



## Short Communication

# Correlation between Depression with Serum Levels of Vitamin D, Calcium and Magnesium in Women of Reproductive Age

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## ABSTRACT

**Introduction:** Micronutrient deficiency is one of the common problems in women of reproductive age. This study was conducted with the aim of determining the correlation between the depression with serum levels of vitamin D, calcium and magnesium in women of reproductive age.

**Methods:** This study was a cross-sectional study. In this study 100 women 15-44 years old with inclusion criteria of the study were called through an invitation in Urmia Motahari hospital in Iran. Demographic and obstetric information as well as the short form Beck Depression Inventory were completed, and then ten ml of venous blood was obtained from the subjects after about 12 hours of fasting. The data were analyzed, by SPSS software.

**Results:** The mean of the depression score was 5.24, and the mean (SD) of the serum levels of vitamin D, calcium, and magnesium were 15.53 (13.41) (ng/ml), 9.14 (0.24) (mg/dL), and 2.07 (0.13) (mg/dl), respectively. Women's depression scores showed a significant inverse correlation with the serum level of vitamin D ( $r = -0.21$ ,  $P = 0.03$ ).

**Conclusion:** It is recommended that interventional programs should be carried out for women of reproductive age to improve their vitamin D status.

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## Introduction

Reproductive age is of great importance due to its impact on a series of major changes and transitions in a woman's life.<sup>1</sup> In addition, Iran is undergoing a nutritional transition. This transition is faster in the Iranian women's population.<sup>2</sup> Vitamin D reduction is considered as a major health problem in the world.<sup>3</sup> In addition to the importance of vitamin D for calcium and phosphorus regulation, recent epidemiological studies have reported relationships between low levels of vitamin D and multiple diseases (such as heart disease, immune deficiency, and infectious diseases).<sup>4</sup>

A meta-analytic study by Tabrizi et al., showed that 61.9% of Iranian women were affected by vitamin D deficiency.<sup>5</sup> About 80% of Iranians do not meet their calcium nutritional needs.<sup>6</sup> Magnesium, as the second most abundant intracellular cation, plays a key role in various cellular and metabolic reactions including: energy, metabolism of carbohydrates and lipids, synthesis of protein and nucleic acids, ionic pumps, and calcium channel function.<sup>7</sup> In a review study by Montazeri et al., in Iran, depression in Iranian women was 1.7 times as high as that of men.<sup>8</sup> Depression leads to disability, and is one of the main causes of the burden of diseases in the world.<sup>9</sup> In fact, among the factors, whose relationships with depression have been

referred to in these studies are: antioxidants, vitamins, zinc, magnesium, and families of vitamins. This review investigate the effect of vitamin D on depression it seems that it is necessary to investigate the relationship between the micronutrients and depression. Given the high importance of micronutrients, as well as the importance of women's fertility history and depression, this study was conducted with the aim of determining the correlation of some fertility factors and the depression score with the serum levels of vitamin D, calcium, and magnesium in women of reproductive age.

## Materials and methods

A cross-sectional study conducted at Motahari Hospital in Urmia in 2014-2015. The ethical code of this study is (Ir.umsu.rec.1394.91) from Urmia University of Medical Sciences. The study population consisted of all healthy women of reproductive age who referred to Motahari Hospital in Urmia. The available sampling method was employed in this analytical study, such that after obtaining the ethical approval from the Vice Chancellor for Research at Urmia University of Medical Sciences, out of the women referring to the gynecologic clinic of Motahari Hospital in Urmia, the ones meeting the inclusion criteria of the study were

called to the study through an invitation. For estimation of sample size according the Power (0.8), confidence interval (95%), the correlation coefficient 0.3, the sample size conducted 84 and considering sample drop, the 100 was considered.

During the invitation, 160 people enrolled for the study, out of whom 100 people eventually met the inclusion criteria for the study and were volunteers and written informed consents were obtained. A demographic questionnaire, a stature meter (Adult Weighing Scale Zt-120), and a set of scales were used to collect data. The inclusion criteria for the study were: being between 15 and 44 years of age. And the exclusion criteria for the study were: a history of chronic hepatic, biliary, renal, thyroid, and parathyroid diseases, malignancies, without depression history and diabetes, history of consuming hypertension drugs and corticosteroids, history of taking calcium, and magnesium supplements, menopause, pregnancy or lactation, being affected by malabsorption diseases, and smoking based on the patient's statement.

After obtaining written consent and completing a questionnaire containing demographic and obstetric information as well as the 13-item short form Beck Depression Inventory (13items), the laboratory expert obtained five ml of venous blood from the participants after about 12 hours of fasting. The hormonal test of Vitamin D3 was performed by Cobas E411 and Roche kit, biochemistry test of magnesium was performed by cobas INTEGRA 400 plus and Roche kit also biochemistry of calcium was performed by Caretium.

Blood sampling was performed by using 10 ml syringe. The 13-item short form Beck Depression Inventory: according to a study conducted by Rajabi is a valid and reliable tool in Iran and Cronbach's alpha and split-half coefficients for the whole questionnaire are 0.89 and 0.82.<sup>10</sup> In this questionnaire, the range score of each question is 0-3. The score cutoff 0-4 is non-depressed and the score above 5 is depressed. The data were analyzed, using SPSS software version 13 and Pearson correlation test was used.

## Results

The mean (SD) of the depression score was 5.24 (5.07), and the means (SD) of the serum levels of vitamin D, calcium, and magnesium were 15.53 (13.41) (ng/ml), 9.14 (0.24) (mg/dL), and 2.07 (0.13) (mg/dL), respectively. Also, the participants' demographic characteristics are presented in Table 1. Women's depression scores showed a significant inverse correlation with the serum level of vitamin D ( $r = -0.21$ ,  $P = 0.03$ ), while no significant correlations with the serum levels of calcium and magnesium (Table 2).

**Table 1.** Demographic characteristics of research participants

Variable	Mean (SD) or Frequency (%)
Age	31.41(7.86) <sup>‡</sup>
Number of Pregnancy <sup>‡</sup>	0-8
Number of delivery <sup>‡</sup>	0-8
Menarche age	13.67(1.5) <sup>‡</sup>
Occupation	
Employed	50 (51)
housewife	32(32.7)
Studying	16(16.3)
education	
Elementary	3(3.1)
Pre high school	7(7.1)
High school	36(36.7)
Academic	52(53.1)
Place of living	
City	85(85)
Village	15(15)
Income	
Less than sufficient	15(15.5)
Sufficient	73(75.3)
Higher than sufficient	9(9.3)

<sup>‡</sup>Mean (SD), <sup>‡</sup>Rang

**Table 2.** Correlation between depression score with serum vitamin D, calcium and magnesium levels

Variable	magnesium r(p)	calcium r(p)	vitamin D r(p)
Depression score	0.001(0.9)	-0.02(0.8)	-0.21(0.03)

\* Pearson correlation

## Discussion

This study was conducted on 100 women of reproductive age. The results showed that women's depression scores had a significant inverse correlation with the serum level of vitamin D.

In a study in Urmia in 2005, about 57% of women aged 15-40 had severe vitamin D deficiencies, and about 25% of them had moderate vitamin D deficiencies.<sup>11</sup> Nowadays, changes in women's lifestyle as well as changes in the content of their diets have paved the way for vitamin D deficiencies during pregnancy.<sup>12</sup> Also in this study, women's depression scores showed a significant correlation with serum vitamin D level, but the depression scores did not show a significant correlation with serum calcium and magnesium levels. Jamilian et al., reported that depression was associated with a decrease in serum vitamin D level but no statistically significant differences were observed between depressive and healthy people in terms of serum calcium level.<sup>13</sup> There were no significant relationships between magnesium levels and depression scores in this study. In a study conducted by Bae and kim, serum calcium and

magnesium levels in Korean women did not differ significantly in three groups with depression.<sup>14</sup> But a study by Rajizadeh et al., showed that there was a significant relationship between magnesium levels and depression, in a way that people with depression had a higher prevalence of hypomagnesemia.<sup>15</sup> The result of a systematic review showed that Mg<sup>2+</sup> involvement in different mood disorders.<sup>16</sup>

In our study participants the overall mean of magnesium was in normal range so it can affect the relationship of it with depression score. The limitation of this study is that it is a cross sectional study, so we recommend a future cohort study be conducted on reproductive age women. The other limitation of this study relates to the fact that we could not control some powerful factors, such as genetics and lifestyle, as well as the location of people or exposure to the sun so, we recommendation the case control studies which would be able to manage such confounding factors. The other limitation has to do with relatively small sample size, for which we would need more studies with larger sample sizes in different locations to show this causal link.

## Conclusion

The results of this study showed there was correlation between women's depression score and their vitamin D levels. Therefore, it is recommended that interventional programs should be carried out for women of reproductive age to improve their vitamin D status.

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## Ethical issues

None to be declared.

## Conflict of interest

The authors declare no conflict of interest in this study.

## References

1. Yar ahmadi A, Roosta F. Health promotion lifestyle in reproductive age women. *Women Develop Polit* 2013; 11 (4): 543-58.
2. Rashidi A, Mohammadpour Ahranjani B, Vafa MR, Karandish M. Prevalence of obesity in Iran. *Obesity Reviews* 2005; 6 (3): 191-2. doi: 10.1111/j.1467-789X.2005.00174.x
3. Mithal A, Wahl DA, Bonjour J-P, Burckhardt P, Dawson-Hughes B, Eisman JA, et al. Global vitamin D status and determinants of hypovitaminosis D. *Osteoporosis International* 2009; 20 (11): 1807-20. doi: 10.1007/s00198-009-0954-6
4. Grundmann M, von Versen-Höyneck F. Vitamin D-roles in women's reproductive health. *Reprod Biol Endocrinol* 2011; 9 (1):146. doi: 10.1186/1477-7827-9-146.
5. Tabrizi R, Moosazadeh M, Akbari M, Dabbaghmanesh MH, Mohamadkhani M, Asemi Z, et al. High Prevalence of Vitamin D Deficiency among the Iranian Population: A Systematic Review and Meta-Analysis. *Iranian Journal of Medical Sciences* 2018; 43 (2): 125-139. (Persian)
6. Maddah M, Sharami SH. Intake of calcium/vitamin D supplement in Iranian postmenopausal women. *Arch Osteoporos* 2009; 4 (1-2): 95-6. doi: 10.1007/s11657-009-0033-9.
7. Gallagher ML. The nutrients and their metabolism. Krause's food and nutrition therapy 12<sup>th</sup> ed. St Louis, Missouri: Saunders Elsevier. 2008:39-143.
8. Montazeri A, Mousavi S, Omidvari S, Tavousi M, Hashemi A, Rostami T. Depression in Iran: a systematic review of the literature (2000-2010). *Payesh* 2013; 12 (6): 567-94. (Persian)
9. Hyman S, Chisholm D, Kessler R, Patel V, Whiteford H. Mental disorders. Disease control priorities related to mental, neurological, developmental and substance abuse disorders. Book, Washington (DC): The International Bank for Reconstruction and Development / The World Bank; New York: Oxford University Press; 2006. <https://www.ncbi.nlm.nih.gov/books/NBK11766/>.
10. Rajabi GR. Psychometric properties of Beck depression inventory short form items (BDI-13). *Journal of Iranian Psychologists* 2005; 1 (4): 291-8. (Persian)
11. Ahmad S, Charesaz S, Azad-najafabad e, Talebi-hesar R. Vitamin D deficiency in women aged 15-40 years old in Urmia. *Urmia Medical Journal* 2005; 16 (2): 9-15. (Persian)
12. Wagner CL, Taylor SN, Johnson DD, Hollis BW. The role of vitamin D in pregnancy and lactation: emerging concepts. *Women's Health* 2012; 8 (3): 323-40. doi: 10.2217/whe.12.17.
13. Jamilian HR, Bagherzadeh K, Nazeri Z. Comparison of the serum levels of vitamin D, parathyroid hormone, calcium, and phosphorous in individuals with major depression and schizophrenics with healthy subjects. *Arak Medical University Journal* 2011; 14 (59): 19-26. (Persian)
14. Bae YJ, Kim SK. Low dietary calcium is associated with self-rated depression in middle-aged Korean women. *Nutrition Research and Practice* 2012; 6 (6): 527-33. doi: 10.4162/nrp.2012.6.6.527.
15. Rajizadeh A, Mozaffari-Khosravi H, Yassini-Ardakani M, Deghani A. Serum magnesium status in patients subjects with depression in the City of Yazd in Iran 2013-2014. *Biol Trace Elem Res* 2016; 171 (2): 275-82. doi: 10.1007/s12011-015-0542-x.
16. Krul-Poel Y, Koenders P, Steegers-Theunissen R, Ten Boekel E, ter Wee M, Louwers Y, et al. Vitamin D and metabolic disturbances in polycystic ovary syndrome (PCOS): A cross-sectional study. *PLoS one*. 2018; 13 (12): e0204748. doi: 10.1371/journal.pone.0204748.