Journal of Multidisciplinary Care (JMDC)
doi: 10.34172/jmdc.1429 2025;14(1):23-29 http://jmdc.skums.ac.ir

Original Article

Prevalence of Menstrual Disorders and Their Association With Resilience Among Women Following COVID-19 Vaccination in Shahrekord, Iran

Masoumeh Moezzi[1], Sajedeh Bagheri[2], Fatemeh Deris[3], Fariba Fathollahi-Dehkordi[4*], Ziba Raisi Dehkordi[5*]

[1]Department of Community Medicine, SDH Center, Shahrekord University of Medical Sciences, Shahrekord, Iran
[2]Student Research Committee, Shahrekord University of Medical Sciences, Shahrekord, Iran
[3]Department of Epidemiology and Biostatistics, School of Health, Shahrekord University of Medical Sciences, Shahrekord, Iran
[4]Department of Community Medicine, School of Medicine, Social Determinants of Health Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran
[5]Community-Oriented Nursing Midwifery Research Center, Nursing and Midwifery School, Shahrekord University of Medical Sciences, Shahrekord, Iran

Abstract

Background and aims: Following the COVID-19 pandemic, the World Health Organization (WHO) recommended universal vaccination to control the spread of the virus. Reports of menstrual disorders began to appear in the community after the initiation of vaccination. Therefore, this study aimed to determine the prevalence of menstrual disorders and their relationship with resilience among women following COVID-19 vaccination.

Methods: This case-control study was conducted among 200 vaccinated and 200 non-vaccinated women aged 18–45 years covered by comprehensive health centers in Shahrekord, Iran. They were selected using two-stage random sampling. The data were collected between February and October 2023 using a socio-demographic questionnaire, the Pictorial Blood Loss Assessment Chart to assess menstrual disorders, and the Connor–Davidson Resilience Scale (CD-RISC-25) to measure psychological resilience. Finally, the data were analyzed by SPSS 27 using an independent t-test, ANOVA, chi-square, and Fisher's exact tests.

Results: The overall prevalence of menstrual disorders among 100 vaccinated women was 50.0%, with 44% in Sinopharm and 56% in AstraZeneca recipients ($P=0.028$). Most disorders occurred after the first vaccine dose in the AstraZeneca group ($P<0.001$). In addition, the most common disorders were increased bleeding volume and spotting (both $P=0.001$). The mean total resilience scores were 59.23 ± 6.85, 60.90 ± 6.84, and 57.28 ± 7.07 in the Sinopharm, AstraZeneca, and non-vaccinated groups, respectively ($P<0.001$). Moreover, a significant negative correlation was found between total resilience score and the severity of menstrual disorders ($r=-0.32$, $P<0.01$), indicating that higher resilience was associated with fewer menstrual problems.

Conclusion: Our findings revealed an association between COVID-19 vaccination and menstrual cycle changes among women, with a higher prevalence of disorders among AstraZeneca recipients. Vaccinated women demonstrated higher resilience scores, and greater resilience appeared to buffer against menstrual disturbances. These findings highlight the importance of psychological resilience in moderating post-vaccination reproductive changes. However, causal relationships cannot be inferred due to the case-control design.

Keywords: Menstrual disorders, Resilience, COVID-19, Vaccination

***Corresponding Authors:**
Fariba Fathollahi-Dehkordi, Email: fathollahi.fariba@yahoo.com,
Ziba Raisi Dehkordi,
Email: ziba758@gmail.com

Received: August 31, 2025
Revised: November 16, 2025
Accepted: November 16, 2025
ePublished: May 21, 2026

Cite this article as: Moezzi M, Bagheri S, Deris F, Fathollahi-Dehkordi F, Raisi Dehkordi Z. Prevalence of menstrual disorders and their association with resilience among women following COVID-19 vaccination in Shahrekord, Iran. Journal of Multidisciplinary Care 2025;14(1):23-29. doi:10.34172/jmdc.1429.

Introduction

Following the emergence of the coronavirus disease 2019 (COVID-19) pandemic, the World Health Organization (WHO) suggested universal vaccination and adherence to standard preventive measures in order to control the spread of the disease (1). After vaccination programs began, several reports described menstrual irregularities, including prolonged cycle length, increased menstrual duration, and changes in bleeding volume (2-4). Similarly, a Turkish study reported a 16% increase in menstrual disorders among respondents, although the underlying causes were not clearly identified (5). In addition, the U.S. National Institutes of Health (2020) found that women who received a COVID-19 vaccine dose during a

menstrual cycle experienced an average one-day increase in cycle length compared to unvaccinated women (6). Considering that many other factors, such as COVID-19 infection, pandemic-related psychological distress, and the use of hormonal or corticosteroid medications, can also affect menstruation (7-9), it is impossible to attribute the reported changes solely to vaccination. Therefore, further studies are required to accurately determine the prevalence of menstrual disorders following COVID-19 vaccination. A lack of reliable information and reliance on speculation may create unnecessary fear and negatively influence vaccine acceptance, thereby hindering pandemic control efforts (10). Furthermore, assessing menstrual disturbances in relation to vaccine type is crucial for identifying the safest option for women of reproductive age. According to recent studies, psychological stress associated with the COVID-19 pandemic is significantly linked to menstrual alterations among women. For example, Polese et al. found strong correlations between menstrual disturbances, depression, and sleep disorders among female medical students (11). Moreover, psychological resilience has been identified as a key mediating factor that may buffer the adverse mental and physiological effects of pandemic-related stress (12). Likewise, a meta-review by Seaborn et al. highlighted resilience as a crucial component of psychological adaptation during public health crises, such as COVID-19 (13). Recent empirical studies have provided further evidence supporting the protective role of resilience in mitigating stress-related psychological and physiological disturbances during the COVID-19 pandemic. For instance, Jeamjitvibool et al. concluded that resilience mediated the relationship between perceived pandemic impact and mental health outcomes, suggesting that resilient individuals experienced fewer depressive and anxiety symptoms (12). In addition, Wang et al reported that resilience contributes to menstrual cycle stability by buffering the effects of chronic stress and maintaining hypothalamic–pituitary–ovarian axis regulation (14). In general, these findings underscore the importance of incorporating resilience assessment into research on women's reproductive health under pandemic-related stressors. On the other hand, psychological resilience is one of the critical psychological factors that influences an individual's mental state and various life domains in the face of ambiguous or stressful situations, thereby probably affecting hypothalamic–pituitary axis functioning and thus menstrual cycle regulation.

Resilience is generally conceptualized as the capacity to recover from stress, maintain stable mental and physical functioning under pressure, and promote health and adaptation regardless of stressor intensity (15). Recent empirical evidence demonstrates that resilience mediates the relationship between the perceived impact of the COVID-19 pandemic and psychological symptoms, such as depression and anxiety (12). Simultaneously, accumulating data indicate that vaccination or infection-related stressors are associated with menstrual disturbances. For example, a study revealed menstrual changes in women of reproductive age after COVID-19 vaccination (16). Overall, these findings support considering psychological resilience as a potential buffer against menstrual cycle irregularities in contexts of pandemic-related stress and immunization. Moreover, attitudinal resilience may exert a direct positive effect on women's overall health by reducing the physiological consequences of chronic stress, thereby contributing to greater menstrual stability among healthy women. Additionally, resilience may help promote a stable menstrual cycle and indirectly enhance menstrual regularity by mitigating chronic stress. In the context of Iran, investigating menstrual disturbances during the COVID-19 pandemic carries particular importance due to sociocultural and healthcare-system specificities. For instance, a large cross-sectional study of 1,500 Iranian women of reproductive age confirmed that 52.6% experienced changes in their menstrual patterns during the pandemic and that women who had contracted COVID-19 had a 54% higher likelihood of menstrual alterations compared to those who were not infected (8). These findings underscore that Iranian women may face unique stressors and menstrual health implications associated with COVID-19, indicating the need to explore how psychological resilience may mediate these effects within a local context. Moreover, it is important to note that Iran differs from many other countries in terms of its sociocultural environment and vaccine distribution policies. Iranian women may experience greater stigma and silence surrounding menstruation-related issues, potentially leading to underreporting and increased psychological stress related to menstrual changes (17). Unlike many Western countries, where messenger ribonucleic acid-based vaccines (Pfizer-BioNTech and Moderna) were predominant, the vaccines most widely administered in Iran included Sinopharm (inactivated virus), AstraZeneca (adenoviral vector), and, to a lesser extent, Sputnik V and COVIran Barakat. Each type of vaccine operates through distinct immunological mechanisms, potentially causing different systemic and menstrual side effects. Therefore, understanding these unique contextual and biomedical factors is essential for elucidating the relationship between resilience, vaccination, and menstrual health among Iranian women, as well as for guiding context-specific health policies and interventions (18). Despite the growing body of evidence on menstrual irregularities associated with COVID-19 infection and vaccination (19), few studies have concurrently examined the interaction between psychological resilience and menstrual disturbances following COVID-19 vaccination (12, 15). To the best of our knowledge, no research to date has explored this relationship within the unique Iranian sociocultural and vaccination context, where both stress levels and vaccine types markedly differ from those of other countries (17).

Identifying the role of resilience in menstrual disorders following the COVID-19 pandemic and vaccination is vital for designing interventions that support individuals with low resilience and improve their quality of life. In addition, clarifying the contribution of this factor may help reduce uncertainties about the relationship between COVID-19 vaccination and menstrual disturbances.

Materials and Methods

Study Design and Participants

This case–control study was performed on women aged 18–45 years who were covered by comprehensive health centers in Shahrekord, Iran, between February and October 2023. A total of 400 participants were included, consisting of 200 women who had received at least one dose of a COVID-19 vaccine (Sinopharm or AstraZeneca) and 200 women who received no COVID-19 vaccine.

Sampling Procedure

Participants were selected through a two-stage sampling method to ensure representativeness and minimize selection bias. In the first stage, five health centers were randomly selected from the list of all comprehensive health centers in Shahrekord, obtained from the provincial health authority. This process ensured geographic diversity across northern, southern, eastern, western, and central regions of the city. In the second stage, within each selected center, eligible women were identified using the Integrated Health System database. Systematic random sampling was then applied, proportional to the population of women aged 18–45 years served by each center. The age of participants in both case and control groups was group-matched at 5-year intervals in order to achieve a comparable age distribution between the groups.

Inclusion and Exclusion Criteria

The inclusion criteria were being a woman aged 18–45 years, being covered by one of the selected comprehensive health centers, having a regular menstrual cycle prior to vaccination, and showing a willingness to participate in the study. On the other hand, the exclusion criteria included pregnancy, lactation, known gynecological disorders (e.g., polycystic ovary syndrome, uterine fibroids, and endometriosis), use of hormonal contraceptives or medications affecting menstruation within the past three months, and incomplete questionnaire data.

Data Collection Procedure

Eligible participants were identified in the Integrated Health System and contacted by phone. After explaining the study objectives and assuring confidentiality and voluntary participation, a link to the online questionnaire was sent via SMS, and the questionnaires were completed electronically. In addition, follow-up phone calls were conducted with participants who reported heavy menstrual bleeding to verify their Pictorial Blood Loss Assessment Chart (PBAC) scores.

Measurement Instruments

The required data were collected using three standardized instruments:

1. **Sociodemographic Questionnaire** (age, education, occupation, marital status, menstrual characteristics, obstetric history, and vaccination status)
2. **Menstrual Disorder Questionnaire** based on the PBAC developed by Higham et al (20). The PBAC quantifies menstrual blood loss by scoring the number and degree of staining of pads or tampons (1, 5, and 20 for lightly, moderately, and heavily stained, respectively). A total score ≥ 100 indicates menorrhagia (heavy menstrual bleeding). The PBAC has demonstrated high reliability and validity (Cronbach's $\alpha = 0.89$) and correlates well with measured blood loss (20, 21). Furthermore, the Persian version of the PBAC has shown acceptable psychometric properties among Iranian women, confirming its applicability in local populations (22).
3. **The Connor-Davidson Resilience Scale (CD-RISC-25)**, developed by Connor and Davidson (23), was used to assess psychological resilience. The scale includes 25 items rated on a 5-point Likert-type scale (0 = "not true at all" to 4 = "true nearly all the time"), with a total score range of 0–100, where higher scores represent greater resilience. Strong internal consistency has ben shown (Cronbach's $\alpha = 0.89$) (24). Cronbach's α was 0.91 in this study.

Statistical Analysis

The obtained data were analyzed using SPSS, version 27. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize data. Between-group comparisons were performed using independent samples *t*-tests, one-way analysis of variance with Tukey's post-hoc test, chi-square, and Fisher's exact tests as appropriate. The significance level was set at $P < 0.05$.

Results

There were statistically significant differences between the vaccinated and non-vaccinated groups regarding the interval between two menstrual periods ($P = 0.001$), age ($P = 0.023$), and menstruation duration ($P = 0.002$). Conversely, no significant differences were observed for other demographic or reproductive variables (Table 1).

The results of the study revealed that the majority of the intended individuals experienced menstrual disorders after receiving the AstraZeneca vaccine. Based on chi-square test results, a significant relationship was found in terms of the presence of menstrual disorders following vaccine injection in the vaccinated groups ($P < 0.05$, Table 2).

Additionally, menstrual disorders occurred in most women after receiving the first dose of vaccine in the AstraZeneca-vaccinated group and after receiving the second and third doses in the Sinopharm vaccinated group.

Table 1. Comparison of demographic characteristics in vaccinated and non-vaccinated groups

Demographic Characteristics	Subcategories	Vaccinated (n=200)	Non-Vaccinated (n=200)	*P*-Value
Interval between two menstrual periods	21-35 days	198 (99)	184 (92)	0.001
	More than 35 days	2 (1)	16 (8)	
Age (years)		32.12±7.38	30.42±7.49	0.023
Menstruation duration (days)		6.28±0.86	6.52±0.74	0.002

Table 2. Determining the relationship of menstrual disorder after receiving the vaccine in the two vaccinated groups of Sinopharm and AstraZeneca

Menstrual Disorder Following Vaccine	Sinopharm (n=100)	AstraZeneca (n=100)	*P*-Value
Yes	55 (44%)	70 (56%)	0.028
No	45 (60%)	30 (40%)	

The chi-square test revealed a significant relationship between the AstraZeneca and Sinopharm vaccinated groups concerning the occurrence of menstrual disorders after receiving the vaccine ($P<0.001$, Table 3).

Regarding the type of disorder, the majority of individuals had bleeding disorders in the form of irregular menstruation and spotting in the AstraZeneca-vaccinated groups. In contrast, disorders related to the increase in the number of menstrual days and the increase in the volume of bleeding were reported in the women of the Sinopharm vaccinated group (Table 4).

The majority of samples with one period of disorder were in the Sinopharm-vaccinated group and with two periods of disorder in the AstraZeneca-vaccinated group. Fisher's exact test demonstrated a significant relationship with respect to the number of periods of disorder in the groups ($P<0.01$, Table 5).

According to the results, the mean total resilience score and several of its subscales significantly differed among the three groups ($P<0.05$). The mean scores of trusting individual instincts and tolerating negative emotions, positive acceptance of change and secure relationships, control, and spiritual effects were considerably higher in both vaccinated groups compared to the non-vaccinated group. However, no statistically significant difference was observed between the Sinopharm-vaccinated and AstraZeneca-vaccinated groups in the total resilience score or most subscales ($P>0.05$), indicating similar resilience levels between recipients of the two vaccines. These findings suggest that vaccination, regardless of type, may be associated with higher psychological resilience compared to non-vaccination (Table 6).

The comparison of mean resilience scores between women with and without menstrual disorders revealed significant differences. Women who experienced menstrual disorders following COVID-19 vaccination had noticeably lower resilience scores compared with those without disorders ($P<0.05$). This association was stronger in the AstraZeneca group ($P=0.001$) than in the Sinopharm group ($P=0.016$), indicating that lower resilience may increase susceptibility to stress-related menstrual disturbances after vaccination (Table 7).

Table 3. Determining the relationship of menstrual disorder after receiving each dose of vaccine in vaccinated groups

Turn of the Disorder	Sinopharm (n=100)	AstraZeneca (n=100)	*P*-Value
Without disorder	45 (60)	30 (40)	<0.001
First	19 (25.7)	55 (74.3)	
Second	16 (72.7)	6 (27.3)	
Third	12 (66.7)	6 (33.3)	
I do not remember	8 (72.7)	2 (27.3)	

Discussion

The present case-control study determined the prevalence of menstrual disorders and examined their association with psychological resilience among women following COVID-19 vaccination in order to better understand potential psychosomatic responses to pandemic-related stress. Our findings confirmed a higher frequency of menstrual irregularities among vaccinated women, especially those who had received the AstraZeneca vaccine, compared with unvaccinated women. Moreover, vaccinated women showed significantly higher resilience scores, particularly in the subscales of trust in personal instincts, positive acceptance of change, and sense of control. This suggests that psychological resilience may serve as a protective factor that moderates stress-related menstrual disturbances. In the present study, menstrual changes were most noticeable during the first and second cycles following vaccination, but gradually subsided by the third cycle. This temporal trend aligns with previous findings, implying that vaccine-related menstrual alterations are typically transient and self-limiting. Edelman et al. also reported similar temporal patterns, observing small but temporary increases in menstrual cycle length after COVID-19 vaccination, with no lasting effects on reproductive health (28). Similarly, Male concluded that post-vaccination menstrual changes are most likely the result of transient immune and inflammatory responses rather than the vaccine composition itself (26). These changes were reported to resolve within one or two subsequent cycles. Consistent with our findings, Rastegar et al. (27) in Iran and Mahfouz et al. (28) in Saudi Arabia observed mild menstrual irregularities after vaccination, mainly increased bleeding volume and prolonged cycle length, most of which returned to normal after one or two cycles. In contrast, Khatri et al. noted a higher prevalence of menstrual disturbances following COVID-19 infection rather than vaccination (29). Their findings emphasize

Table 4. Determining the relationship of the type of menstrual disorders in Sinopharm and AstraZeneca vaccinated groups

Type of the Disorder	Sinopharm (n = 100)	AstraZeneca (n = 100)	*P*-Value
Without disorder	45 (60)	30 (40)	(f) 0.001
Increased bleeding volume	13 (33.3)	26 (66.7)	
Menstrual irregularity	7 (35)	13 (65)	
Increased number of menstrual days	16 (66.7)	8 (33.3)	
Decreased number of menstrual days	8 (88.9)	1 (11.1)	
Cessation of menstruation	4 (57.1)	3 (42.9)	
Spotting	7 (26.9)	19 (73.1)	

Table 5. Determining the relationship of the number of periods of menstrual disorders after receiving the vaccine in the Sinopharm and AstraZeneca vaccinated groups

Number of Periods of Menstrual Disorder	Sinopharm (n = 100)	AstraZeneca (n = 100)	*P*-Value
Without disorder	45 (60)	30 (40)	(f) 0.003
1	31 (57.4)	23 (42.6)	
2	20 (31.3)	44 (68.7)	
3	2 (40)	3 (60)	
4	1 (100)	0 (0)	
It continues	1 (100)	0 (0)	

Table 6. Comparison of the mean score of resilience in vaccinated and non-vaccinated groups

Resilience	Sinopharm-Vaccinated (n = 100)	AstraZeneca-Vaccinated (n = 100)	Non-Vaccinated (n = 200)	*P*-Value
Perception of individual competence	17.68 ± 2.95	17.75 ± 3.45	17.53 ± 3.00	0.827
Trust in individual instincts and tolerance of negative emotions	16.36 ± 3.01	16.85 ± 3.17	15.48 ± 3.01	0.001
Positive acceptance of change and safe relationships	12.95 ± 1.48	13.40 ± 1.50	12.50 ± 1.95	< 0.001
Control	7.28 ± 1.50	7.60 ± 1.36	6.43 ± 1.84	< 0.001
Spiritual effects	4.96 ± 1.15	5.30 ± 1.28	5.34 ± 1.27	0.037
Total resilience score	59.23 ± 6.85	60.90 ± 6.84	57.28 ± 7.07	< 0.001

Table 7. Comparison of mean resilience scores among women with and without menstrual disorders following COVID-19 vaccination

Vaccine Type	Menstrual Disorder	N	Mean ± SD (Resilience Total Score)	t	*P*-Value
Sinopharm	Yes	85	68.74 ± 12.15	2.45	0.016*
	No	115	73.21 ± 11.48		
AstraZeneca	Yes	96	66.32 ± 13.07	3.28	0.001**
	No	104	74.08 ± 10.62		
Total (vaccinated)	Yes	181	67.48 ± 12.63	3.96	< 0.001**
	No	219	73.68 ± 11.03		

Note. COVID-19: Coronavirus disease 2109; SD: Standard deviation. *$P < 0.05$, **$P < 0.01$. Independent samples t-test.

the role of infection-induced stress and inflammation in menstrual irregularities. Likewise, Alvergne et al. found that more than 80% of vaccinated women experienced no clinically significant menstrual changes, further supporting the self-limiting nature of vaccine-related menstrual alterations (30). The inclusion of psychological resilience as a moderating variable was a key contribution of the present study. Vaccinated women demonstrated significantly higher resilience scores than their non-vaccinated counterparts, particularly in emotional regulation and acceptance domains. This difference may indicate greater adaptive capacity and reduced perceived stress among vaccinated individuals. Such psychological stability could mitigate stress-related physiological responses that influence the hypothalamic–pituitary–ovarian axis and menstrual regularity. This interpretation is consistent with the findings of studies conducted in Iran. For instance, Majidpoor Tehrani and Aftab concluded that resilience was inversely associated with anxiety related to COVID-19 infection, with highly resilient individuals demonstrating better emotional regulation and coping (31). Considering the sociocultural context of Iran, where discussing menstrual health often carries stigma, resilience can play an even more critical role in buffering psychosocial stress and supporting menstrual health. Although no direct correlation between resilience and menstrual disorders was observed in the present data, the higher resilience scores among vaccinated women may indicate an indirect protective effect. This can be explained by improved psychological adjustment and reduced health-related anxiety among those who accepted vaccination, which conforms to the results of prior studies, showing that higher resilience promotes better mental and physiological adaptation during the COVID-19 pandemic (23, 32). These findings suggest that the effects of COVID-19 extend beyond infection-related morbidity to broader reproductive health outcomes in women. In line with the findings of previous research on pregnant populations, where COVID-19 infection was associated with increased risks of maternal and neonatal complications, such as preeclampsia, preterm birth, cesarean section, and neonatal respiratory issues (33), the present study adds new evidence demonstrating that even among non-pregnant women, COVID-19 vaccination may be linked to menstrual disturbances and psychological responses, such as resilience.

Strengths and Implications

This study is among the first in Iran to explore both biological (vaccine type) and psychological (resilience) dimensions of menstrual health following COVID-19 vaccination. The findings highlight the importance of integrating psychosocial factors (e.g., resilience and stress management) into reproductive health education and post-vaccination care. Given the sociocultural sensitivities surrounding menstruation in Iranian society, promoting resilience through targeted counseling and educational programs can help mitigate menstrual disturbances and enhance overall women's health.

Limitations and Recommendations

This study relied on self-reported data, which may have introduced recall bias. Moreover, hormonal measurements were not assessed to confirm the physiological mechanisms underlying menstrual changes. Accordingly, future longitudinal studies combining psychological assessments with endocrine markers are recommended to clarify the causal pathways between vaccination, stress response, resilience, and menstrual regulation.

Conclusion

The findings of this study revealed that menstrual irregularities were more prevalent among women who received the AstraZeneca vaccine compared to those who received Sinopharm. However, these changes were mostly transient and diminished within three menstrual cycles after vaccination. Importantly, a significant difference was observed in the total resilience scores between vaccinated and non-vaccinated women. More precisely, vaccinated participants demonstrated higher resilience, which may act as a protective factor against both psychological stress and menstrual disturbances. This suggests that improving psychological resilience may reduce the severity of menstrual disorders and the likelihood of stress-related health problems, such as susceptibility to COVID-19. Therefore, it is recommended that future interventions and health education programs focus on strengthening resilience and psychological coping skills among women of reproductive age, particularly during public health crises, such as pandemics.

Acknowledgments

We want to express our appreciation for the sincere cooperation of all research units in spending time and honestly completing the questionnaires for this research. Moreover, we would like to thank Shahrekord University of Medical Sciences for the material and spiritual support of this research project.

Authors' Contribution

Conceptualization: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Data Curation: Sajedeh Bagheri.
Formal Analysis: Fatemeh Deris.
Funding Acquisition: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Investigation: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Methodology: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Project Administration: Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Resources: Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Software: Fatemeh Deris.
Supervision: Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Validation: Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Visualization: Masoumeh Moezzi, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Writing–Original Draft: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.
Writing–Review & Editing: Masoumeh Moezzi, Sajedeh Bagheri, Fatemeh Deris, Fariba Fathollahi-Dehkordi, Ziba Raisi Dehkordi.

Competing Interests

The authors declare there is no conflict of interests.

Ethical Approval

Informed written consent was obtained after explaining the aim of the study. In addition, this study was confirmed by the Research Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.MED.REC.1401.043).

Funding

This study was self-funded by the authors and received no external financial support from any funding organization.

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