



Psychometric properties of the Revised Obsessive Intrusion Inventory

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Abstract

Introduction: Obsessive-Compulsive Disorder (OCD) is a clinically diverse condition. To enhance the understanding and treatment of patients, the symptomatology of OCD has been organized into more homogeneous symptom dimensions. Therefore, we aimed to assess the psychometric properties of the Obsessive Intrusive Thoughts Inventory.

Materials and Methods: The research included two groups: a community sample (n= 995) and a clinical group of OCD patients (n= 128), which were selected by convenience sampling method in different regions of Mashhad, Iran in 2023. The participants completed the Revised Obsessive Intrusion Inventory (ROII) and Obsession Compulsion Inventory-18 (OCI-18). We analyzed the data using descriptive statistics, correlation coefficients, exploratory factor analysis, and confirmatory factor analysis through SPSS-22 and AMOS-24.

Results: Exploratory factor analysis indicated the presence of six first-order factors, which are grouped into two second-order factors. One factor includes aggressive, sexual, immoral, and impulsive intrusive thoughts, while the other encompasses contamination, doubts, and mistakes. The two-factor model had appropriate fit indices, and Revised Obsessive Intrusion Inventory had criterion and concurrent validity.

Conclusion: Based on the findings, the Revised Obsessive Intrusion Inventory demonstrates strong validity and reliability and can effectively assess intrusive obsessive thoughts in patients with obsessive-compulsive disorder and normal people.

Keywords: Intrusive thoughts, Obsessive-compulsive disorder, Psychometric

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Introduction

Obsessive-Compulsive Disorder (OCD) is a major disabling psychiatric illness that causes individuals to suffer from recurrent intrusive thoughts or images (obsessions) and engage in repetitive behaviors (compulsions) aimed at eliminating distress or feared consequences of the obsessions (1-3). OCD has a lifetime prevalence estimated at 2% worldwide (4-6). The four principal symptom domains of OCD include 1) contamination (or washing), 2) checking, 3) unacceptable thoughts (i.e., aggressive and sexual/religious obsessions), and 4) just right (i.e., perfectionism, exactness, indecisiveness, counting, symmetry, ordering (7,8). A related unanswered question is whether there are significant subcategories of obsessive symptoms.

Hunt showed that the Y-BOCS-SC offers a fairly exhaustive accounting of major subtypes of OCD; there are some commonly observed OCD presentations whose frequencies cannot be gleaned from the principal categories of instrument (9). Recent research has adopted a more dimensional perspective, exploring symptom dimensions that effectively reflect the variety of OCD (7). This approach aligns better with cognitive models of OCD. Another method for evaluating obsessive-compulsive symptom dimensions involves analyzing Obsessional Intrusive Thoughts (OITs) in both clinical and non-clinical populations (10).

One of the most common inventories that covers a wide range of intrusive thoughts is the Revised Intrusive Thoughts Inventory (ROI). Research-based on the revised obsessive intrusive thoughts showed that obsessions are placed in a two-dimensional structure. The two-dimensional model includes reactive and autogenous models (11,12). Thus, these studies suggest a two-dimensional rather than a four-dimensional structure of obsessions, as previously proposed. Some studies suggested the first and second-order structure and first-order factors such as pollution, doubt, symmetry, aggression, sexual/religious, and superstition in the second-order structure type 1 and type 2 (10). On the other hand, Ozcanli et al. put bad self and bad outcome in two dimensions. In general, a variety of tools have been used to identify obsessive intrusive thoughts experienced by non-clinical participants (13).

Nonetheless, these measures have notable limitations in their psychometric properties,

hindering the evaluation of intrusive thoughts associated with obsessive-compulsive disorder. Julien et al. determined that ROI is among the most effective tools for assessing OITs. ROI is a well-developed measure that assesses an individual's mental intrusions in terms of content and frequency and has been used in many studies related to mental intrusions and obsessions (14,15).

Particularly in that most findings related to unwanted intrusive thoughts and OCD have been derived from studies focusing on populations in western countries (16), there may exist notable variations in the nature of intrusive thoughts experienced by individuals in different countries, a phenomenon that underscores the influence of cultural factors on the manifestation of these thoughts (9). This variation is evidenced by the impact of specific sociocultural attributes, such as the rigid and precise regulations in certain religions, on the phenomenology of unwanted intrusive thought (17). Research on OCD in non-western populations has revealed both similarities and differences compared to western samples. However, drawing a definitive conclusion is challenging, as current studies have primarily focused on cultural variations in the levels of obsession. Whether the dimensional structure of obsessions is consistent across different cultures remains unclear. In addition, due to the limitations of the existing tools, such as not covering the autogenous obsessions and not paying attention to their details, is the Revised Intrusive Thoughts Inventory (ROI) is a suitable tool in this field because it partially overcomes the aforementioned limitations. It is calculated, and since there is no scale in the Persian language to measure the dimensions of obsessions, the present research was conducted to investigate psychometric characteristics and their factor structure in Iranian society.

Materials and Methods

The study employed a cross-sectional design and comprised two distinct groups. The first group consisted of 995 individuals aged 18 to 64, who were selected by the convenient sampling method in different regions of Mashhad, Iran, in 2023. We calculated the sample size based on a study by Meyers, Gamst, and Guarino (18), who considered the sample size for factor analysis 10 times the number of items. The second group comprised a clinical sample of 128 patients diagnosed with

primary OCD, including 47.7% women and 52.3% men. These patients were selected using the Structured Clinical Interview based on DSM-5 (19). The Persian version of SCID-5-RV was utilized for this purpose (20). A trained clinical psychologist conducted diagnostic interviews for OCD patients.

All participants in this group were outpatients seeking treatment in psychiatric clinics. The inclusion criteria were that the participants were 18 or older and willing to participate in the study. Exclusion criteria included any major medical, physical, and neurological diseases.

Research instruments

A) *The Revised Obsessional Intrusions Inventory (ROII)*: This inventory assesses obsessive intrusive thoughts comprehensively (15). This inventory, consisting solely of obsession items, encompasses a broad spectrum of obsessions. The ROII is divided into two sections. The first section includes a list of 52 statements, organized into six first-order factors: aggressive, sexual, religious, and immoral, contamination, doubts, mistakes, and the necessity to check symmetry and order, and superstition. Participants rate each statement on a 7-point scale ranging from 0 ("I have never had this thought") to 6 ("I have this thought frequently during the day"). Lee and Kwon conducted exploratory and confirmatory factor analyses that revealed a consistent two-factor structure corresponding to the autogenous reactive model, which is an autogenous obsession factor (41 items) and a reactive obsession factor (11 items) (11).

B) *The Obsessive-Compulsive Inventory-Revised (OCI-R)*: It is an 18-item tool evaluating six obsessive-compulsive symptoms: washing, checking/doubting, obsessing, mental neutralizing, ordering, and hoarding. Items on

the OCI-R are rated on a 5-point Likert scale from 0 (not at all) to 4 (extremely) (21). Khosravani et al. investigated the construct validity of the Persian version of the questionnaire and reported a 6-factor structure through factor analysis, also exhibiting good reliability (22).

The sample was initially divided randomly into two subgroups. We used the first subgroup for Exploratory Factor Analysis (EFA) to investigate the structure of the ROII, while the second subgroup underwent Confirmatory Factor Analysis (CFA). We assessed the validity of the ROII using SPSS and AMOS software in three phases. First, we conducted EFA with the Oblimin rotation method to explore the underlying factor structure. Next, we performed CFA to evaluate the adequacy of the model identified in the first phase. Once the factor structure of the ROII was established, reliability was assessed by calculating Cronbach's alpha for each subscale, with values above 0.70 considered acceptable.

Results

Out of 995 participants in the current study, 50.2% were women, and 49.8% were men. The majority of participants held a bachelor's degree (61%), followed by those with a diploma (18.6%), and the fewest participants had a doctoral degree (0.8%). The mean and standard deviation of participants' ages were 27.49 and 7.68, respectively.

Out of a total of 128 participants with diagnosed OCD disorders, 47.7% were women, and 52.3% were men. Most participants held associate degrees (39.1%), followed by those with master's degrees (29.7%), and the fewest participants had a bachelor's degree with 21.9%. The mean and standard deviation of participants' ages were 31.92 and 6.45.

Table 1. Demographic characteristics of two samples of exploratory and confirmatory factor analysis

Variable	Exploratory factor analysis (N= 560)		Confirmatory factor analysis (N= 563)		
	Frequency	Percentage	Frequency	Percentage	
Gender	Female	275	50.2	285	49.6
	Male	273	49.8	290	50.4
Education	Lower than diploma	27	4.9	21	3.7
	Diploma	93	17	92	16
	Associate degree	101	18.4	61	10.6
	Bachelor degree	249	45.4	395	68.7
	Master degree	63	11.5	3	0.5
Marital status	Ph.D. degree	15	2.7	3	0.5
	Single	243	44.3	305	53
	Married	305	55.7	267	46.4
Age	Divorced			3	0.5
		M	SD	M	SD
	29.32	8.33	26.75	6.77	

The sample of 1123 people was randomly divided into two groups to perform factor analysis. Five hundred sixty people underwent exploratory factor analysis, and 563 underwent confirmatory factor analysis (Table 1).

Exploratory Factor Analysis (EFA) was employed to assess the construct validity of the Revised Obsessional Intrusions Inventory (ROII). To assess the suitability of the correlation matrix for factor analysis, both

sample size adequacy and Bartlett's test of sphericity were employed. The results revealed a KMO value of 0.88, presenting a proper sample size for this research. Thus, the sample size for this analysis was sufficient. Bartlett's test of sphericity yielded $\chi^2 = 17355.608$ ($df = 1326, P < 0.001$). In the EFA, six factors were identified using the Oblimin rotation method.

Table 2. Results of the lower-order exploratory factor analysis on the ROII

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Q19	0.70			Q43	0.68	
Q16	0.70			Q38	0.60	
Q15	0.66			Q35	0.58	
Q20	0.63			Q39	0.34	
Q14	0.60			Q37	0.33	
Q21	0.57			Q33		0.77
Q17	0.56			Q32		0.76
Q18	0.54			Q34		0.75
Q25	0.33			Q29		0.70
Q26	0.33			Q30		0.65
Q48		0.84		Q27		0.42
Q47		0.83		Q31		0.36
Q49		0.81		Q28		0.35
Q46		0.78		Q9		0.78
Q51		0.74		Q10		0.78
Q52		0.73		Q12		0.56
Q45		0.73		Q13		0.56
Q50		0.71		Q6		0.55
Q24		0.64		Q8		0.52
Q23		0.59		Q11		0.48
Q22		0.59		Q7		0.45
Q3			0.72			
Q4			0.72			
Q2			0.60			
Q1			0.47			
Q5			0.46			
Q42				0.75		
Q41				0.73		
Q40				0.69		
Q36				0.69		
Q44				0.69		

Table 2 illustrates the factor loadings of each item of ROII on the six extracted factors. Factor loadings above 0.30 were considered for assigning each item to a component. The results of this stage confirmed six factors. Subsequently, exploratory factor analysis was conducted again by reducing the factor extraction to two factors and employing Oblimin rotation for factor loading of each item.

Two factors were extracted: the first factor accounts for 24.92% of the total variance, and the second factor explains 35.28%, totaling

52.97% of the total variance. Then, exploratory factor analysis was conducted again, limiting factor extraction to 2 factors and using varimax rotation for each item factor loading. By extracting 2 factors, the first factor explains 24.92% of the total variance and the second factor explains 35.28% of the total variance of the test. Based on this information, ROII has two subscales; the first has 41 questions, and the second has 11 questions. The mean, standard deviation, and Cronbach's alpha value of each component are separately presented in Table 3.

Table 3. Results of the descriptive variables, and Cronbach's alpha of ROII-52

Factors of ROII	Items	Mean	SD	α
1. Dirt/disease/contamination	22, 23, 24, 45, 46, 47, 48, 49, 50, 51, 52	12.9179	13.65956	0.91
2. Sexual acts	35, 36, 37, 38, 40, 41, 42, 43, 44	6.9571	9.26947	0.89
3. Impulsive acting out	1, 2, 3, 4, 5	2.4268	3.80636	0.77
4. Mistake	27, 28, 29, 30, 31, 32, 33, 34	2.7982	4.73184	0.81
5. Aggressive thoughts	14, 15, 16, 17, 18, 19, 20, 21, 25, 26	4.8125	6.92424	0.83
6. Doubt	6, 7, 8, 9, 10, 11, 12, 13	3.9143	5.60378	0.80

In confirmatory factor analysis, a six-factor model was examined. This model is validated in the current study and exhibits a satisfactory fit. Fit indices, including Chi-square goodness-of-fit ($\chi^2= 4504.71, P< 0.001$), relative Chi-square ($\chi^2/df= 3.62$), Goodness-of-Fit Index (GFI) (GFI= 0.76), Adjusted Goodness-of-Fit Index (AGFI) (AGFI= 0.74), Comparative Fit

Index (CFI) (CFI = 0.80), Incremental Fit Index (IFI) (IFI= 0.80), Tucker-Lewis Index (TLI) (TLI= 0.80), and Root Mean Square Error of Approximation (RMSEA) (RMSEA= 0.06), indicate a desirable fit of the model. The final model demonstrates a satisfactory fit. The model is depicted in Figure 1.

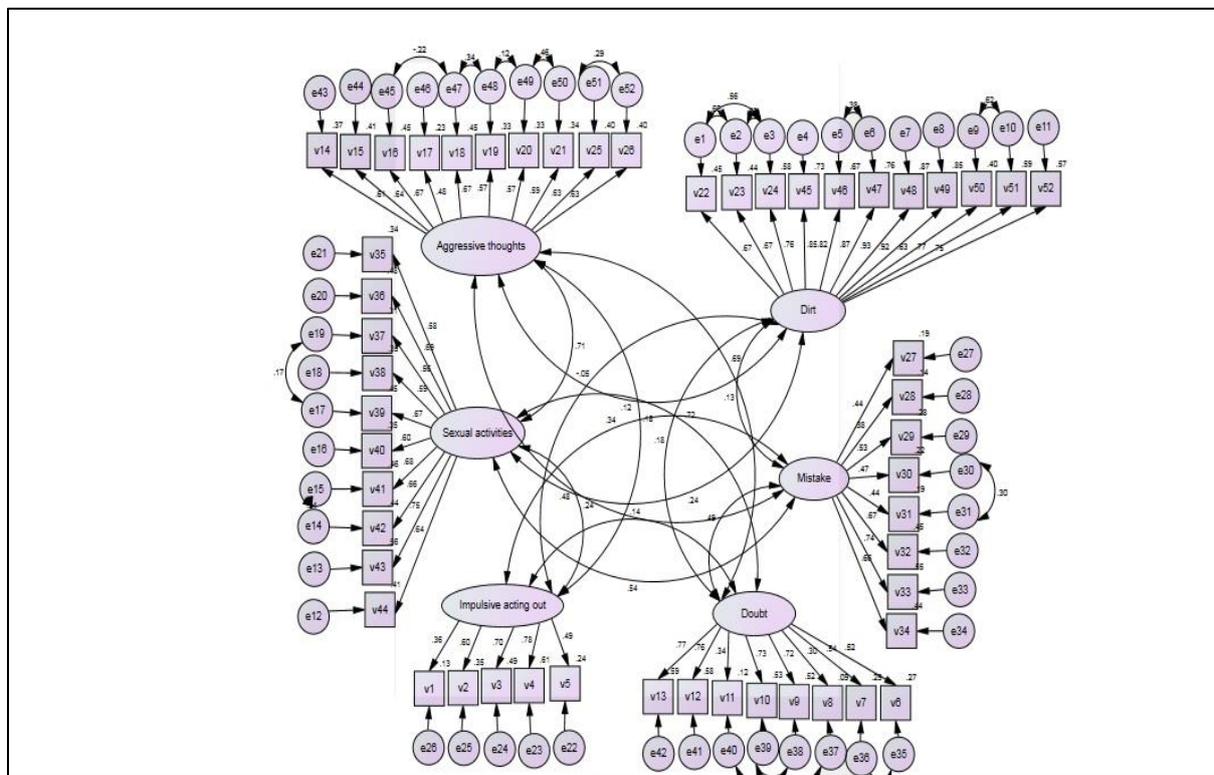


Figure 1. Confirmatory factor analysis of six lower-order factors

In confirmatory factor analysis, a two-factor model was also examined. Fit indices, including Chi-square goodness-of-fit ($\chi^2=4504.71, P<0.001$), relative Chi-square ($\chi^2/df=3.27$), GFI= 0.79, AGFI= 0.77, CFI= 0.79, IFI= 0.79, TLI= 0.77, and RMSEA= 0.06, indicate fit of the model.

In the second part, to check the convergent validity, the OCI-R questionnaire was used simultaneously with the ROII-52 questionnaire, administered to 128 people. The Pearson correlation coefficient results showed that the correlation between the scores of the two components of intrusive and reactive obsessive thoughts and their subscales with the components of the OCI-R questionnaire is

significant, which indicates the convergent validity of the intrusive and obsessive thoughts questionnaire. Additionally, the inter-item correlation coefficients ranged from 0.15 to 0.49, signifying that no item required removal from the questionnaire (Table 4). The mean levels of intrusive thoughts are reported for the two groups in Table 5. The differences were significant. Intrusive thoughts were more frequent for OCD patients than for non-clinical people. The results indicate that all the OCD patients and non-clinical participants reported experiencing intrusive thoughts. However, the OCD patients had more intrusive thoughts than the non-clinical participants.

Table 4. Pearson correlations between ROII subscales and OCI-R subscales

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Autogenous obsessions	1													
2. Reactive obsessions	0.34**	1												
3. Impulsive	0.80**	0.22**	1											
4. Sexual	0.70**	0.27**	0.42**	1										
5. Aggressive	0.76**	0.28**	0.49**	0.37**	1									
6. Mistake	0.26**	0.86**	0.18**	0.22**	0.21**	1								
7. Contamination	0.30**	0.49**	0.16**	0.31**	0.23**	0.19**	1							
8. Doubt	0.19**	0.75**	0.15**	0.22**	0.19**	0.56**	0.45**	1						
9. ROII	0.91**	0.69**	0.29**	0.24**	0.71**	0.50**	0.47**	0.49**	1					
10. Washing	0.12*	0.55**	0.12**	0.04	0.40**	0.48**	0.45**	0.55**	0.32**	1				
11. Checking	0.15**	0.44**	0.15**	0.06	0.17**	0.67**	0.54**	0.58**	0.31**	0.55**	1			
12. Neutralizing	0.32**	0.36**	0.29**	0.21**	0.27**	0.11*	0.36**	0.37**	0.41**	0.50**	0.53**	1		
13. Obsession	0.70**	0.23**	0.66**	0.59**	0.40**	0.21**	0.45**	0.15**	0.64**	0.13*	0.23**	0.22**	1	
14. Symmetry	0.15**	0.44**	0.14**	0.05	0.17**	0.27**	0.45**	0.54**	0.31**	0.88**	0.50**	0.12*	0.38**	1
15. OCI-18	0.33**	0.53**	0.30**	0.20**	0.27**	0.33**	0.45**	0.55**	0.49**	0.89**	0.73**	0.69**	0.65**	0.88**

Table 5. The between-subject effect test on the intrusive thoughts variable in the OCD and non-clinical group

Variable	Non-clinical participants (n = 995)	OCD patients (n = 128)	t	P
Contamination	9.93 (10.15)	33.36 (19.17)	-21.11	0.000
Sexual intrusive thoughts	4.87 (7.66)	13.71 (10.55)	-11.71	0.000
Impulsive acting out	2.20 (3.68)	1.23 (3.30)	2.84	0.005
Mistake	2.56 (4.77)	3.43 (5.31)	-1.92	0.054
Aggressive intrusive thoughts	3.77 (6.25)	9.52 (9.17)	-9.21	0.000
Doubt	2.81 (4.89)	6.81 (7.19)	-8.17	0.000

Discussion

The current study evaluated the psychometric properties of the ROII created by Purdon and Clark (15). We indicated that a hierarchical model accurately represented the data. This model included six lower-order factors (dirt/disease/contamination, sexual acts, impulsive acting out, thoughts about mistakes/accidents, aggressive thoughts, and doubt) and two higher-order factors (autogenous obsessions and reactive obsessions (AOs and ROs)). Confirmatory factor analysis

further validated that this hierarchical model suits the data collected. The findings of our study align with earlier research that identified the same key symptom dimensions in OCD. For example, Ozcanli et al. (13) and another studies (10,23) also recognized two higher-order factors: AOs and ROs. In our study, six partial level factors and items, including dimensions such as dirt/disease/ contamination, sexual acts, impulsive acting out, thoughts about checking/mistake, aggressive thoughts, and doubt, were consistent with our findings (10).

There are inconsistencies in international research regarding classification methods, which vary between five and four factors. For instance, Seo et al. (23) identified a five-factor structure, while Ozcanli et al. (13) found four. Despite many studies exploring the dimensions of OCD symptoms, a conclusive agreement has not been achieved.

Variations in categorization methods in OCD research may stem from differences in data processing and symptom selection. Our study employed a two-level structure that combines research on OC symptoms and OITs into a cohesive model, offering a more thorough understanding of symptom dimensions. Furthermore, cultural factors and sample size variations also explain these discrepancies. Despite these differences, our findings revealed consistent symptom dimensions in western countries, indicating stability across various regions and sociocultural contexts.

The internal consistency reliability was rated from good to very good. The six first-order factors of the ROII were incorporated into a second-order construct featuring two dimensions, referred to by Garcia-Sorino, et al. as "type I morality-based" and "type II immorality." type I encompasses three factors: sexual thoughts, acting out, and aggressive intrusive thoughts, while type II includes dirt/disease/contamination, checking/mistakes, and doubt (10).

This distinction evokes the autogenous versus reactive model of OCD (11) and the traditional separation between aversive or pure obsessions and overt compulsions. Type I intrusive thoughts can be seen as purely cognitive products—such as thoughts, images, and impulses—that are highly ego-dystonic, as they clash with the individual's values and moral beliefs, leading to efforts to control these thoughts. In contrast, type II intrusive thoughts tend to involve more overt behaviors (like washing, ordering, and checking) driven by the fear of making mistakes (e.g., getting sick, losing something valuable, or doing something wrong), which are associated with perceived negative outcomes.

The ego dystonic provoked by these intrusive thoughts can be thought of as the result of extreme responsibility to eliminate or prevent a perceived threat or harm. The overall score and the subscale of the ROII show excellent psychometric properties. In addition, to further support the validity of ROII, the comparison

between obsessive-compulsive patients and the normal group in the frequency of the total score and subscales of intrusive thoughts indicated that patients with obsessive-compulsive disorder scored higher than normal participants. These results indicate that ROII has a high sensitivity in distinguishing obsessive-compulsive patients and normal people. This finding indicates that the questionnaire effectively captures obsessive content, demonstrating its value as a diagnostic tool for OCD subtypes.

To assess convergent validity, the OCI-18 was employed. The results confirm the validity of the questionnaire, with moderate-to-high correlations with OC symptom measures suggesting that the ROII and OC symptoms are related yet distinct constructs. This aligns with the continuity assumption regarding the relationship between intrusive thoughts and obsessions (24,25).

This research faced several limitations. For instance, the clinical sample size was small, and we could not conduct a factor analysis within this sample. Additionally, a self-report questionnaire was used to measure intrusive thoughts. Given these limitations, it is recommended that the factorial structure of this inventory be examined in the clinical population and that an interview-based version be used to assess intrusive thoughts.

Conclusion

In conclusion, this study introduced a content-focused model of intrusive obsessive thoughts, organizing six distinct dimensions into two higher-order categories. Our findings further affirm the universality of intrusive thoughts.

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Conflict of Interests

The authors declare no conflicts of interest.

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Ethical Considerations

All eligible participants provided informed consent, and the study received ethical approval from the Ethical Committee of Mashhad University of Medical Science.

Code of Ethics

IR.MUMS.REC.1402.342

Authors' Contributions

Study concept and design: Mohammad Aminaee, Seyed Mohammadreza Taghavi, Mahdi Reza Sarafraz, and Mohammad Ali Goodarzi.

Acquisition of data: Mohammad Aminaee and Seyed Alireza Sajadi. Analysis and interpretation of data: Mohammad Aminaee and Seyed Mohammadreza Taghavi

Drafting of the manuscript and critical revision of the manuscript for important intellectual content: Mohammad Aminaee and Seyed Mohammadreza Taghavi.

Statistical analysis: Mohammad Aminaee. Administrative, technical, and material support and study supervision: Seyed Alireza Sajadi

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