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The Effect of Analytical Metacognitive Therapy on Reducing Residual Anxiety and Depression of Nurses in Covid-19 Wards

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Abstract

Introduction: Nurses play an important role in preventing and controlling diseases. Therefore, maintaining their mental health is considered important for disease control. The present study aimed to investigate the effect of analytical metacognitive therapy on reducing residual anxiety and depression of nurses during the Covid-19 pandemic.

Method: This research followed a semi-experimental (quantitative) design of type A-B with several baselines. The statistical population of the study included all nurses suffering from residual anxiety and depression disorders of Zahedan city. One person was purposefully selected and underwent metacognitive analytical therapy. For data analysis, the intra-situational and inter-situational visual analysis was used.

Results: Findings revealed that the data of the baseline and intervention stages had a good non-overlap. Tau-U values were 0.88 and 0.89 for anxiety and depression, respectively. Hedges-g value was 2.67 for both variables, and the scores of stable change index were -127.5 and -110.5 respectively, which were higher than +1.96 and -1.96, revealing increased scores with high effect size and reliable change.

Conclusion: According to the findings of the present study, in order to reduce anxiety and depression of nurses, metacognitive-analytic treatment can be used.

Keywords: Metacognitive-Psychoanalytic Treatment, Anxiety, Depression

Introduction

The Covid-19 disease, which started in December 2019 from Wuhan, China, put a significant pressure on all areas of human social, economic, and psychological life [1]. Healthcare workers, especially nurses, were exposed to mental health challenges during the Covid-19 pandemic [2], experiencing increasingly growing psychological problems such as anxiety and depression [1, 2, 3, 4, 5] . In a comprehensive and systematic review of global evidence, the overall incidence of anxiety and depression in nurses was 24.94% and 24.83%, respectively, during the epidemic [5].Another systematic review found that among healthcare workers, the incidence of anxiety and depression was respectively 22.8%-27% and 28% in nurses [5]. The prevalence of anxiety and depression in Iranian nurses was 89% and 74%, respectively [6], revealing the detrimental effects of harsh conditions of the disease, high mortality rates, and work pressure during the Covid-19 epidemic on the mental health of nurses [7], which even extended beyond the epidemic period [8]. Research shows that healthcare workers suffer from psychological problems, including anxiety and depression, in the post-Covid-19 era [12, 9 ,10].

Research shows that ego weakness [11,12] and maladaptive metacognitive patterns

(cognitive attentional syndrome) [13-18] are related to psychological problems such as anxiety and depression. Meanwhile, nurses involved in Covid-19 suffer from ego weakness [14] and maladaptive metacognitive patterns [15,16]. Freud [17], Fongy [18], Aydin et al. [19], and Wagers et al. [20] consider the origins of ego weakness and maladaptive metacognitive patterns to be early experiences, especially childhood traumas, which are implicit and unconscious, strongly affecting the true perception of oneself, others, and the challenges of the outside world. Many studies have shown that childhood traumas cause ego weakness [21,22,23] and lead to maladaptive metacognitions [24, 25,26]. Other researchers emphasize the increasing ego strength [27] and metacognitive capacities [28] to prevent and treat psychological problems of nurses. Since ego strength and metacognition have a consistent role in health and illness [29], researchers consider executive functions involved in metacognitive processing [30] and ego functions to be the same [31]. Parviz et al. [38] refer to ego as a general and broad concept while considering metacognition one of its abilities and capabilities. These researchers showed a positive and significant relationship between ego strength and metacognition [38] and a negative and significant relationship between superego and metacognition with the mediation of rumination [32]. According to the metacognitive-analytical model of Parviz et al. [38, 41,33], the superego and metacognition are in conflict like the ego and superego. Superego results in maladaptive metacognition through rumination. In other words, a stronger superego results in more rumination, consequently increasing the weakness and malfunction of metacognition. They look at rumination as a defense mechanism of the unconscious, whose purpose is to prevent awareness of disturbing contents to consciousness. According to these researchers, when most of the mind's capacity is dedicated to specific thoughts about certain topics, the ability of the mind to become aware of unconscious mental processes is reduced, and the mind is practically involved in rumination, frequent repetition of thoughts and exaggerated threats and dangers, or cognitive attentional syndrome. These researchers believe that a strong superego leads to weak and dysfunctional metacognitive processes while also making the ego weak. According to them, the superego, along with maladaptive metacognition (which leads to ego weakness), form the backbone of mental disorders [41, 42]. In fact, the maladaptive experiences of early development cause ego weakness through maladaptive internalized patterns and roles [34]. The weakness of the ego provides the ground for extreme action for the superego [26], subsequently leading to the creation and intensification of maladaptive metacognitive patterns, as a result of which metacognition becomes dysfunctional [41, 42]. On the other hand, early maladaptive experiences affect the formation of maladaptive metacognitive patterns [33, 34, 35], providing the basis for strengthening the superego while creating maladaptive metacognition [41, 42]. A stronger superego makes the ego weaker [26], and this faulty mutual communication results in anxiety and depression [35,36]. By intensifying immature mechanisms, anxiety and depression weaken the ego [26], intensify maladaptive metacognitive and metacognitive patterns, and strengthen the superego [41, 42]. In the meantime, the literature shows significant gaps for previous treatments, as psychodynamic treatments for ego strength have mainly focused on identifying and correcting maladaptive internalized patterns and roles [37]. However, the developmental basis of maladaptive metacognitive patterns has been neglected, more importantly, failing to consider the negative impact of cognitive symptoms on the superego and, as a result, the ego. However, analytical metacognitive treatment has paid attention to both cases, i.e., examining the developmental basis of maladaptive metacognitive patterns and the negative impact of attentional symptoms on the superego and consequently the ego, as well as maladaptive internalized patterns and roles related to ego weakness (emphasized by the dynamic approach) [38]. Cognitive therapy has focused on the content of cognitions but has neglected the evolutionary foundation that shapes this content [39,40]. On the other hand, analytical cognitive therapy has addressed the evolutionary foundation that shapes the content of cognitions to solve this shortcoming [48, 49]. However, both therapeutic approaches, i.e., cognitive and analytical cognitive therapy, have ignored the fact that cognitions operate through higher level processes, i.e., metacognitions. In other words, people who have negative cognitions do not necessarily suffer from mental disorders, but the processes that cause the continuation of the presence of negative cognitions in the mind, known as maladaptive metacognitive patterns, are the main cause of emotional disorders [41,42]. Although metacognitive therapy has paid attention to metacognitive patterns and processes in health and disease in general[51], it has failed to consider the effect that psychodynamic therapy exerts on the superego, strengthening the ego and as a result modifying cognitive attentional syndrome. Besides, the evolutionary foundation of maladaptive metacognitive patterns have also been neglected, while the analytical metacognitive model has sought to address these shortcomings [47]. This model has taken into consideration the maladaptive metacognitive patterns that are the main drivers of cognitions in the mental space, through the way that psychodynamic therapy affects the strength of the ego and indirectly exerts its effect on the maladaptive metacognitive patterns and through the direct effect of psychodynamic therapy on maladaptive metacognitive patterns, specifically applied through the investigation of the

evolutionary basis of maladaptive metacognitive patterns and the effect of metacognitive therapy itself on maladaptive metacognitive patterns [47]. In fact, analytical metacognitive therapy seeks to reduce anxiety and depression by strengthening ego capacities and metacognitive capacities. In the meantime, what has not been addressed is the investigation of the impact of analytical metacognitive therapy on reducing anxiety and depression, necessitating research in this regard. Thus, the researchers in the present study have aimed to investigate the effect of analytical metacognitive therapy on reducing the residual anxiety and depression of the nurses in the Covid-19 wards. Therefore, the question of the current research is whether metacognitive analytical therapy has an effect on reducing residual anxiety and depression of nurses or not?

Method

This research was a semi-experimental (quantitative) single-subject study of A-B type with several baselines. The statistical population included all nurses suffering from anxiety and depression disorders who had visited psychological centers in Zahedan between December 2022 and May 2023. One person was purposefully selected for the study. The inclusion criteria were as follows: having at least a nursing Bachelor's degree, at least one year of work experience in Zahedan hospitals, at least two months of work experience in the crisis (COVID-19) departments of Zahedan hospitals, satisfaction and desire to cooperate, the age of at least 23 years and at most 40 years, not reporting any other severe physical or psychological illness in the initial interview for screening, not using psychological services from another person at the same time, a diagnosis of mixed anxiety and depression, the onset of anxiety and depression since the COVID-19 epidemic, and being female. The exclusion criteria included: anxiety and depression with psychotic features, severe disability in one of the five senses, severe mood swings, absence of more than one session, and not doing homework more than twice.

The tools used in this study were as follows:

Beck's Anxiety Questionnaire: Beck's anxiety questionnaire is a 21-item scale in which the subject chooses one of four options in each item that indicates the intensity of anxiety. The four options of each question are scored on a four-point spectrum from 0 to 3. Each test item describes one of the common symptoms of anxiety (mental, physical, and panic symptoms), leading to a total score of 0 to 63. The internal consistency coefficient (Cronbach's alpha) and reliability of this questionnaire were 0.92 and 0.75, respectively, with a one-week interval, and the correlation of its items varied from 0.30 to 0.76. Five types of content, concurrent, construct, diagnostic, and factor validity were measured for this test, all indicating the high efficiency of this tool in measuring the intensity of anxiety [43]. Kaviani and Mousavi [44] confirmed validity ($r=0.72$, $p<0.001$), reliability ($r=0.83$, $p<0.001$), and internal consistency (Alpha=0.92) of this test in Iran.

Beck's Depression Inventory (BDI): This tool is also a 21-item scale in which the subject chooses one of four options to indicate the severity of depression. The four options of each question are scored on a four-point spectrum from 0 to 3. Each of the test items focuses on an area, including sadness, pessimism, feelings of helplessness and failure, guilt, sleep disturbance, loss of appetite, and self-loathing. The total score of this questionnaire ranges from 0 to 63; [45].

Beck [46] reported the overall validity of the questions at around 0.31 to 0.68 and the overall validity of the questions with the Spearman-Brown correlation method at around 0.93. Using the Koder-Richardson and the test-retest methods, Wikowicz reported the validity of the scores 0.78 for an interval of one month, 0.74 for an interval of three months, and 0.48 in 59 psychiatric patients for an interval of three weeks.

The correlation coefficient between the pre-test scores of the BDI and the Hamilton Depression Rating Scale has been reported as $r=0.66$; In Iran, Hosseinpour et al. [55] reported the reliability coefficient of this questionnaire to be 0.78, while Pasha Sharifi and Nikkho [55] reported the overall reliability of the questions in the range of 0.31 to 0.68 and the overall reliability of the questions with the Spearman-Brown correlation method around 0.93.

In this study, the effect of Shahbakhsh et al,'s analytical metacognitive therapy protocol [47] on the reduction of anxiety and depression of nurses was evaluated. Hence, 18 volunteers were initially introduced for cooperation, and screening was conducted by a clinical psychology doctoral student and a psychiatrist. According to the screening results, 10 people were rejected, and eight were found to be eligible. Out of the eight people who were eligible, one with the diagnosis of mixed anxiety and depression was purposefully selected.

A detailed discussion of the objectives of the research was conducted, along with a baseline test for five weeks, once a week, to stabilize the scores of the dependent variables. Then the intervention of metacognitive analytical therapy was implemented in the form of one session per week over a total of ten sessions. During the intervention, the participant was tested after each treatment session (before the start of the next session). The last test was taken with an interval of one week after the end of the intervention.

In this research, Intra-situational and inter-situational visual analysis was used. in such a way that median, average, range, stability chamber, percentage of stability chamber data, range of stability chamber changes, relative and absolute rank changes were calculated to examine basic stability and basic trend.

Then overlapping indicators, including the percentage of non-overlapping data (PND), the percentage of non-extinction of all pairs (PAND), and the percentage of data passing through the median (PEM), were calculated with inter-situational visual analysis. The reliable change index was used to estimate the effect size of Tau-U and Hedges-g and to ensure the change due to the intervention. The above indices were calculated with R software.

Table 1. Summary of Analytical Metacognitive Therapy Sessions

Session	Aim	Content	Expected behavior changes	Homework
1	Preparation, creating a therapeutic relationship, and hoping for improvement.	Evaluation of metacognitive beliefs and ineffective coping styles. Preparation for treatment.	Motivation and hope for improvement. Awareness of metacognitive beliefs and ineffective coping styles. Preparation and motivation to learn healthy coping styles.	Practicing thought suppression experiment.
2	Continuing preparing and reviewing the narrative of the client's life.	Analytical metacognitive model training and presentation of treatment logic.	Awareness of the treatment model and adjustment of goals and expectations. Awareness of one's underlying factors. problems	Completion of the A-M-C form.
3	Examining the developmental experiences and the challenge with the belief related to the uncontrollability of worry-rumination.	Examining developmental experiences and their relationship with uncontrollability beliefs of worry-rumination. Teaching and practicing mindfulness, mindful attention, and postponing worry-rumination.	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning Discrete Mindfulness (DM) techniques, mindfulness, and worry deferral.	Practicing detached mindfulness and postponing worry-rumination.
4	Continuing to examine the developmental experiences of and the challenge with the belief related to the uncontrollability of worry-rumination.	Examining developmental experiences and their relationship with beliefs related to the uncontrollability of worry-rumination. Verbal and behavioral re-attribution (rethinking) of beliefs related to uncontrollability of worry-rumination. Presenting contrary evidence, training and practice of loss of control experiment. Checking and stopping non-compliant control and avoidance behaviors.	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning ways to manage rumination worry.	Practicing experiment loss of control.
5	Continuing the investigation of developmental experiences, challenge with risk beliefs, worry-rumination.	Investigating developmental experiences and focusing on experiences related to metacognitive beliefs related to the risk of worry-rumination. Intensification of inconsistency, review of evidence, opposing evidence, and mechanism of action.	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning ways to manage worry-rumination.	Examining evidence, confirming and rejecting metacognitive beliefs related to the risk of worry-rumination.
6	Continuing the investigation of developmental experiences, challenge with risk beliefs, worry-rumination.	Examining the developmental experiences and focusing on experiences associated with metacognitive beliefs related to the risk of worry-rumination. Behavioral experiments	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning ways to manage worry-rumination.	Practicing behavioral experiments.
7	Continuing the investigation of developmental experiences, challenge with positive metacognitive beliefs.	Examining the developmental experiences and focusing on experiences related to positive metacognitive beliefs about worry-rumination and verbal re-attributions.	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning ways to manage worry-rumination.	Writing evidence, confirming and refuting positive metacognitive beliefs.
8	Continuing the investigation of developmental experiences, challenge with positive metacognitive beliefs.	Examining developmental experiences and focusing on experiences related to positive metacognitive beliefs about worry-rumination. Worry-rumination mismatch strategy. Worry-rumination modification experiment.	Gaining insight into the developmental factors of worry-rumination uncontrollability beliefs. Learning ways to manage worry-rumination.	Completing the non-compliance strategy form.
9	Re-formulation. Starting a new processing program and preparing to end the sessions.	Reformulation. Starting a new processing program. Listing ineffective factors and alternative plans. Preparing the client for the end of treatment sessions.	Creating a comprehensive view of underlying, revealing, and sustaining factors. Strengthening alternative metacognitive programs. Preparing for the end of sessions.	Writing inconsistent metacognitions and alternative metacognitive programs.
10	Continuation of the new processing program. Ending the sessions.	Continuation of the new processing program. Listing incompatible metacognitive components. Completing the replacement program and ending the sessions.	Strengthening alternative metacognitive programs.	Writing metacognitions and dysfunctional coping styles and applying an alternative metacognitive program.

Results

As According to Table 2, the scores of the two anxiety and depression variables are stable in the baseline phase, indicating that based on the 20-80% rule, 0.10 of the data in the baseline phase are in the stability chamber for both variables. In the baseline stage, the relative level is 0.5 and 0.5 and the absolute level change is -1 and 0 for the two variables of anxiety and depression, respectively, revealing the uniformity of the data trend. In fact, the data in the baseline phase are centered on the median and mean axis. However, the results indicate the instability and variability of the scores in the intervention phase, resulting in the relative level of -15 and -14 and the absolute level of -33 and -30 for anxiety and depression, respectively, and highlighting a decreasing trend of scores. In fact, the data deviated from the mean and average of the baseline in the intervention stage, indicating that 0.70 scores of anxiety and 0.60 scores of depression were out of the stability chamber. Overall, the results show the stability and uniformity of the scores in the baseline stage and the change and decrease of the scores in the intervention stage, confirming the effect of the intervention on the variables in the intervention stage.

Table 3 compares the scores of the participant for anxiety and depression in the baseline and intervention stages, indicating that the scores in the baseline stage were stable and started to decrease by entering the intervention stage. The relative and absolute levels for the participant show the gradual change of anxiety and depression scores in the intervention phase compared to the baseline phase. In other words, the first sessions of the intervention stage have little difference with the baseline scores, while the scores take a more decreasing trend in the middle sessions of the intervention stage and show a significant difference in the last third of the intervention sessions compared to the baseline. The results of the percentage of non-overlapping data (PND) show that 0.100 of the data of the intervention stage are outside the range of the baseline stage data for both variables. The results of non-extinction of all pairs (PAND) for both anxiety and depression variables are 0.100, indicating that the change applied in the intervention phase is significantly different from the baseline phase. The percentage of data crossing the median (PEM) has been 0.100 for both anxiety and depression, confirming that all the data of the intervention phase have crossed the median of the data of the baseline phase for both variables. In general, the results of these indicators show that the impact of the analytical metacognitive intervention has been strong for the participant. Besides, Tau-U (0.88 and 0.89) and Hedges-g (2.67) values indicate a strong effect size for both variables. Also, the score of the reliable change index for the two variables of anxiety and depression is -127.5 and -110.5, respectively, which is higher than +1.96 and -1.96, confirming the reliability of the statistical change.

Table 2. Intra-Situational Visual Analysis for the Participant regarding Anxiety and Depression

Sequence of situations	**Baseline phase**		**Intervention phase**	
Variable	Anxiety	Depression	Anxiety	Depression
Duration of situations	5	5	10	10
		Level		
Median	48	47	21.5	24
Mean	48.2	46.8	22.7	24.7
Range	48-49	46-47	10-43	13-43
Range stability	38.4-57.6	37.6-56.6	17.2-25-8	19.2-28.8
Data percentage Range stability	0.10	0.10	0.30	0.40
Change in stability	Stable	Stable	Unstable	Unstable
		Change in level		
Relative change	0.5	0.5	-15	-14
Absolute change	-1	0	-33	-30
		Trend		
Direction	Constant	Constant	Descending	Descending
Stability	Stable	Stable	Unstable	Unstable

Chart 1. Anxiety and Depression Variable Scores in phase A and B

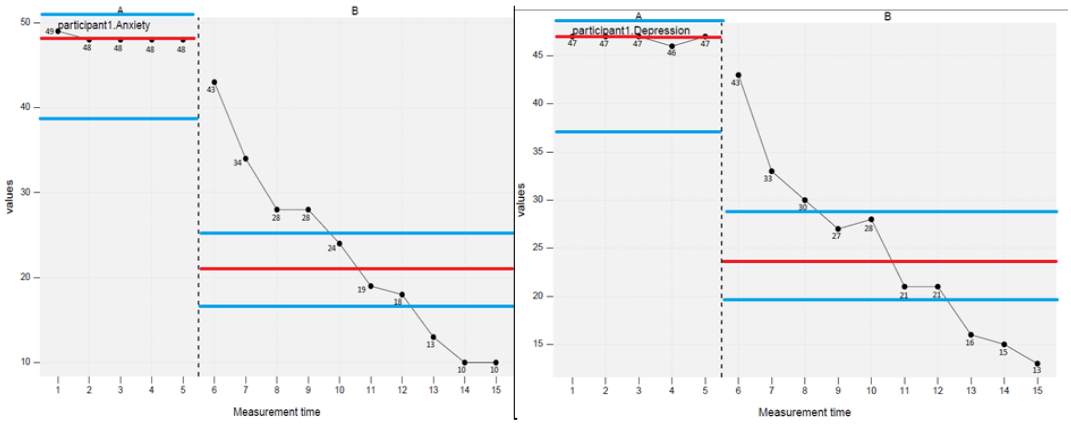
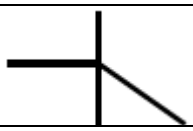
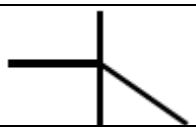


Table 3. Inter-situational Visual Analysis for the Participant regarding Anxiety and Depression

Comparison of situations	**Baseline and intervention phases**	
Variable	Anxiety	Depression
	Trend changes	
Direction changes		
Trend direction	negative	negative
Change in stability	Stable to unstable	Stable to unstable
	Change in level	
Relative change	48.5-13	47-16
Absolute change	48-43	47-43
Median change	48-21.5	47-24
Mean change	48.2-22.7	46.8-24.7
	Overlap	
Percentage of non-overlapping data (PND)	0.10	0.10
Percentage of all non-overlapping data (PAND)	0.10	0.10
Percentage of data passing the median (PEM)	0.10	0.10
	Effect size	
Tau-U	0.88	0.89
Hedge-g	2.67	2.67
	Reliability change index	
Jacobson & Truax	-127.5	-110.5

Discussion

The present study aimed to investigate the effect of metacognitive therapy protocol on reducing residual anxiety and depression of nurses during the Covid-19 pandemic. The results of the research showed that analytical metacognitive therapy had an effect on reducing the residual anxiety and depression of nurses. These results are consistent with the findings of previous studies [15-39, 41, 42, 47], indicating the impact of early traumatic experiences on maladaptive internalized patterns and roles and maladaptive metacognitive patterns that cause ego weakening and metacognitive dysfunction and highlighting that ego weakness and metacognition dysfunction cause anxiety and depression. These studies also emphasize the need to strengthen ego and metacognitive capacities to prevent and address psychological problems of nurses while revealing the effectiveness of analytical metacognitive therapy in strengthening ego and metacognitive capacities and reducing anxiety and depression.

In justifying these findings, it can be argued that psychodynamic therapy helps to strengthen the ego and adjust the maladaptive metacognitive patterns by providing insights into the maladaptive experiences and early developmental traumas associated with ego weakness and maladaptive metacognitive patterns (cognitive attentional syndrome). Hence, psychodynamic therapy strengthens the ego by providing insight into early traumatic experiences associated with maladaptive internalized patterns and roles that weaken the ego and their modulation and correction. As a result, the strengthened ego can control and restrain the superego and prevent its excessive functioning, consequently reducing the cognitive attentional symptoms and strengthening metacognition. In addition, the ego receives the effect of psychodynamic therapy on metacognition through inhibition of the cognitive attentional symptoms and as a result, the inhibition of the superego indirectly. In other words, psychodynamic therapy strengthens metacognition by providing insights into early traumatic experiences related to maladaptive metacognitive patterns and their adjustment and correction. Thus, the superego is influenced and restrained, ultimately leading to the ego strengthening. On the other hand, metacognitive therapy strengthens metacognition by correcting maladaptive metacognitive patterns, consequently providing the ground to restrain the superego and affecting the strength of the ego, finally strengthening the ego and metacognitive capacities, which reduces anxiety and depression. In other words, that positive and negative metacognitive beliefs about worry and rumination, catastrophizing and threat-focused attention, and the inability to control worry and rumination, which form the basis of anxiety and depression, represent a disturbance in inhibition and reality testing, revealing disturbance in two basic ego or executive functions. In other words, disturbance in inhibition and realism as two functions of the ego from a psychodynamic perspective and two executive functions from the cognitive psychology viewpoint causes the patient to focus on monitoring threats and signs of rejection (in the form of high and inflexible inhibition that causes intense biased attention to threats and rejection), leading to the presumption that thinking about worries would prevent unfortunate events or that worry would be uncontrollable and cause a heart attack

or death. Hence, any symptoms, such as palpitations, are interpreted in a catastrophic way, or rumination is interpreted as a reason for insanity (defect in reality testing). From the metacognitive point of view, worry and rumination are considered an incompatible strategy. Although these strategies are used to avoid unpleasant emotions and to suppress them, they have the opposite result and cause the maintenance and continuation of unpleasant emotions. This is exactly similar to what is called a maladaptive defense mechanism from a psychodynamic perspective (see Hansen, [47] for more information), employed with the exact same goal of avoiding unpleasant emotions but leading to the preservation and continuation of unpleasant emotions. Psychodynamic therapy examines the course of development and unfortunate experiences of the distant and recent past, providing a deep insight into the origin of the formation of the underlying factors that weaken realism and inhibition, as well as inconsistent metacognitive dimensions. Both psychodynamic and metacognitive therapy techniques help the patients to consciously experience emotions in the present and adjust and modify the underlying factors of unpleasant emotions, enabling them to better understand their emotions, become aware of internal conflicts, and choose the correct problem-solving method. The patients are guided and encouraged to consciously strengthen reality testing and inhibition or optimal self-control with mental and practical exercises. As a result of strengthening realism and self-control as two ego or executive functions, individuals adopt reality-based coping methods and acquire the ability to control rumination, consequently reducing anxiety and depression. Like other studies, this research has faced limitations, some of which are: 1. the impossibility of random sampling, which should be considered in generalizing the results, 2. conducting research on the statistical community of nurses in the Covid-19 wards, which necessitates caution in generalizing the results to other communities, 3. the limitation of time and cost, which made follow-up impossible, necessitating the implementation of the follow-up stage in future research, and 4. the impossibility of comparing the effect of other treatments with metacognitive-analytical therapy due to time and cost limitations. Therefore, researchers are suggested to compare metacognitive-analytical therapy with other treatment models that have an effect on reducing anxiety and depression.

Conclusion

Analytical metacognitive therapy has an effect on reducing residual anxiety and depression of nurses. Therefore, hospital managers are recommended to consider a metacognitive analytical treatment plan for the prevention and treatment of anxiety and depression in nurses. Psychologists and consultants who serve in hospitals are also recommended to use the analytical metacognitive therapy programs to treat nursing staff and prevent adverse effects.

Conflict of Interest

Authors have no conflicts of interest.

Ethical Approval

The permission of the Ethics Committee was obtained from the Research Ethics Royan Research Institute - Academic Jihad (Code: IR.ACECR.ROYAN.REC.1401.010). Registration of this randomized control trial has been completed with the Iranian Registry of Clinical Trials (IRCT) (Code: IRCT20180705040356N1). Throughout the study, ethical principles were strictly adhered to, ensuring the confidentiality and privacy of the participants' information. The participants were provided an informed consent before their involvement in the research. It is essential to note that the intervention implemented in this study posed no harm or adverse effects to the participants.

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