85		T = 2.93 p= 0.004*

* Significant difference at P level ≤ 0.05

Table 4 and figure (1): In relation to the level of 25-OHD, the highest percent of nurses in both Alexandria and Cairo nurses had Insufficiency level of 25-OHD (51.5 % and 51.0 % respectively) compared to severe deficiency (3.5 %) in the Alexandria nurses and (13.5 %) in Cairo nurses. There was statistically significant decrease of 25-OHD level between Cairo and Alexandria nurses (T= 2.004 P = 0.004).

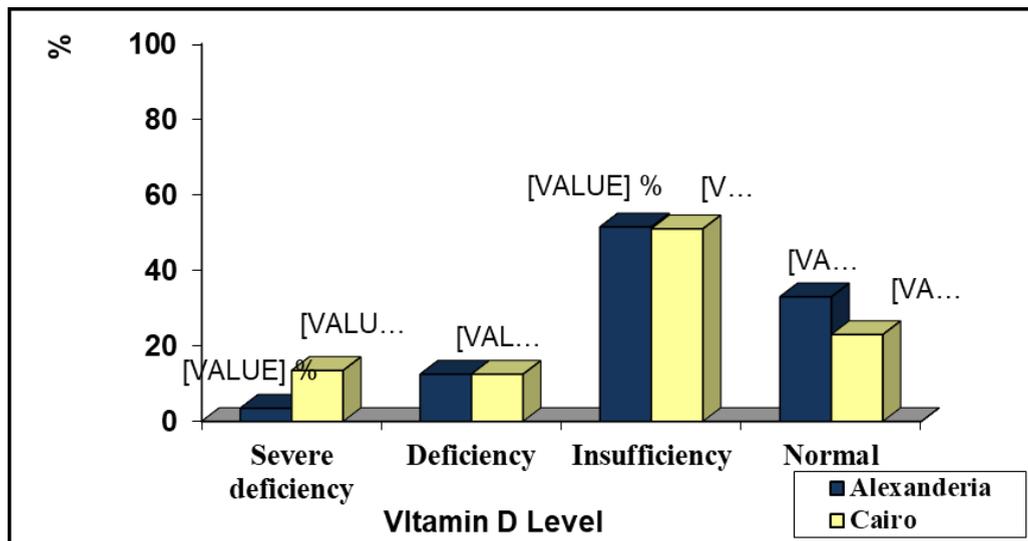


Figure (1): comparison of level of 25 hydroxyvitamin D (25- (OH)D) among Cairo and Alexandria universities nurses'

Table 5: Regarding fatigue assessment, in the Alexandria nurses' group the mean \pm SD of Fatigue was ($\bar{X} = 35.26 \pm 4.73$) while in Cairo nurses' group, it was ($\bar{X} = 37.43 \pm 5.10$). There was a statistically significant difference between fatigue level between both groups ($T = -4.39$ $p = 0.000$).

In relation to health related quality of life, in the Alexandria nurses' group the mean \pm SD of SF12 was ($\bar{X} = 30.23 \pm 1.81$) while in Cairo nurses' group, it was ($\bar{X} = 29.53 \pm 1.98$). There was a statistically significant high score of SF12 in the Alexandria nurses' group than Cairo nurses' group ($T = 3.70$ $p = 0.000$).

Table 5: Comparison between Alexandria and Cairo universities nurses' regarding Fatigue Assessment Scale and Health Related Quality of Life

Group	FAS	SF12
	Mean \pm SD	Mean \pm SD
Alexandria Nurses	35.26 \pm 4.73	30.23 \pm 1.81
Cairo Nurses	37.43 \pm 5.10	29.53 \pm 1.98
Significance test	T = - 4.39 *p= 0.000	T = 3.70 *p= 0.000

* Significant difference at P level \leq 0.05

Table 6: Shows correlation between Vit D and BMI, Fatigue and Health SF12 among the Cairo and Alexandria nurses. Regarding to the correlation between the vit D level and body mass index, there was statistical significant inverse correlation between them among the Alexandria and Cairo nurses ($r = - 0.530$ $p = 0.000$) and ($r = - 0.527$ $p = 0.000$) respectively. In addition there was statistical significant inverse correlation between vit D level and fatigue level while there was statistical significant direct correlation between Vit D level and health related quality of life among the Alexandria and Cairo nurses ($r = 0.312$ $p = 0.000$) and ($r = 0.227$ $p = 0.001$) respectively.

Table 6: Correlation between vitamin D, Body Mass Index, Fatigue and Health related Quality of Life among the Cairo and Alexandria universities nurses'

Group	Vit D & BMI	Vit D & FAS	Vit D & SF12
Alexandria Nurses	r = - 0.530** p = 0.000	r = -0.495** p= 0.000	r =-0.312** p= 0.000
Cairo Nurses	r = - 0.527** p = 0.000	r = -0.630** p= 0.000	r = -0.227** p= 0.001

* Significant difference at P level ≤ 0.05

7-Discussion:

Nursing as a profession is striving to meet the professional demands and the enormous workloads that provoked by increasing patient acuity and the expanding complicity of treatment modalities. (Caldwell, 2019). However, the relationship between vitamin D, fatigue, BMI, and their effect on the quality of life in a healthy people has not been investigated sufficiently. Simultaneously, despite nurses know the consequences of working when fatigued, many tend to give more considerations to patients' needs and colleagues rather than their own. So, the study aimed to examine influence of vitamin D level on self-perceived fatigue, body mass index and health related quality of life in female nurses.

The current study revealed that the subjects consist of 400 female nurses worked in Main Alexandria university hospital and Genecology hospital Cairo University. Regarding their sociodemographic characteristics, the result revealed that the age of the nurses was around half in age group (30 - 40 years), the highest percentage of them graduated from the technical nursing institute,

married; the highest percentages in Alexandria nurses' group had not enough income while more than half in Cairo nurses' group had enough income.

In relation to perceived health lifestyle activities of nurses in both governates; regarding to working hours, both groups in Alexandria nurses' and Cairo nurses' were working twelve hours; most of the nurses in both groups had exposed to the sun between (11-20 hours per week); that may be affect their nutritional behaviour related to long shifts hours and exposure to the sun. In line with this finding, Varli, Bilici (2016) who mentioned that in a study of "the nutritional status of nurses working shifts in Turkey" aged between 25 to 50 and the education level was technical, while the mean working hour per day was 11.2 ± 7.2 that affect their nutritional status. Coppeta, Papa and Magrini (2018) in review article about Vitamin D3 deficiency related to shift and indoor work; mentioned, the majority of studies strongly indicate that the changing role of labour is at least contributing to the increased prevalence of vitamin D3 deficiency". One more study by Sowah and et al (2017); found that the level of vitamin D3 in 48% of outdoor workers was lesser than 50 nmol/L. While about 80 % of shift workers were deficient.

While other factor of nurses' lifestyle was using make up; most of nurses in Alexandria and Cairo using make up and sun screen cream; that could affect absorption of vitamin D by skin; this finding was in same line of study by Hollis (2008) on the production of vitamin D₃ in skin that influenced by a number of factors, as skin pigmentation, using of makeup, use of sunscreen, clothing, and amount of skin exposed.

Regarding nurse's knowledge and diet sources of vitamin D; more than half of the nurses in the Alexandria group and Cairo group respectively had

incomplete knowledge about sources of vitamin D. In the light of having a vitamin D from food sources; as eating fish, there was a statistically significant higher frequency in the Alexandria group than in Cairo group, while there was no statistically significant difference between both groups about drinking milk or eating eggs. These finding could be related to that Alexandria is a coastal city, and their citizens are more dependent on seafood and fish in their eating lifestyle than the citizens of Cairo. This result could indicate that Alexandria nurses exposed to sunlight all over the year and their diet was rich of calcium, phosphorus, and vitamin D. This finding supported by Shelbaya and et al (2017) who found a highly statistically significant difference in the vitamin D levels between the studied groups, and vitamin D intake from diet, and exposure of sun among high waist population than valley population.

In relation to the level of 25-OHD among the participants, more than half of nurses in both Alexandria and Cairo nurses had insufficiency level of 25-OHD, in addition (13.5 %) of Cairo nurses had sever deficiency level. These results might be related to the geographical location of Cairo and citizens avoid sun exposure especially during summer months, which lead to decrease vitamin D absorption through skin. In addition, Thesis results were linked with the results that revealed most of the nurses in both groups had long working shift and poor health lifestyle behaviour. In congruent with this result, Iran found 89% showed different levels of deficiency of vitamin D (Alavi etal , 2016); in Qatar 95 % of vitamin D deficiency was observed with female health care givers (Mahdy et al, 2010). In addition, 95.4 % of the prevalence of vitamin D deficiency in Thailand was nurses (Hattapornsawan et al, 2012). Moreover, in 18 different spots of India, 94 % of health center workers had a deficiency and severe

deficiency of vitamin D (Beloyartseva et al , 2012) and Sowah et al (2017); found that the level of vitamin D3 in 48% of outdoor workers was lesser than 50 nmol/L. While about 80 % of shift workers were deficient.

The present study finding showed that the BMI of the Alexandria nurses' group and Cairo nurses' group located on overweight category. A statistically significant inverse correlation was observed between vitamin D level and body mass index among both groups. This finding is in line with Miller , Alpert, Cross (2008) who found that more than half of nurses were overweight. Furthermore, a study on nurses found a relationship between working in night shift and gaining weight (Peplonska, Bukowska, Sobala, 2015).

Regarding fatigue assessment, nurses expressed perceived fatigue more than the average level. There was a statistically significant difference between fatigue level between both groups. There was statistically significant inverse correlation between vit D and fatigue levels in both groups. This was in line with Nowak and et al (2016), who found correlation between vitamin D deficiency and perceived self-fatigue in healthy adult female. In contrast of this finding, Havdahl et al (2019) who observed small evidence of association in large number of populations in European ancestry and suggested that vitamin D supplement could not be useful in lowering the probability of feeling fatigue.

Regarding health-related quality of life, a statistically significant high score of FS12 in the Alexandria nurses' group was observed than Cairo nurses' group. In addition, there was a direct correlation between vitamin D level and health related quality of life among both groups. These could be due to improve level of vitamin D in Alexandria than Cairo nurses that affect the score of FS12,

also that affect nurses' health quality of life. These findings could be affected by severe deficiency of a vitamin D level and the lifestyle in the Cairo than the Alexandria group. That was in the same finding with Ewid et al (2019) who found that Saudi females experienced an improvement in the quality of life, and muscle strength after given standard 25 (OH) D oral supplementation.

Therefore, circulating 25(OH) D levels of nurses in both Alexandria and Cairo universities ranged from Insufficiency level of 25-OHD to severe deficiency; most of nurses suffer from overweight, and high level of perceived-fatigue (There was a high score of FAS) and health related quality of life (There was a high score of FS12 in Alexandria than Cairo). Thus, there was correlation between the vit D level and body mass index, inverse correlation between vit D level and fatigue level while there was statistically significant direct correlation between Vit D level and health related quality of life.

Conclusion

The current study findings concluded that nurses in both Alexandria and Cairo hospital had insufficient level of 25-OHD, while Cairo nurses had Severe deficiency (> 10 ng/mL). There was statistically significant difference in lifestyle between the study groups especially in diet sources of vitamin D and sun exposure; this was affected by long shifts (12 hours). The study found an inverse correlation between vitamin D level, body mass index, and perceived fatigue level, while there was a statistically significant direct correlation between Vit D level and health-related quality of life among nurses in both groups.

7. Recommendations

The current study recommended periodic national health policies for screening of vitamin D level among nurses. Health education and training programs for nurses should be developed regarding vitamin D including sources vitamin D in the diet, and proper safe sun exposure.

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المخلص العربي

تأثير مستوى فيتامين (د) على مؤشر التعب الادراكي الذاتى وكتلة الجسم ونوعية الحياة المتعلقة بالصحة بين الممرضات في مستشفياتين مختلفين

المقدمة: ارتبط نقص فيتامين (د) بالإرهاق وأعراض أخرى غير محددة منها الصداع وآلام العضلات والعظام والضعف والاكتئاب وضعف الأداء . التعب هو شعور شائع بين الممرضات بسبب العمل في ظروف صعبة. انخفاض فيتامين د الأكثر انتشارا بين الأفراد الذين يعانون من السمنة، هذا العامل يقلل من ثقة الممرضات بأنفسهن ويسبب الشعور بالفشل، و ذلك يؤثر على الخدمة التمريضية المقدمة للمرضى.

الهدف من الدراسة: هدفت الدراسة الحالية إلى فحص تأثير مستوى فيتامين (د) على مؤشر التعب الادراكي الذاتى ، ومؤشر كتلة الجسم ونوعية الحياة المتعلقة بالصحة لدى الممرضات.

أسئلة البحث: سوف تجيب هذه الدراسة على الاسئلة البحثية التالية:

□ هل توجد علاقة بين مستوى فيتامين د بالدم ومؤشر كتلة الجسم بين الممرضات؟

□ هل هناك علاقة بين مستوى فيتامين د بالدم و مؤشر التعب الادراكي الذاتى بين الممرضات؟

□ هل هناك علاقة بين مستوى فيتامين د بالدم ودرجة جودة الحياة الصحية للممرضات؟

منهجية البحث: اتبع البحث دراسة مقطعية قائمة على الملاحظة بتحليل البيانات من مجموعة اشتملت على عينة الدراسة 400 ممرضة في مستشفياتين (200 ممرضة بالمستشفى الرئيسى الجامعى ، جامعة الاسكندرية – 200 ممرضة بمستشفى القصر العينى للنساء جامعة القاهرة).

تم استخدام اربع ادوات لتجميع المعلومات من الممرضات:

الاداة الاولى: استبيان مقابلة لجمع المعلومات الديموغرافية و معلومات عن نمط الحياة الصحى.

الاداة الثانية: بيانات تخص الحالة الصحية وتشمل مؤشر كتلة الجسم و مستوى فيتامين د بالدم.

الاداة الثالثة: (SF-12) هو مقياس للحالة الصحية العامة (جودة الحياة) من الناحية الجسمية و النفسية.

الاداة الرابعة: (FAS) مقياس التعب الادراكي الذاتى لقياس مستوى الاحساس بالتعب.

النتائج: لقد اسفرت نتائج البحث عن الآتى: اولاً: هناك نسبة كبيرة من الممرضات في عينة البحث يعانون من نقص فيتامين د بالدم و خاصة بالقاهرة. ثانياً: كانت هناك علاقة عكسية ذات دلالة إحصائية بين مستوى فيتامين د وزيادة مؤشر كتلة الجسم ومستوى التعب الادراكي الذاتى (FAS) والارتباط المباشر ذو دلالة إحصائية بين جودة الحياة (SF12).

التوصيات: افضت الدراسة الى التوصيات التالية:- وضع سياسات صحية وطنية للفحص الدورى لفيتامين (د) بالدم والوقاية من خلال تناول فيتامين د في النظام الغذائى والتعرض الجيد للشمس لمدة 10-15 دقيقة / يوم - تنظيم برامج تدريب بالمنشآت الصحية للممرضات عن اهمية فيتامين (د) و علاقته بالصحة العامة.