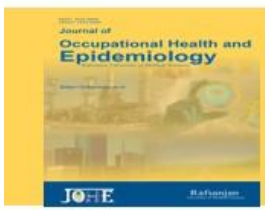
Original Article



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Work-Related Rumination and Its Effect on Employee Health and Well-Being: A Meta-Analysis

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Abstract

Background: Rumination has been suggested to be an important factor and a possible mechanism hindering the healing process after work. The present study aimed to evaluate work-related rumination and its impact on employees' health and well-being.

Material and Methods: To conduct the present meta-analysis, an extensive electronic search was undertaken across MEDLINE (PubMed and Ovid), Web of Science, and Scopus, covering the period from January 2014 to July 2024. Search terms were carefully selected to correspond with the objectives of the review. The study adhered to the PRISMA 2020 guidelines (27 items) to ensure methodological rigor. From the initial retrieval of 1,281 records, only 14 cross-sectional investigations satisfied the inclusion criteria and were retained for synthesis. The analysis employed effect size estimates with 95% confidence intervals as the principal outcome metric. All statistical procedures were performed using STATA/MP, version 17.

Result: The meta-analysis reveals a statistically significant and negative relationship between rumination and well-being (ES, -0.22; 95% CI, -0.25 to -0.18; $p < 0.001$), indicating that as rumination increases, employee well-being decreases.

Conclusion: The present meta-analysis emphasizes the importance of reducing Work-related rumination in increasing employee well-being.

Keywords: Rumination Syndrome, Psychological Well-Being, Employee, Working Conditions, Work Environment, Occupational Health

Introduction

Organizational psychologists have shown great interest in the relationship between job characteristics and employee well-being [1]. Over the past decade, the rumination construct has been integrated, providing ample empirical evidence and leading to major advances, particularly in the field of clinical psychology [2]. Due to its relative newness, a tremendous amount of research has been conducted on the topic of worker rumination [3, 4]; however, this has also led to a lack of more comprehensive work incorporating data from many studies.

Recent investigations into occupational stress have expanded beyond simply identifying, quantifying, and categorizing supportive or harmful workplace factors and their effects on employees' mental health and well-being. The emphasis is now on understanding how individuals respond to stressful demands in their work

environment. A central theme in this line of inquiry is the way employees cognitively process such experiences, particularly in relation to their capacity for recovery after work. This cognitive dimension has become a cornerstone of the contemporary framework for stress management [3-6].

An intervention strategy against secondary stress is part of the dynamic recovery process after a day at work [7]. By working in unhealthy or toxic work environments, an employee's interactions can have negative impacts, which this intervention strategy aims to mitigate [8, 9]. The focus today is on recovery processes that employees can use every day, even if these processes were previously tied to weekends or vacation time [10, 11].

Because toxic work environments place greater demands on resources than healthy work environments, it is more important to take measures to support psychophysiological recovery outside of work hours [12]. Although a full recovery is a reliable sign of good health, certain behaviors hinder proper recovery, endanger workers' health and well-being, and cause sleep or fatigue problems [13, 14]. Work-related thoughts can be either pragmatic or emotional in nature and can lead to rumination or problem-solving thinking, respectively [15-17].

Clinical psychologists have studied ruminative thought processes in depth and now consider it a transdiagnostic factor for eating disorders, anxiety, depression, and substance abuse [18, 19]. Rumination is the inability to step away from work after the work is done [20]. Although these processes are defined differently across the literature, they generally share three defining features. First, they consist of semi-automatic cycles of thought that are embedded in negative emotional states. Second, they represent ineffective or maladaptive strategies for dealing with stress. Finally, individuals who engage in such ruminative thinking often perceive it as advantageous, despite its detrimental impact [21, 22].

Several risk factors, including affective rumination at work, have been linked to burnout [23, 24]. Work-related rumination is associated with various health consequences, such as increased emotional exhaustion and reduced well-being [25-27]. Daily well-being is positively correlated with ruminative self-focus [28]. The main effect of work-related rumination on daily well-being observed in the current study is consistent with previous research suggesting that negative post-work rumination patterns and difficulty switching off from work can negatively impact well-being and mental health [29, 30]. Studies suggest that everyday well-being can play a role in causing emotional fatigue in particular and burnout in general [31]. Research shows that rumination reduces employee innovation performance and has a significant negative impact on employee health [32].

In a meta-analytic investigation of primary and moderating effects, two central relationships were tested: the link between negative workplace conditions and work-related rumination, and the connection between rumination and diminished employee well-being. Findings indicated that rumination was significantly associated with both adverse work experiences and reduced well-being [15]. A systematic review study showed work-related rumination is an essential mechanism in the relationship between work characteristics [33].

Although previous studies have attempted to assess the relationship between work-related rumination and employee health and well-being from different perspectives and using different research methods, a comprehensive assessment has not been provided to provide strong evidence. Clinical and health psychology research demonstrates the importance of rumination on employee mental health [15, 34-36]. Therefore, in the present study, an attempt has been made to reach a consensus on the findings of previous studies. The present meta-analysis study aimed to evaluate work-related rumination and its impact on employee health and well-being.

Materials and Methods

Search strategy and Information sources: From January 2014 to July 2024, a comprehensive literature search was carried out across major international databases, including MEDLINE (PubMed and Ovid), Embase, and the Cochrane Library, to identify scientific evidence on work-related rumination and its influence on employee health and well-being (Table 1). Additional searches were conducted in Scopus, Wiley Online Library, Web of Science, Cochrane Central Register of Controlled Trials, EBSCO, ISI, Elsevier, and through the Google Scholar search engine. The search strategy covered ten years in order to capture the most recent publications and emerging evidence. The methodology of this study followed the PRISMA 2020 guidelines, which are based on a 27-item checklist [37].

For searching the literature in MEDLINE (via PubMed), Cochrane, and Embase, the following keyword syntax was used: Table 1.

The search strategy used in MEDLINE (via PubMed): ("Rumination Syndrome"[Mesh] OR "Rumination, Cognitive"[Mesh]) OR ("Rumination Syndrome/diagnosis"[Mesh] OR "Rumination Syndrome/prevention and control"[Mesh] OR "Rumination Syndrome/therapy"[Mesh]) AND ("Psychiatry and Psychology Category"[Mesh] OR Mental Disorders, "Rumination Syndrome "[Mesh] AND "Psychological Well-Being"[Mesh] AND "Occupational Groups"[Mesh] AND ("Employees"[Mesh] OR "Personnel"[Mesh] OR

"Workers"[Mesh] OR "Occupational Group "[Mesh] OR "Worker "[Mesh].

The search strategy used in Cochrane: Rumination Syndrome OR Work-related rumination. Psychological Well-Being. Employees OR Personnel OR Workers OR Employee OR Group, Occupational OR Groups, Occupational OR Occupational Group OR Worker.

The search strategy used in Embase: (Rumination) OR (Rumination Syndrome) OR (Work-related rumination): ab, ti,kw; Psychological Well-Being': ti,ab,kw; smooth implant AND textured implant;: ti,ab; Employees' Workers': ab,ti,kw; chapter' OR 'conference abstract' OR 'conference paper' OR 'conference review' OR 'editorial' OR 'erratum' OR 'letter' OR 'note' OR 'preprint' OR 'short survey'/it (Filter).

Selection criteria: The inclusion criteria specified that only studies published in English were considered. The research questions were structured according to the PICOS framework: Population (P) included employees and workers; Intervention (I) referred to work-related rumination; and Comparison (C) was defined as the control group; Outcome (O): the effect of work-related rumination on employees' health and well-being; Study design(s): randomized controlled trial (RCT), cohort studies and Descriptive and analytical studies. Studies that focused only on rumination or examined its relationship with adverse life events were excluded. Studies that examined only one of the research variables were also excluded. The current analysis excluded studies on therapeutic interventions, tests, or questionnaires measuring psychometric values, studies with samples of employees with mental disorders, and studies examining rumination in the context of remote work. It also excluded review studies and books, qualitative studies, laboratory studies, animal studies, and studies without comprehensive and relevant data.

The process of selection and data collection: Two researchers separately and blind collected data from individuals using a standardized data collection form that was previously designed to reduce reporting, data collection errors, and omissions. A third researcher examined the data, and any discrepancies between the two investigators were resolved by discussion and re-determination.

The research team created the original form, which included the following information: the author's name, year of publication, Number of participants, mean of age, gender, Job, Country, and study design.

Heterogeneity and publication bias: The heterogeneity across studies was examined using the Chi-square ($\chi 2$) test and quantified by the I2 statistic. According to the I2 value, heterogeneity was classified as low (less than 50%), a value between 50 and 74% means moderate heterogeneity, and a value above 75% is considered high heterogeneity.

The possibility of publication bias was explored by the Egger and Begg tests and the funnel plot.

Methodological quality: The included cross-sectional studies were assessed for their methodological quality using the Newcastle-Ottawa Scale (NOS) [38]. Each study received a maximum of nine stars on this scale. Research was considered high quality if it received seven or more stars; if not, it was considered inferior.

The effect measure of choice was the effect size with 95% confidence intervals. The results were reported based on a Fixed-effects model with inverse-variance. The data were analyzed at a significance level of 0.05 using Stata software (version 17).

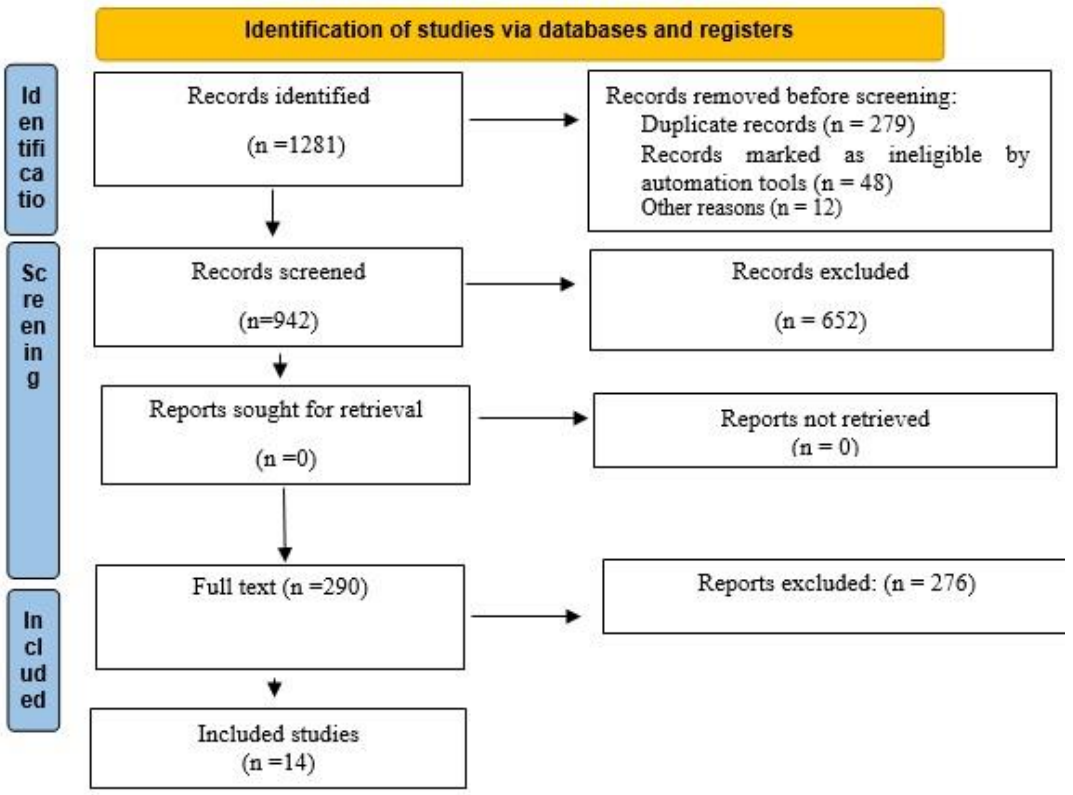

Fig. 1. PRISMA 2020 Checklist

Results

Description of studies: The initial database search yielded 1,281 articles. During the first screening phase, 279 duplicate records were removed based on the titles. In the second phase, 652 studies were excluded after reviewing the abstracts of 942 articles that did not meet the inclusion criteria. In the third phase, full-text examination of 290 articles led to the exclusion of 276 studies due to incomplete data or failure to meet the eligibility criteria. Ultimately, 14 articles were included in the present analysis (Fig. 1 and Table 2).

Study characteristics**:** Fourteen cross-sectional studies were included in present study. In present study 6717 employees included with the range of age between 36 to 47 years. A summary of study characteristics is provided in Table 2.

Table 2. Summary characteristics of studies

Study. years	Study design	Country	Number of participants	Mean age	Sex		Job	Result
					Male	Female		
Zheng et al., 2024 [39]	cross-sectional	China	282	36.64 ± 7.05	138	144	Chinese University Logistics Staff	The findings mediate the relationship between rumination and well-being and ill-being.
Wu et al., 2023 [40]	cross-sectional	China	536	39.40 ± 7.64	207	329	Chinese university teachers	By reducing rumination and work-related emotional exhaustion, it is desirable to increase vitality at work.
Gossmann et al., 2023 [31]	cross-sectional	Germany	58	40.6 ± 11.6	NR	NR	psychotherapeutic practitioners	Work-related ruminative thoughts suggest diverse relationships with job demands and well-being.
Chen et al., 2022 [41]	cross-sectional	Taiwan	823	38.40 ± 6.64	NR	NR	Taiwanese full-time workers	Higher rumination and lower detachment exacerbated the positive association between both job demands and aggression and emotional exhaustion.
Minnen et al., 2021 [42]	cross-sectional	United States	59	31.59 ± 10.97	18	41	Employees	Work-related rumination that influences employee well-being at bedtime.
Bakker et al., 2021 [43]	cross-sectional	Canada	501	NR	NR	NR	large bank cooperation	High ruminators fared least well in terms of weekly well-being.
Toyoshima et al., 2021 [44]	cross-sectional	Tokyo	458	40.8±11.9	201	257	adult workers	Work-Related Rumination contributes to sleep disturbance, which affects well-being.
Kinnunen et al., 2019 [45]	cross-sectional	Finland	664	47.5 ± 9.9	279	385	Finnish employees	Work-Related Rumination affects well-being and safety.
Kinnunen et al., 2017 [25]	cross-sectional	Finland	664	47.5 ± 9.9	279	385	Finnish organizations in different sectors	Work-related ruminative thoughts suggest diverse relationships with job demands and well-being.
Kinman et al., 2017 [46]	cross-sectional	U. K	1682	47 ± 8.25	1429	253	U.K. prison officers	Work-related ruminative thoughts suggest diverse relationships with well-being.
Huhtala et al., 2017 [47]	cross-sectional	Finland	133	38.02 ± 9.5	8	125	school psychologists	High levels of control/support were associated with greater job satisfaction.
Cropley et al., 2015 [48]	cross-sectional	U. K	108	40.8 ± 10.4	31	77	Primary and secondary teachers	A positive personality was associated with positive well-being both at work and outside of work.
Demsky et al., 2015 [49]	cross-sectional	United States	699	48 ± 16.6	356	434	Forest service employees	Work-Related Rumination affects well-being.
Vahle-Hinz et al., 2014 [50]	cross-sectional	Germany	50	42.6 ± 7.3	48	2	Various	Work-related rumination on weekends was positively related to nocturnal heart rate variability during the night between Saturday and Sunday.

Correlation between rumination and employee well-being: The correlation between rumination and employee well-being was -0.22 (ES, -0.22; 95% CI, -0.25, -0.18; p<0.001) (Fig. 2). The heterogeneity was low (I2 = 0%, p = 0.89). The meta-analysis shows that there is a statistically significant and negative relationship between rumination and well-being, meaning that the more rumination increases, the lower employee well-being becomes.

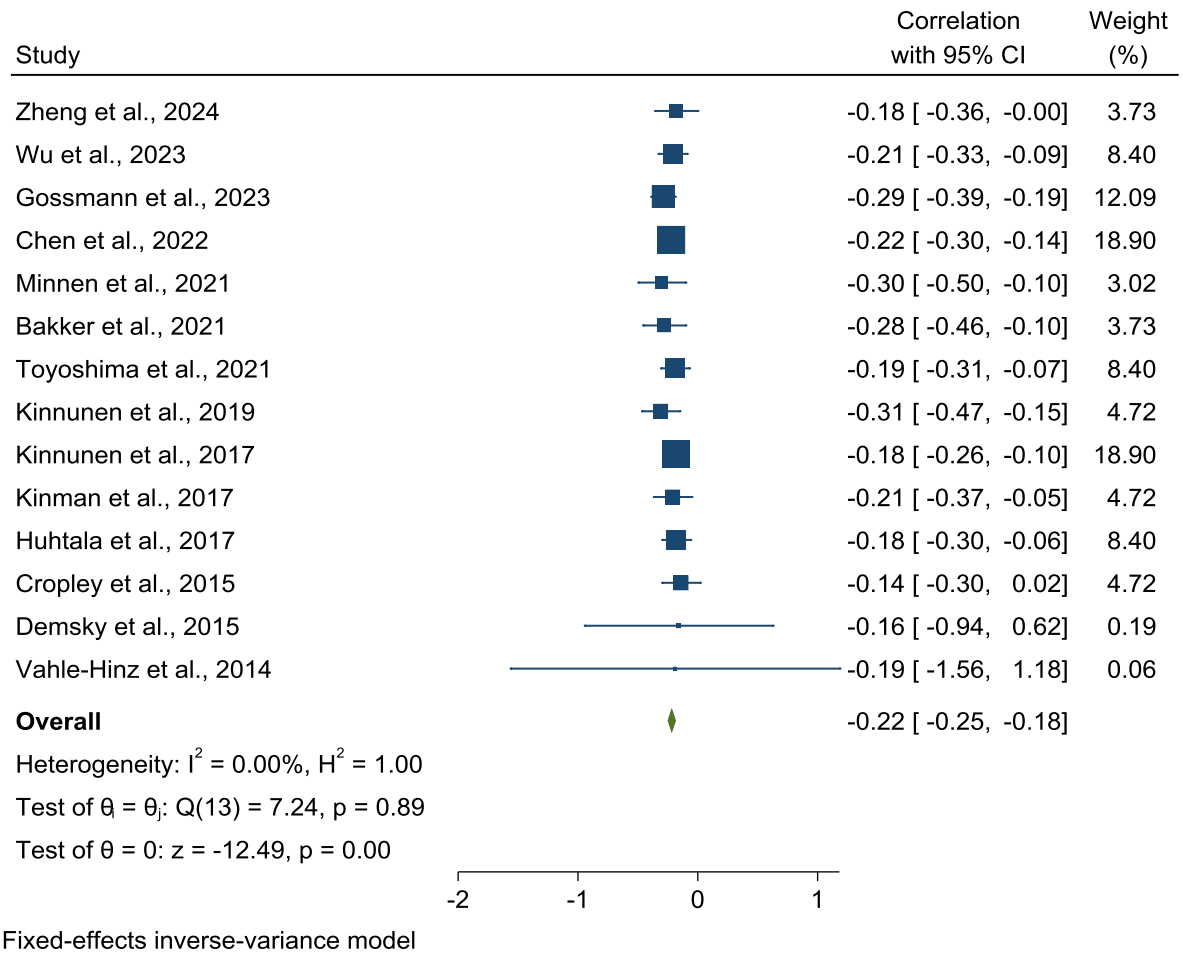

Fig. 2. Forest plot showed relationships between rumination and well-being

Meta‑regression Analysis: The findings regarding the moderating role of age and gender on the link between rumination and well-being are presented in Table 3. The analysis indicates that neither age nor gender significantly moderates the relationship between rumination and well-being.

Table 3. Summary of meta-regression results for age, and gender

_Meta_es	Coefficient	Std. err.	z	P>|z|
Age	.002026	.0042084	0.48	0.630
Male	.0003464	.0044144	0.08	0.937
Female	.0004273	.004409	0.10	0.923
_Cons	-.3150536	.1628431	-1.93	0.053

Discussion

The present systematic review and meta-analysis study examined work-related rumination and its effect on employee well-being. In all studies that were included in the present systematic review, participants reported low levels of well-being. The meta-analysis showed a negative association with work-related rumination and employee well-being, such that low work-related rumination predicts positive well-being; other studies also confirm these findings [51-53]. Included studies suggest that a positive attitude, a healthy lifestyle, and high levels of control and support in the workplace are associated with greater well-being both inside and outside of the workplace. Anxiety and depression outside of work led to lower well-being. It was also found that positive well-being was predicted by high work efficiency, while negative well-being was predicted by high work demands and life stress. The rumination strategy is more commonly used by employees in stressful work environments who are employed in the service industry or in so-called knowledge jobs [54, 55]. The meta-regression analysis showed that the link between diminished well-being and the use of rumination remains stable, with no significant influence from employees' age or gender.

Gadegaard et al.,2018 reported that individuals working in the service sector and in knowledge-based occupations tend to engage in rumination more frequently when exposed to stressful work environments [56]. Regarding the correlation with poor morale of employees, the findings suggest a very similar average magnitude of impact. Thus, when it comes to the negative or negative aspects of the workplace, there is no difference between the two: workers are in a negative frame of reference, whether it is related to the work or the personal aspect. Conversely, in settings with a healthy workplace and elements relating to employee well-being, the opposite is true: the healthier the workplace, the more satisfied employees are with their work, and the more opportunities for recovery, such as good sleep, the more they will be able to relax.

In a meta-analysis conducted by Blanco-Encomienda et al., 2020 researchers investigated both the association between a negative work environment and work-related rumination, and the link between rumination and employees' well-being. The results indicated a significant connection, showing that higher levels of rumination were associated with both adverse workplace experiences and reduced well-being [15]. In a systematic review by Gerçek et al., 2024 work characteristics, work-related rumination, classification of work characteristics, well-being, and well-being approaches were examined in 25 articles (regardless of study design). The findings indicated that work-related rumination is a fundamental mechanism in the relationship between work characteristics [33]. A study showed that work-related rumination increases emotional exhaustion after returning to work, which is an indicator of subjective well-being [25]. Studies have used physical and psychological indicators to examine the effects of work-related rumination on well-being; one study reported well-being as engagement and fatigue [42], and another reported well-being as focusing on elements of happiness and life satisfaction [57].

Kinnunen et al., 2017 reported similar results that The presence of work-related ruminations shows a direct relationship with well-being [25]. Other study reported that reducing work-related rumination is associated with increased vitality in the workplace [45]. Zheng et al., 2024 reported low levels of well-being and high levels of work-related rumination among Chinese university logistics staff [39.

This meta-analysis has several limitations, even though it provides valuable insights into factors contributing to work-related rumination and its impact on employee well-being, without being significantly affected by publication or methodological bias. First, since the analyses rely on cross-sectional data, causal relationships cannot be definitively established. Second, caution is warranted in interpreting the results because they are based on self-reported measures, which are better at capturing content than the underlying cognitive processes. On the other hand, the use of self-reports allows differentiation among types of data collected. Findings from questionnaires underscore the relevance of individual employee characteristics in rumination, with the strongest associations observed in studies that employed diary-based surveys.

Future studies should place greater emphasis on potential moderating factors to better understand the variability observed in previous research. Specifically, investigations should aim to identify which variables account for the heterogeneity in findings. This meta-analysis could not assess the influence of job type across the examined associations. One reason is that many primary studies drew random samples from workers across diverse occupational categories, making it impossible to disaggregate effect sizes. Additionally, studies focusing on specific occupational groups tended to examine workers within a narrow range of skill levels or roles involving frequent public interaction. It would be valuable to explore the relationship between adverse work environments and rumination in unskilled or technical occupations, as well as how rumination affects well-being among employees in these roles. Further research should also consider the moderating impact of variables such as education level, socioeconomic status, or tenure in the current position, which were not included in this analysis due to inconsistent coding in the primary studies or insufficient data availability.

Conclusion

Work-related rumination is a potential risk factor for reducing employees' daily well-being; after assessing different dimensions of daily well-being, work-related rumination is associated with all its dimensions. Reducing rumination at both the individual and organizational levels is suggested to improve well-being. The findings of the present study will be considered a valuable basis for human resource professionals, psychologists, and researchers interested in work-related topics.

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Conflict of interest

None declared.

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Ethical Considerations

The study adhered to the Helsinki ethical guidelines.

Code of Ethics

This study was approved by the Mashhad University Ethical Committee with Ethical Code: IR.MUMS.MEDICAL.REC.1399.114.

Authors' Contributions

Leila Bigdelu: study was conceived and designed, authored the final manuscript; Mohammad Baradaran Firoozabadi: study was conceived and designed, performed the data analysis, authored the final manuscript; Yousef Dowlatabadi: drafted the manuscript and contributed to its critical revision; Hedieh Alimi: drafted the manuscript and contributed to its critical revision; Hourak Poorzand: drafted the manuscript and contributed to its critical revision; Maryam Emadzadeh: provided language polishing and scientific editing; Fereshteh Ghaderi: provided language polishing and scientific editing.

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