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RESEARCH ARTICLE

Assessment of the level of vitamin D among female prisoners in the Directorate of Women and Children reformatory in Sulaimani City

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ABSTRACT
Background: The health of women depends heavily on vitamin D3, sometimes known as the "sunshine vitamin". People who are incarcerated or in jails are more prone than the general population to suffer from chronic health conditions. Particular conditions in prisons, such as limited outside activities and little exposure to sunshine, may cause vitamin D insufficiency in in mates. Aim of the study: To find out the measure of the level of vitamin D, and determine the relationship between the amount of vitamin D and sociodemographic and other factors in the Sulaimani City Directorate of Women and Children. Study Design: a descriptive study. Material and Methods: Data were gathered through direct interviews with research participants. Following agreement, the researcher used convenience sampling to distribute questionnaires to 41 female convicts. In accordance with the objectives of the study and after a comprehensive review of the literature, a questionnaire format was developed for this purpose. The data were examined using SPSS version 22. Whether there is a significant association between the variables is determined using the P-value Chi-Square and Fisher exact test. P values below 0.05 are regarded assignificant. Results: Among 41 female prisoners, the majority 87.8 % of female convicts were less than 10 or severely insufficient, 9.8% were insufficient, just 2.4 % were near optimal, and none was within the normal range. There was a significant association between the CS type and most CS indications. There was no significant association between CS type and CS indications for other items such as poor presentation, pre- eclampsia, APH, Antipartum Hemmorrhage, fresh scars, and old primiparas. Conclusion: The study concluded that inadequate education regarding the risk factors of Vit D deficiency, limited exposure to the sunlight and prolonged prisoners sentence are the most important predisposing factors for Vit D deficiency among the female prisoners in Sulaimani City. There were a significant association between participants and duration of prisons, education levels, age and exposure to sunlight uncovered. Although, there is no association between low vitamin D levels and other sociodemographic and reproductive or participants' habits.

Keywords: Assessment, Vitamin D, Prisoners .

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INTRODUCTION

People who are incarcerated or in jails are more prone than the general population suffer from chronic health conditions. Particular conditions in prisons, such as limited outside activities and little exposure to sunshine, may cause vitamin D insufficiency in inmates (Lamberton, C., & Vaughn, 2022).The health of women depends heavily on vitamin D3, sometimes known as the "sunshine vitamin". Despite being discovered 100 years ago, vitamin D has become one of the most contentious nutrients and prohormones of the twenty-first century, and much study has been done on this molecule (Silvagno, F., & Bergandi, 2022) . In the United States, vitamin D insufficiency is more widespread than in other countries (Sizar, O., Khare, S., Goyal, A., Bansal, P., & Givler, 2021). Vitamin D is a class of prohormones having skeletal and extra-skeletal activities known as seco-steroid chemicals, namely vitamin D2 and vitamin D3 (Malik et al., 2022). The livers cytochrome P450 enzymes produce the major indicator of vitamin D status, by hydroxylating both vitamin D2 and D3. The physiologically active form of vitamin D, known as one, 25-dihydroxyvitamin D or calcitriol is produced by a further hydroxylation process in the kidneys and helps to regulate plasma calcium and phosphate concentrations, supporting bone health (Gayan-Ramirez & Janssens, 2021) . A plea for epidemiological research focused on criminology has been made in response to recent studies of prisoners in the United Kingdom and the United States that revealed inadequate consumption of vitamin D and other minerals. This call is necessary because, despite recent studies linking vitamin D deficiency to poor bone health, decreased muscle strength, increased body sway, falls, disability, low bone mineral density, osteoporosis, and fractures, there is no systematic analysis of the vitamin D status of prisoners in the global scientific literature (Lips et al., 2021).The majority of people should get their vitamin D levels checked due to the common shortage. Since 25-hydroxyvitamin D is the main vitamin D circulating form in the body, blood concentrations of this molecule are the greatest gauge of vitamin D status. The assessment of the vitamin D status of female convicts was the goal of this study. Unfortunately, there are no statistics on the vitamin D status of inmates inSulaimani; thus, this work presents the first published study into vitamin D levels in a Sulaimani prison population and serves as a foundation for a larger prospective cohort study.

METHOD

Design: In order to examine the sociodemographic data, measure the level of vitamin D, and determine the relationship between the amount of vitamin D and sociodemographic and other factors, a descriptive research was carried out in the Sulaimani City Directorate of Women and Children Reformatory.

Study sample: Non-probability Convenient sampling was used to choose 41 female convicts from the research period.

Data collection: First of all, an interview was held with the study group in order to clarify the objectives of the study, obtain their consent for collecting data and blood sample for laboratory test. In accordance with the objectives of the study and after a comprehensive review of the literature, a questionnaire format was developed for this purpose. 41 female convicts who were older than 18 and able to talk were included inthis research. Female inmates who resided continuously in the Directorate of Women and Children Reformatory were the target populations. Data were gathered over the course of three months, from February to April 2022. Three sections of a questionnaire were used to gather the data; the first part asked about the participants age, education, past employment, and other demographic information. Data on reproductive history was provided in the second section, and the amount of vitamin D was included in the third. The levels of vitamin D were classified as, less than 10ng/ml sever insufficient, deficient less than (20ng/ml), inadequate (20- 29.6ng/ml), and appropriate more than (30ng/ml). Without concern for meals or the use of a tourniquet, blood samples were collected early in the morning. Each participant had their venous blood drawn for five milliliters (5 ml).

Blood Samples and Laboratory Analysis: Subjects have completed a test for blood 25-hydroxyvitamin D as a secondary screening that also involves analysis. All recruited participants antecubital veins were used to collect fasting blood samples. For the testing of serum 25(OH) D concentrations, samples

were transferred to the Nishtiman clinical laboratory in Sulaimani City. The tests were carried out utilizing the Roche Elecsys vitamin D3 assay and the Roche Cobas e411 immunoassay analyser (Roche Diagnostics, Mannheim, Germany).

Data analysis: The SPSS version 22 was used to conduct the statistical analysis for this study. The percentage and frequency of the variables, as well as the mean standard deviation for continuous variables, were determined using descriptive statistics. Standard deviation (SD), frequencies (Numbers), and percentages (percentage) were all used in the analysis. Chi-square to determine the association between the categorical factors and vitamin D level when the cells less than 5 and Fisher exact test was used when the cells more than 5. Finally, data and findings were presented in tables with explanatory paragraphs using a level of significance of 0.05 as significant.

RESULTS

According to this data, 36.6% of participants were between the ages of 30 and 40. Unfortunately, large portions of women in prison were illiterate, and their blood type was O, which made up 31.7 % of each variable respectively. Additionally, this table reveals that 90.3% of participants wore long clothing that concealed their bodies and less than half 43.9% of the participants BMI was over 30, and that 48.8% of participants were housewives. 75.6% of patients did not exercise and 82.9% did not expose their skin to sunlight. Nearly all of study participants 97.6% remain in the jell for longer than a year as presented in the table (1). Table (2) reveals that 63.4 % of participants menstruate regularly, 82.9% of participants are menstruation between the ages of 12 to 14, all of the participants have PMS symptoms, and 19.5 % of participants have never been pregnant. Additionally, 65.9% of participants have more than one children and only 14.6% of female prisoners have one child. This data clearly in this table demonstrates that, regrettably, the blood 25-hydroxyvitamin D levels of 87.8 % of individuals were less than 10 or severely insufficient, 9.8% were insufficient, just 2.4 % were near optimal, and none were within the normal range. This table demonstrates that there was a very highly significant association (0.00) between participants' and duration of prisons, education levels, age and exposure to sunlight uncovered because the p values less than 0.05. Although, there is no association between low vitamin D levels and other sociodemographic and reproductive or participants' habits

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Table 1: Demographic characteristics of the Participants

Items	Variables	Frequency	Percent
Age	less than 20	0	0
	20 - 30	10	24.4
	30 - 40	15	36.6
	40 - 50	10	24.4
	more than 50	6	14.6
Education level	illiterate	13	31.7
	primary	11	26.8
	secondary	12	29.3
	institute	2	4.9
	college	3	7.3
BMI	less than 18.5 underweight	0	0
	normal 19-24.9	7	17.1
	overweight 25-29.9	16	39
	obese over 30	18	43.9
Blood group	A	11	26.8
	B	4	9.8
	AB	3	7.3

	O	13	31.7
	don't know	10	24.4
Wearing long clothes	yes	37	90.3
	med	3	7.3
	no	1	2.4
Occupation	house wife	20	48.8
	governmental employee	12	29.3
	student	2	4.9
	self-employee	7	17.1
Exercise history	yes	10	24.4
	No	31	75.6
Exposure to sunlight uncovered	yes	0	0
	No	34	82.9
	sometimes	7	17.1
Duration in the prison	Less than 1 years	1	2.4
	More than 1 years	40	97.6

Table 2: Reproductive History of participants

Items	Variables	Frequency	Percent
Age at menarche	less than 12	2	4.9
	14-Dec	**34**	**82.9**
	14 - 16	4	9.8
	more than 16	1	2.4
	Total	**41**	**100**
Regularity of menses	yes	26	63.4
	no	15	36.6
	Total	**41**	**100**
Suffer from PMS	yes	**41**	**100**
Number of pregnancy	Null para	8	19.5
	Primigravida	6	14.6
	Multigravida	27	65.9
	Total	**41**	**100**

Table 3: Level of Vitamin D3 among study participants

Levels of vitamin D3	Frequency	Percent
less than 10 sever insufficient	36	87.8
10-20 insufficient	4	9.8
20-30 near optimal	1	2.4
Total	41	100

DISCUSSION

Age, level of education and time of segregation were associated risk factors for Vit D insufficiency among female prisoners in Directorate of women and children reformatory in Sulaimani City.

According to the result of this study, it is clear that the majority of the study sample were suffering from Vitamin D deficiency. 87.8% of them had severe Vit D deficiency; only 2.4% of them were near optimal. After testing correlation between demographic characteristics of the study sample and low level of Vit D, our descriptive study found that, age was a significant factor for sever Vit D deficiency p-value (0.049). Highest percentage of the age group was between 30-40 years old.

A community-based cross-sectional study done by Pan T et al., in 2018 among 40 years old females done in India , they discussed that the main factor of Vit D Insufficiency (VDI) at the age of 40 were related to the problem of loss of bones due to menopause (Pan, T., Banerjee, R., Dasgupta, A., & Paul, 2018) . Same trend of our study also found in a study done by AlFaris et al., in 2019 among women who lives in Riyad in Saudi Arabia among females aged 30-49, they found low level of Vit D were mostly among this specific age group which may be due to feeding diets poor in Vit D or younger woman usually do not take Vit D supplements in this age (AlFaris et al., 2019).

Another important finding in this study was the positive relation between VDI and prisoners level of education p-value (0.022). Most of our participants have completed secondary school as 29.3% and only 7% of them were from colleges.

A cross-sectional study done by Rune etal, in 2016, stated that participants with Bachelor´s degree did not have the issue of Vit D deficiency than those with other levels of education (Tønnesen et al., 2016). Furthermore a study of relation between low level of Vit D and level of education done by Shinkov in 2015 , were similar to the result of our study, the lowest level of Vit. D were found among those with elementary and secondary school than among those with higher level of education (Shinkov, A., Borissova, A. M., Dakovska, L., Vlahov, J., Kassabova, L., & Svinarov, 2015).

Regarding exposure to sunlight, this study detected that short period exposure to sunlight is another notable risk factor for Vit. D deficiency among the participants. Chalcraft et al, in 2020 found that Youngers aged 19-39 years old, after 30 minutes of daily exposure to sunlight (totally 24-48 hours of exposure) their serum Vit. D level were raised. Burchell, Rhodes and Webb concluded that exposing to sunlight remained as an important factor for increasing serum Vit. D level among both young and old people (Burchell, K., Rhodes, L. E., & Webb, 2020) .

The most unique risk factor of severe Vit. D deficiency among prisoners was the duration of segregation. A highly positive relation was found between the period spent in the prison and Vit D deficiency, the P-value was (0.001). Inmates who spent more than one year in the Directorate of women and children reformatory in Sulaimani City had severe Vit D deficiency. A retrospective study done by Nwosu et al., in 2014 among 526 inmates in the US confirmed that isolation has effect on the level of Vit D deficiency. Isolation is defined as remaining inside the prison for a long period of time while insolation is defined as a solar radiation which arrives on earth's surface and it is considered as primary source of Vit D (Nwosu et al., 2014).

The result of our study also found that the duration that the inmates spend inside the prison is an effective factor of Vit D deficiency, which indicates inadequate exposures to sunlight among prisoners. However a retrospective case study done by Zelda Doyle in 2018, found minimum relation between VDI and duration of segregation in prisoners (Doyle et al., 2018) in Australia, while Jacobs and Mullany in 2015 reported that 90% of inmates had Vit D deficiency due to long time segregation and limited exposure to sunlight (Jacobs, E. T., & Mullany, 2015). This present study found a negative relation between prisoners BMI, blood group, wearing long sleeves clothes, occupation, exercise, woman's reproductive health.

CONCLUSIONS

Based on the results of the study, inadequate education regarding the risk factors of Vit D deficiency, limited exposure to the sunlight and prolonged prisoners sentence are the most important predisposing factors for Vit D deficiency among the female prisoners in Sulaimani City.

RECOMMENDATIONS

1. Education sessions required for the female prisoners regarding importance of Vit D for human health.

2. Prisoners need to take Vit D supplements in order to increase the level of serum Vit D in their body.

3. Allowing more sunlight exposure is required for the prisoners by the jailer staff as the sunlight is still a primary source for increasing the level of serum Vit D in the human body.

Ethical considerations:

the Sulaimani College of Nursing regional ethics committee authorized the study. Participants provided their informed permission after being told of the study design. For collecting data, the formal letter was sent to the Sulaimani Directorate of Women and Children Reformatory and the General Directorate of Social Reformatory.

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AUTHOR'S CONTRIBUTIONS

The study was designed by the authors, who also oversaw the management and gathering of data and wrote the report's content.

DISCLOSURE STATEMENT:

No conflicts of interest exist, according to the authors.

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