The Effect of Acceptance and Commitment Therapy on Rehabilitation of Sleep Quality, Saturated oxygen in blood and Pulse Rate in Female Seniors

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This study is taken from first author’s PhD thesis

ABSTRACT

Aims: the present study aims to determine the effect of acceptance and commitment treatment on improving sleep, saturated oxygen in blood and pulse rate in female seniors suffering from insomnia.

Methodology: this is a quasi-experimental with pre-test, post-test and three month follow-ups and a control group study. The sample study consists of female seniors suffering from insomnia in Shiraz (Iran) daycare center for seniors in 2019, which 32 subjects were selected by simple random sampling method, according to the inclusion criteria and were randomly placed into two equal groups. The experimental group went under 8 sessions of 90 minutes of acceptance and commitment treatment as the control group did not receive any training. Data were collected from Pittsburgh Sleep Quality Questionnaire and the pulse oximeter and were analyzed by univariate analysis of covariance in SPSS software version 23.

Results: the result showed that the experimental group and control group did not differ significantly in terms of demographic parameters (P>0.05), also acceptance and commitment treatment increased sleep quality, increased saturated oxygen in blood of the female seniors suffering from insomnia. The results in the follow-up section were maintained as (P<0.05), but although it had an effect on pulse rate in post-test (P>0.05) as it was not stable.

Conclusion: due to the results, planning to use the acceptance and commitment methodology on female seniors is useful for the improvement of sleep quality and saturated oxygen in blood. Therefore, health professionals and therapists can use acceptance and commitment treatment alongside other treatments to improve sleep quality and oxygen saturation in blood in female seniors.

Keywords: acceptance and commitment treatment, saturated oxygen in blood, pulse rate, female seniors, insomnia

1. Introduction

Seniority is one of the most important challenges in developing countries that are increasing due to decrease of fertility and improvement of the health system [1]. Seniority defines a stage of life and senior is a person over 60 years old [2]. One of the main disorders that threaten the health of female seniors is insomnia [3]. Insomnia has been divided into primary and secondary insomnia, which unlike the later one; the primary insomnia is not the result of another mental or physical disorder or even substance use [4]. The spread of insomnia will increase as the age growth and 42% of female seniors are facing sleep disorders which means difficulty in sleeping or remaining sleep [5].

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There is a two-way relationship between insomnia disorder in seniors and problems in sleep quality, saturated oxygen in blood and pulse rate [6]. Sleeping is an active process that has a restorative and protective role, which is regulated by the central nervous system, neural factors, endocrine glands and behavioral factors[7]. Sleep quality defines as the satisfaction of quality aspect of sleep such as latent duration of sleep and its associated arousals and also the quantities aspect of sleep including deep sleep or relaxing sleep and person's feeling after waking up [8]. Poor sleep quality causes daily drowsiness, daily fatigue, mood swings, decreased energy, anxiety, nervousness, increased risk of drug use, lack of enthusiasm and inflexible thinking [9]. Also, poor sleep quality and insomnia leads to the increase of pulse rate through epinephrine and norepinephrine secretion [8]. The reports showed spread of hyper saturated oxygen in blood and improper heart bit among various communities between 10 to 60 percent [10]. Saturated blood oxygen in low blood and high pulse rate is one of the main health threats and after smoking, is the second leading causes of death and the third highest risk of non-communicable diseases in developing countries [11].

One of the treatment methods for improvement of various features is acceptance and commitment treatment [12]. This approach believes that anxiety, pain and human's suffering comes from psychological inflexibility, and attempts to revise it through acceptance and attention alongside commitment [13]. Acceptance and commitment treatment is a behavioral and contextual therapy that has six aspects; acceptance, cognitive failure, relation to the present, self as a background, values and commitment actions to increase psychological flexibility [14]. The main purpose of this approach is to promote psychological flexibility as a means to choose a solution that is better than the others [12]. Acceptance and commitment treatment unlike many other treatment methods that aims for a better feeling of their subjects at the end of their treatments; they seek for a better life regardless of the fact that a better life is associates with a better or worse feeling. Therefore as better life sometimes requires some pain, in this approach some grounds will be created in which the subject might feel pain [15]. A few and scattered projects were conducted on the effect of acceptance and commitment treatment over sleep quality, saturated oxygen in blood and pulse rate. For example the result of ElRafsi-Ferreira et al al [6], indicates the effect of behavioral intervention based on acceptance and commitment treatment, leads to the reduction of insomnia and increase sleep adequacy. In another study; Salari and et al [16], reported that acceptance and commitment treatment led to the reduction of insomnia and increased sleep quality. Following the previous studies, Ezadee and Rasouli [17], came to an understanding that psychotherapy based on acceptance and commitment reduced postpartum depression and increased sleep quality. In addition to these studies; Khazaie and Zakiei's [18], study results showed that acceptance and commitment treatment lead to reduction of problems regarding excitement regulation and sleep quality in patients with chronic insomnia. At the same topic of study, Mansouri and Korozhde [19], reported that acceptance and commitment treatment causes the reduction of uncertainty, intolerance, anxiety and insomnia in mothers of children with autism spectrum disorder. Tavakoli and et al [20], in their study achieved a conclusion that behavioral therapy based on acceptance will lead to the reduction of latent anxiety, overt anxiety and the increase of oxygen saturation in blood and the decrease of pulse rate in cardiovascular patients. In another research, Baradaran and et al [21], reported that acceptance and commitment treatment led to the improvement of physical parameters such as blood oxygen saturation and pulse rate and cortisol. Female seniors suffering from insomnia are facing aging problems on one hand and facing insomnia problems such as low saturated oxygen in blood and poor pulse rate on the other hand. Due to the increasing number of seniors and the high prevalence of sleep disorders, poor pulse rate and poor saturated oxygen in blood in seniors, there is a need for proper treatment methods to improve their sleep quality and saturated oxygen in blood. One of the treatment
methods derived from the third wave of psychotherapy is the acceptance and commitment treatment; but at the same time there is only a few and scattered studies that covered the effect of this approach on sleep quality and pulse rate and saturated oxygen in blood and there has been no evidence of a study that analyzes the continuity of the results; therefore the present study aims to determine the effect of acceptance and commitment treatment on the improvement of sleep quality in patients suffering from insomnia disorder.

2. Methodology

The present study is a quasi-experimental with pre-test, post-test and three months follow-up and a control group. The sample study consists of female seniors suffering from insomnia in Shiraz (Iran) daycare center for seniors in 2019. The minimum sample size in the intervention studies is 12 people. To insure the sample size and due to the high number of female seniors suffering from insomnia, the sample size added up into 16 subjects per group. Therefore, 32 subjects following the inclusion criteria were selected using random sampling method. Inclusion criteria include literacy, age over 60, female subject, suffering from periodic insomnia which were diagnosed based on clinical interview from fifth edition of the Diagnostic and Statistical Manual of Mental Disorder, non-smoker, score over 5 in the Pittsburgh Sleep Quality Index, agreement to participate in the project, did not receive any psychological services in the past three month and did not receive any acceptance and commitment treatment before. Exclusion criteria are absenteeism for more than one session and withdrawal of cooperation.

In order to conduct this research; after coordinating with officials of Jahandedhgan daycare center, seniors were informed via SMS and placing advertisement in center. 350 members agreed to participate in this project and only 110 subjects were eligible. From this 32 female subjects were selected using simple random sampling and were placed randomly into experimental and control groups. Assurance of ethical observance was given to the participants, their well-being was considered according to their age and insomnia and written consent was obtained from the members in order to participate in this study. The experimental group received 8 sessions of 90 minutes, two sessions per week of acceptance and commitment treatment and control group did not receive any treatment at all. The content of acceptance and commitment treatment for insomnia patients was taken form Fletcher protocol 2008, El–Rafiihi-Ferreira et al [6], which is summarized in table 1.

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Explain the goals and introducing member to each other, presenting the treatment, remembering the inability to sleep through pictures, using metaphors such as Sludge in Glass metaphor(one step forward, one step backward until cure), Two Mountains metaphor(patient and therapist's conditions) and Man in a Hole metaphor(creative hopelessness) and using meditation, mindfulness of breathing exercise with counting.</td>
</tr>
<tr>
<td>Second</td>
<td>Creative hopelessness, mediation exercise, recall of inability to sleep through imagery, review sleep diary, the Tug-of-War with a Monster metaphor</td>
</tr>
<tr>
<td>Third and Fourth</td>
<td>Acceptance training, control is the problem, meditation, patient's statement on realizing, Polygraph metaphor, falling in love, warm jelly donut, Passengers on the Bus metaphor, Two Scale metaphor, acceptance practice</td>
</tr>
<tr>
<td>Fifth and Sixth</td>
<td>Self as a context and de-fusion, review sleep diary and meditation, Chessboard metaphor, Milk, milk, milk exercise and leaves on stream.</td>
</tr>
<tr>
<td>Seventh and Eighth</td>
<td>Review sleep diary and meditation, introduce values, focus on committed actions, meditation focused on values and committed action, Metta meditation, Ton-glen meditation, Bum at the door metaphor and Moving Through a Swamp.</td>
</tr>
</tbody>
</table>

Table 1. Content of each session step by step

In each session, homework or exercises related to the sessions were given to the patients and at the beginning of the next session they were reviewed and received a constructive
feedback. Most of the homework included sleep diary and doing meditation at home and recognizing the distractions. Alongside the demographic information form, Pittsburgh’s Sleep Quality Index, and a pulse oximeter were used to collect data in the evaluation process.

For measuring sleep quality we used Pittsburgh’s Sleep Quality Index made by Boise et al [22]. This tool has 18 items and 7 sections including quality of mental sleep, latency in falling sleep, sleep adequacy, sleep duration, insomnia, using sleep medication and poor functioning during the day. Each section was given the score from 0-3, and the score of each part will be calculated by summing the scores of all sections. Therefore, the range of scores will be between 0-21, as the score of over 5 means poor sleep quality and the higher the score gets, means more poor sleep quality. Boise et al [22], confirmed the convergent validity of the instrument and reported its reliability by Cronbach alpha method at 0.83. In Iran Azizi, Farivar and Bashar poor [23], obtained the reliability of the instrument by Cronbach alpha at 0.83. The pulse oximeter device is a tool to analyze dissolved oxygen in blood and pulse rate. In the present study we used a digital oximeter made in Germany. It should be noted that this device has no side effects and place easily on finger and shows a number. This device with its sensitive receptors can detect oxygen in blood and pulse rate on its screen as well. Oxygen saturation between 99-94 considers normal and 94-90 is a reduced one as recommended a doctor’s visit and less than 90 is considered critical and requires immediate medical intervention. Normal pulse rates for adults are between 60 -100, but it’s suggested that seniors have to have a pulse rate between 60 -75. People with a pulse rate less that 60bpm called bradycardia and over 100bpm called tachycardia require immediate medical intervention [24]. All the collecting data with the above mentioned instrument, entering into the computer using chi-square method for demographic findings, variance analysis to assess the age of subjects and univariate covariance analysis in SPSS software version 23, were used for the analytical purposes.

3. Findings

The result of statistical analysis of demographic parameters of experimental and control group are presented in table 2 which were according to this table, groups were not significantly different in terms of education, physical activity, occupation, age and marital status as P>0.05.
of regression, were studied. However, since the sample size is equal in both experimental and control group; the homogeneity of variance-covariance matrix default in M-BOX test has a little effect on results and can be excluded from this study [25]. One of the most important assumptions for covariance analysis is the linearity relationship between the dependent variable and covariate in the experimental and control group. A scatter plot was used to examine the linearity relationship between the dependent and covariate variables, as the result came symmetric. Based on the collected data, all the necessary assumptions including linearity, homogeneity of variance and homogeneity of regression were performed to conduct a covariance analysis.

The result of covariance analysis shows that after adjusting the score of post-test and follow-ups and eliminating the effect of pre-test; the effect of acceptance and commitment treatment on sleep quality, oxygen saturation and pulse rate in the post-test and follow-ups presented a significant difference in sleep quality, oxygen saturation and pulse rate in post-test as P>0.05, but in the follow-up sessions this effect will be vanished on pulse rate variable as P>0.05, but remains the same regarding two remaining variables. Acceptance and commitment intervention causes a decrease in sleep quality score and steadily increasing of saturated oxygen in blood.

![Table 3](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>Post-Test</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS</td>
<td>DF</td>
</tr>
<tr>
<td>Post-Test Sleep</td>
<td>1.26</td>
<td>1</td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>85.23</td>
<td>1</td>
</tr>
<tr>
<td>Mistake</td>
<td>70.24</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>4206</td>
<td>32</td>
</tr>
</tbody>
</table>

**Table 3.** Results of one-way covariance analysis on post-test and follow-up on sleep quality scores, with a control on the effect of pre-test in acceptance and commitment group and control group.

![Table 4](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>Post-Test</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS</td>
<td>DF</td>
</tr>
<tr>
<td>Post-Test oxygen saturation</td>
<td>30.93</td>
<td>1</td>
</tr>
<tr>
<td>Control</td>
<td>17.17</td>
<td>1</td>
</tr>
<tr>
<td>Mistake</td>
<td>33.82</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>282456</td>
<td>32</td>
</tr>
</tbody>
</table>

**Table 4.** Results of one-way covariance analysis on post-test and follow-up on saturated oxygen in blood scores, with a control on the effect of pre-test in acceptance and commitment group and control group.

![Table 5](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>Post-Test</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS</td>
<td>DF</td>
</tr>
<tr>
<td>Post-Test pulse rate</td>
<td>70.20</td>
<td>1</td>
</tr>
<tr>
<td>Control</td>
<td>53.15</td>
<td>1</td>
</tr>
<tr>
<td>Mistake</td>
<td>108.23</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>166845</td>
<td>32</td>
</tr>
</tbody>
</table>

**Table 5.** Results of one-way covariance analysis on post-test and follow-up on pulse rate scores, with a control on the effect of pre-test in acceptance and commitment group and control group.

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4. Discussion

Due to the increasing statistical growth of seniors and the prevalence of sleeping problems, saturated oxygen in blood and pulse rate in female seniors; this study aims to determine the effect of acceptance and commitment treatment on improving sleep quality, increasing of saturated oxygen in blood and decreasing pulse rate on female seniors suffering from insomnia disorder.

The result of this study showed that the acceptance and commitment treatment improves sleep quality, saturated oxygen in blood and pulse rate in female seniors suffering from insomnia in the post-test section, but in the follow-ups phase this therapeutic effect will disappear on heart rate variable, but remains stable on two other variables. The result of this study is in consistence with the results of ElRafihi-Ferreira et al [13], Salari et al [16], Ezadee and Rasouli [17], Khazaie and Zakie [18], Mansouri and Korozhde [19], For example, Salari et al [16], achieved the fact that acceptance and commitment treatment reduced insomnia and increased sleep quality in their study. In another study Ezadee and Rasouli [17], reported that psychotherapy based on acceptance and commitment causes the increase of sleep quality.

Another study by Prabhakar et al [26], showed that using auditory deviation strategy, will promotes saturated oxygen in the blood and reduces pulse rate in children. Farrokhnia, Fathabadi and Shahidi [27], also presented some evidence on the cognitive intervention which lead to the increasing of saturated oxygen in the blood, minimizing the pain and improvement of pulse rate in patients. Sharifi, Tabatabaiei, Babaei and Tollabi [28], came up with some interesting results that practicing Yoga will improve the respiratory indexes and pulse rate in female subjects. The result of Richards et al [29], project indicates that the effect of proper music therapy on subject’s breathing and pulse rate has been noticed. Due to the limited history on the effect of acceptance and commitment therapy on saturated oxygen in blood and pulse rate in seniors who were going under insomnia treatment intervention, all the above mentioned researches are consistent on the saturated oxygen in blood in two phases, but they are inconsistent on the pulse rate variable on post-test and follow up. In this study due to the importance of stability of treatment we proceed the study as inconsistent.

In elaborating the results on the effect of acceptance and commitment therapy on sleep quality, due to the studies of Khazaie and Zakie [18], we can conclude that the process of this treatment can be improved through the subject's willingness to have a bad sleep experience or poor quality sleep. The result of this willingness will come back as something we call safety check behavior. Some of these behaviors are restrictive activities, sleep compensation and the excessive effort to go to sleep. In acceptance and commitment therapy, the main emphasis is on the subject's desire for inner experiences. Meanwhile we help patients suffering from insomnia to consider their dysfunctional thoughts and any thoughts related to sleep, only as an thought. For example the idea that I must have 8 hours of sleep, is only an idea in the mind and this method of therapy helps the subjects to realize the ineffective nature of their current sleep pattern and concludes that his/her effort for sleeping is in fact ineffective and as a result they
should be put aside. Subjects also learned to move toward life's values since these values exist in the realm of sleep as well. On the other hand, they change their position from an involver to an observer by doing exercises related to the process of self as content. In this phase the subject changes its position into an observer and concludes that a disturbing and inefficient thought has entered my mind and I will only observe it. As a result, acceptance and commitment therapy through the described processes can improve sleep quality in seniors suffering from insomnia.

Elaborating the effect of acceptance and commitment intervention on saturated oxygen in blood, based on the research evidences we can infer that 1) the function of respiratory system is to bring oxygen into the body and transporting carbon dioxide out of the body. Mindfulness is one of little interventions gained from acceptance and commitment therapy on insomnia. Therefore, by focusing on breathing we probably improve saturated oxygen in blood of the subject of this study. It should be noted that in feature studies regarding the acceptance and commitment therapy, the researcher must conduct a study to see a comparison between the effects of this improvement only due to intervention or part of mindfulness phase. 2) On the other hand, improving mental flexibility leads to the reduction of stress in subjects, which according to the previous studies and their results, can improve saturated oxygen in blood. 3) Improvement of subject's sleep quality, improves the physical function of respiratory system. 4) According to the research evidence, sleep with high quality has restorative properties in human body [30]. Human's body regains its lost power in sleep and probably this event is the main help for the respiratory system and lungs to repair themselves.

In explaining why acceptance and commitment therapy did not affect pulse rate, we can come to several reasons: 1) The difference between statistical population of this study with others and the fact that most seniors use pulse rate medication such as Metoral and on the other hand, pulse rate mean of the subjects of study was normal, as the other studies subjects had irregular pulse rate. 2) The criteria for entering this research were insomnia and the main goal of this intervention is to focus on sleep quality; although we followed the effect of this therapy on physiological parameters as well. 3) regarding the short-term effect on the reduction of heart bit in acceptance and commitment group and the combination group therapy in post-test we can come across two factors; one the unknown interventional variables and the other one is end of subject's physical presence due to the end of group therapy sessions. Can the presence of the subjects in therapy be affected the results or the social relationship between the seniors had a healing properties?

The most important strengths of the present study are the use of random sampling method with random substitution in groups and follow-up and long term stability of the results. Regarding the weakness of this study; the limited sample study as it was only the female seniors with insomnia disorder in Jahandedhgan daycare center in Shiraz, Iran and the failure to review the results by gender or even by marital status. Therefore it's recommended to conduct a research on seniors of other cities and even seniors based on gender, marital status and etc. and compare the results with the present study. Based on the present study's results, planning for the use of acceptance and commitment therapy in female senior's area to improve sleep quality and saturated oxygen in blood is required. Therefore, health professionals and therapists can use acceptance and commitment therapy alongside other medical treatment to improve sleep quality and saturated oxygen in blood.

Ethical considerations

All the ethical principles of this research have been approved by the Islamic Azad University of Yasooj Iran (12020706972007). Participants were allowed to leave the study whenever
they wished to. They were also informed about the research’s process. Participant’s information is kept confidential.

**Sponsor**

Sponsor of this study has received no financial support from any organization neither government nor private sector.

**Participation of the authors**

All the authors participated in the preparation of this article.

**Conflict of interest**

Conflict of interest is the same for all authors and there is no conflict of interest.

**Acknowledgement**

This research is taken from the first author’s doctoral dissertation in psychology. The researchers of this study consider it necessary to acknowledge their gratitude to all the elders of Jahandidehgan day care Center in Shiraz, who made this study possible by their affability and consideration through the whole study, the management of welfare organization in Shiraz, Iran and the technical manager of Jahandidehgan day care center, the vice consultant researcher of Azad Islamic University of Yasooj, Iran and the mentors and professors who facilitate this study with their support.

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