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Vitamin D reduces postpartum depression and fatigue among

Iranian women

For many women, the days after childbirth are associated with the experience of depression and fatigue (Klainin and Arthur, 2009). Fatigue has characterised by ‘a lack of energy, profound tiredness, muscle weakness and lack of concentration’ (Giallo et al, 2014). Depression is defined as ‘the symptoms of emotional lability, sleep disruption, dysphoria, confusion, significant anxiety, and suicidal ideation’(Zhang et al, 2016).

 Up to 70% of women experience fatigue in the first 12 months postpartum (Giallo et al, 2015a; 2015b). The research showed a high level of depression among Asian women, and different studies in Iran have reported rates between 15% and 32% (Mohammad-AlizadehCharandabi et al, 2013). A literature review (Klainin and Arthur, 2009) estimated that 3.5–63.3% of mothers would experience depression. These problems not only affect the quality of life but also delay a mother’s timely response to her baby’s needs (Rouhi et al, 2012; Mohammadi et al, 2015; Giallo et al, 2015a).

While fatigue and depression may result from different causes, in Asian countries, especially in the Middle East, vitamin D deficiency is a key cause of depression and fatigue (Murphy et al, 2010a; Christesen et al, 2012; Bassil et al, 2013). Vitamin D deficiency is also associated with pulmonary disorders, chronic rhinitis, depression, colon and prostate cancer, type 2 diabetes, breast cancer, and hypertension (Johnson and Sattari, 2015).

Vitamin D deficiency is prevalent worldwide and influences up to two-thirds of women of childbearing age (Wagner et al, 2008; Dawodu et al, 2015). However, it is especially prevalent among Asian and Middle Eastern women, and despite the plentiful sunshine, 20–80% of women have vitamin D deficiency (Bassil et al, 2013). Studies in Iran have shown that the prevalence of vitamin D deficiency was 69% among different age groups (Alipour et al, 2014), with 86% of pregnant women and 75% of infants (46% and 35% in winter and summer, respectively) experienced vitamin D deficiency (Mohammad-Alizadeh-Charandabi et al, 2015).

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Sun exposure is the primary source of vitamin D, although this can be impeded by the use of topical

# Abstract

**Background Depression and fatigue have been recognised as common postpartum morbidities. One of the proposed well established aetiologies is vitamin D deficiency, which is prevalent among Iranian women.**

**Aim To determine the efficiency of vitamin D supplement on postnatal depression and fatigue.**

**Method In this double blind, randomised controlled trial, 80 primiparous women, who scored ≥13 and ≥20 on the Edinburgh Postnatal Depression Scale and the Fatigue Identification Form, respectively, were randomly distributed into the control and intervention groups over 4-10 months following birth. Groups received vitamin D3 1000IU and placebo pills daily for 6 months.**

**Logistic regression tests assessed the relation between variables. Findings Vitamin D decreased depression scores and fatigue scores in the intervention group (*P*>0.001).**

**Conclusion Considering vitamin D supplements as routine postpartum care among high-risk women would be useful. However, more studies are needed to support this conclusion.**

Keywords: **Postpartum | Depression | Fatigue | Vitamin D supplement | Randomised controlled trial**

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sunscreen to reduce the risk of skin cancer (Sachan et al, 2005). Vitamin D is also found in some food sources, such as fish liver oil, beef liver, cheese, egg yolk and some mushrooms (De-Regil et al, 2012). Given the importance of vitamin D and lack of adequate vitamin D from diet and sun exposure, supplementation is required (De-Regil et al, 2012).

The link between vitamin D and mood disorders is still unclear (Murphy et al, 2010a). Biologically, it is recognised that vitamin D joins to vitamin D receptors in the cells. Vitamin D deficiency means there is insufficient vitamin D to attach to the receptors, so hormonal processes are affected, leading to mood disorders (Garland et al, 2006; De-Regil et al, 2012).

 According to previous studies, there is a relationship between vitamin D deficiency, fatigue and depression (McGovern et al, 2006; Rouhi et al, 2011; Robinson et al, 2014; Gur et al, 2014; Accortt et al, 2016). Vitamin D supplements are non-toxic (Hollis et al, 2011) and are suggested to decrease prenatal and postpartum depression (Accortt et al, 2015). Vaziri et al (2016) concluded that 2000 IU vitamin D3 during pregnancy decreased the level of perinatal depression. This hypothesis was tested to see if vitamin D supplements would decrease depression and fatigue among women after childbirth.

## Method

### Design

This study was a randomised, controlled, double-blind clinical trial that took place in health centres in Mahabad between 2014 and 2015. Mahabad has a population of 237 000 and is situated in the north west of Iran.

According to the immunisation protocol system in Iran, mothers referred to health centres at 4, 6 and 12 months postpartum (Moradi-Lakeh and Esteghamati, 2013). At first, two researchers were present at health centres daily to recruit women according to inclusion criteria (vaginal birth, no medical or surgical restrictions, no history of psychiatric disorders, no prescribed medications and breastfeeding). After the aims of the study were clearly explained, all participants signed the consent form before interviews. Women then completed the Edinburgh Postnatal Depression Scale (EPDS) and Fatigue Identification Form (FIF) questions personally.

Confidentially was guaranteed. All questionnaires were completed in a private room under safe, comfortable conditions and stored in a locked box. Ethical approval and permission to perform the study was acquired from the Nursing and Midwifery College of Azad University, Mahabad Branch, and the West Azerbaijan District Health Centre.

There were six public health care centres in Mahabad, and participants were recruited from all centres. The subjects were selected by convenience sampling.

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### Sample

The literature review did not reveal any studies that showed the effect of vitamin D on depression and fatigue. To define the appropriate sample size, the comparison of means formula was calculated as mean=11, SD=4.1 (Abry Aghdam, 2006). To estimate the sample size, the authors considered 5% significance level, 10% probability of sample loss and 80% power 40 per group.

Computer-generated block randomisation to have a reasonable balance of participants in each of the two groups chose an allocation ratio of 1:1. Each participant was given a unique identification number.

Participants were allocated by a person outside the study using opaque, sealed, consecutively numbered envelopes. The participants were not aware of the aim of the study or whether they took vitamin D or a placebo. Women who had EPDS ≥13 and FIF ≥20 were selected. A total of 590 women were assessed for eligibility, 507 of whom were not eligible. Of the 83 who agreed to participate, 3 left the study and the rest were randomly placed into the intervention group (*n*=40) or comparison group (*n*=40). Groups received vitamin D3 (1000 IU daily) or placebo pills (containing lactose, starch and microcrystalline cellulose) daily for 6 months. The selection process is represented in *Figure 1*.

 The placebo capsules were designed to be similar in appearance to the vitamin D capsules, and the Jalinous pharmaceutical company in Iran coded the capsules to guarantee the blind nature of the study. A person outside the study prepared envelopes and block scheduling. Participants were advised not to take any other supplements except the one provided by the investigators, and received a monthly phone call to encourage the regular use of supplements. Six months after the study, to assess the mean scores, participants were invited to completed EPDS and FIF at health centres.

### Data collection

Based on the literature review, a semi-structured interview was planned to assess sociodemographic variables and any risk factors for depression and fatigue after childbirth (Bernazzani and Bifulco, 2003; Klainin and Arthur, 2009; Thombs and Stewart, 2014).

A Persian-language version of the EPDS designed for population-based screening was used to assess depression (Montazeri et al, 2007). The reliability of the Persianlanguage version of the EPDS is 75% (Mazhari and Nakhaee, 2007). The EPDS is a self-reporting research tool with ten questions on perinatal depression. The scale shows recent maternal feelings, to which women can give four answers (‘never’, ‘hardly ever’, ‘sometimes’ and ‘very often’) (Mohammadi et al, 2015). A score of ≥13 provides 95.3% sensitivity and 87.9% specificity to recognise clinical depression (Montazeri et al, 2007).

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**Figure 1. Study selection flow diagram.**

**EDPS: Edinburgh Postnatal Depression Scale; FIF: Fatigue Identification Form**

Women identified

(

*n*

=590)

Assessed for eligibility

(

*n*

=95)

Agreed to participate

(

*n*

=83)

Complete the EDPS and

 FIF scales

Left the study

(

*n*

=3)

Randomised

(

*n*

=80)

Completed EPDS and

FIF scales

(

*n*

=40)

Intervention group

(

*n*

=40)

Placebo group

(

*n*

=40)

Received

placebo

Received

vitamin D

(1000

 IU

)

Completed EPDS and

FIF scales

(

*n*

=40)

The FIF contains 30 yes/no statements to assess psychosomatic symptoms of fatigue (Yoshitake, 1978). Internal consistency for the Iranian version of the FIF was 0.83. (Rouhi, 2001). For this research, Cronbach’s alpha (α) for the FIF was 0.91. The participants answered statements that expressed their recent experiences. A score of ≥20 on FIF is regarded as probable fatigue (Milligan et al, 1997; Pugh et al, 1999).

## Data analysis

Data were analysed using SPSS version 18. To compare the groups’ demographic characteristics, a paired T-test was used. Descriptive statistics were used to characterise participants. Analysis of variance (ANOVA), chi-square (χ2) test, Fisher’s exact test and T-test was used to analyse the results. Statistical significant was considered at *P*≤0.05.

## Findings

This study was a randomised, double-blind controlled clinical trial. Of 95 women who were eligible, 83 agreed to participate.

### Participant baseline characteristic

Primiparous women were allocated to vitamin D group (*n*=40) and control group (*n*=40). No statistical differences were found between the groups regarding demographic features such as age, rate of vaginal delivery, past psychiatric illness, adverse events in the previous months, unplanned or complicated pregnancy, marital problems and obesity. The mean age of women was 24.7 years (SD=3.1). The majority (94%) of participants were housewives and the rest were on maternity leave during the study period (*Table 1*).

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### EPDS and FIF scores

No significant differences identified in scores of depression and fatigue between groups at baseline

(*Table 2*).

At baseline, the mean score of depression in the intervention group and placebo group were 15.05 and 15.27, respectively with no significant differences (*P*=0.484). The mean score of fatigue in the intervention group and placebo group were 23.25 and 25.23, respectively, with no significant differences (*P*=0.725).

Six months after treatment, FIF scores among those randomised to the intervention group decreased by 12 points or more (CI=4.38–7.71; *P*=0.001) and EPDS scores by 7 points (CI=3.02–5.35; *P*=0.001). There were no significant differences in mean FIF and EPDS scores in the control group.

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| **Table 1. Demographic of the participant’s characteristics by groups** |  |  |
| **Characteristics**  | **Vitamin D *n*=40 (%)** | **Placebo *n*=40 (%)** | ***P*** |
| **Age (years)** |  |  |
| Mean | 24.7 (3.1) | 24.8 (3.2) | 0.657\* |
| **Education**  |  |  |
| Primary and secondary school  | 25 (62.5) | 17 (42.5) | 0. 805\*\* |
| Diploma | 10 (27.5) | 5 (12.5) |  |
| University | 5 (10.0) | 18 (45.0) |  |
| \*Independent sample test, \*\*Analysis of variance (ANOVA) |  |  |
| **Table 2. The average scores of postnatal depression and fatigue in groups** |
| **Groups** | **Fatigue Mean (SD)** | **Depression Mean (SD)** |
| **4 months** | **10 months** | **4 months** | **10 months** |
| Vitamin D group | 23.3 (2.1) | 11.4 (3.3) | 15.1 (1.9) 8.6 (4.3) |
| Placebo group | 25.4 (2.9) | 25.1 (6.2) | 15.3 (1.8) 13.4 (4.7) |
| **Group comparison** | **Mean** | **SD** | **CI *P*** |
| Fatigue before and after treatment | 6.1 | 7.5 | 4.38–7.71 0.001 |
| Depression before and after treatment | 4.2 | 5.2 | 3.02–5.35 0.001 |

## Discussion

This study was a randomised, double-blind controlled clinical trial study in Iran. This study assessed the effect of 1000 IU of vitamin D3 supplement per day during 180 days postpartum on both depression and fatigue. To the authors’ knowledge, this is the first report of the effect vitamin D on depression and fatigue among postpartum Iranian women. Results showed that among women who experienced depression and fatigue, vitamin D supplementation improved EPDS and FIF scores.

### Vitamin D and depression

In this study, vitamin D supplements decreased postpartum depression. Studies indicate that vitamin D deficiency is associated with increased depressive symptoms (Armstrong et al, 2007; Berk et al, 2007). A study of 98 postpartum women in the US showed that women with vitamin D deficiency were had higher depression scores, according to the EPDS (Murphy et al, 2010b). Although this study did not measure blood vitamin D levels, vitamin D deficiency is prevalent in Iranian society, especially among women (MohammadAlizadeh-Charandabi et al, 2015). Murphy et al (2010a) found that women experiencing depression as verified by the the EPDS had low levels of vitamin D in the first 7 months after childbirth.

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### Vitamin D and fatigue

Despite a literature review, we were not able to identify reports that addressed depression, fatigue and vitamin D supplementary together. However, there are publications related to vitamin D supplement and postpartum depression (Miyake et al, 2015; Vaziri et al, 2016; Williams et al, 2016) and vitamin D and fatigue in other patient groups that excluded pregnant and postpartum women (Johnson and Sattari, 2015; Mokta et al, 2016).

Postpartum fatigue is considered as a typical result of physical and role alterations for new mothers (Mori et al, 2017). Fatigue has been reported as a common postpartum morbidity among this group of women, which may be experienced even at 5 years postpartum (Rouhi et al, 2016). Other factors are predictive for postpartum fatigue such as social and family support, lifestyle, age and parity (Mori et al, 2017).

Mokta et al (2016) studied five patients whose chief complaint was fatigue and low level of 25(OH)D. They treated patients with oral vitamin D weekly for 8 weeks followed by monthly doses. All five patients improved effectively with supplementation (Mori et al, 2017).

### Limitations

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This study has several methodological limitations. Vitamin D deficiency was not assessed by blood samples,

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# Key points

* Postpartum depression and fatigue are the most common morbidities after childbirth around the world
* In Asian countries, especially in the Middle East, vitamin D deficiency is a key cause of depression and fatigue
* Considering vitamin D supplements as routine postpartum care among highrisk women would be useful for this group of women

and depression and fatigue were based on EPDS and FIF scales, which are self-reported tools, as opposed to a clinician’s diagnosis. Although the EPDS and FIF have been endorsed among different groups of people, the role of socioeconomic factors must be considered in the responses of participants. This was a small trial and requires further research to clearly demonstrate a correlation between postpartum depression and fatigue with levels of vitamin D.

## Conclusion

This study suggests that vitamin D intake improved the fatigue and depression scores among postpartum women. Vitamin D supplementation may be a useful strategy to prevent symptoms of depression and fatigue among highrisk groups of postpartum women. **BJM**

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