

## The effect of multi-sensory stimulation (MSS) on cognitive status of women with Alzheimer's disease in Fereshtegan elderly care center

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### Abstract:

#### Introduction:

Alzheimer's disease leads to negative effects on the individual's physical, psychological and cognitive conditions. Multi-sensory stimulation helps the patients to promote their physical, psychological and cognitive condition. The aim of this research is to determine the effect of multisensory stimulation on cognitive status of patients with Alzheimer's disease; they wereresidents of Fereshtegan center for people with Alzheimer disease during the year of 2012.

#### Materials and Methods:

This is a clinical trial performed on two groups of control and experiment. 52 subjects were selected through random sampling. The experiment group underwent 20 sessions of multi-sensory stimulation, each lasting 45 minutes. Data were collected through psychiatric records, a demographic questionnaire, and the brief questionnaire used for mental status examination.

#### Results:

Multi-sensory stimulation had a significant impact effect on the cognitive status of patients in the experiment group after several sessions of sensory stimulation test as compared to before the intervention and also in comparison with the control group. Cognitive status of the participants in the experimental group was improved. Also, the mean score of the brief mental status examination of the experiment group was significantly more than that of the control group, which shows that the intervention

#### Conclusion:

Multi-sensory stimulation can be an effective way to improve the cognitive state of patients with Alzheimer's disease. Further studies are recommended on different subjects with larger sample size to further confirm the results of this study.

**Keywords:** Alzheimer, Disease, Elderly, Mental Processes

### Introduction

Dementia has the most destructive and progressive course among diseases during aging. The disease is identified by a progressive decline in different domains of individual's cognitive function that interferes with social and occupational

functions as well. Alzheimer's disease is the most common form of dementia whose prevalence is 65% to 75% of all cases (1). Alzheimer's disease develops in about 4 percent of people after age 65, and its incidence at age 80 reaches 20%. A little time has passed from the first introduction

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of Alzheimer's disease and the start of its investigation dates back to twenty years ago. Due to the absence of clear symptoms, the health problems associated with Alzheimer's disease are numerous (2).

American scientists have predicted that the number of people with Alzheimer's disease in America will reach about 14 million and 300 thousand people on mid-twenty-first century with an increase of 350 percent. In America the average lifetime cost of caring for a person with Alzheimer's disease is estimated 174 thousand dollars and it is expected to reach 450 thousand dollars in the future (3). Alzheimer's disease is the third most expensive disease in America after cancer and heart disease. Medical research organization in Australia has allocated more than 12 million dollars to research on dementia annually (4). According to report of World Alzheimer's Association in 2010, the disease is the fourth leading cause of death among older adults, especially in women, and women suffer from the disease more than men (4).

At present, five million elderly are living in Iran and it is expected to reach nearly twenty-six million people (24% of the population) by 2050. Currently, 6000 people (one-ten-thousandth of the population) are held in elderly care centers and nursing homes. Iran Alzheimer's Association by an informal report has estimated the total number of patients with Alzheimer's disease in Iran 450 thousand persons. Given these statistics, this problem associated with superstition and stigma cannot be hidden anymore and it should be considered a public health priority (5). Today, our society is dealing with the problem of care of patients with Alzheimer's disease. The monthly care fee for a patient with Alzheimer's disease is 6,500,000 IRR, so family and care centers endure about 70,000,000 IRR of annual cost per patient.

Currently, there are several treatment methods to stabilize everyday functioning

of these patients. Although medication has been helpful in reducing a number of psychiatric symptoms (6), the drugs currently used to treat this disease at best have modest effect on stabilization of a few cognitive and behavioral signs (7). Drug side effects and interactions have questioned the usefulness of existing drugs (8).

One of the new therapeutic and supportive methods for such patients is multi-sensory stimulation technique that is suitable for improving adjustment of people with particular cognitive conditions such as Alzheimer's disease. Multi-sensory stimulation is based on the philosophy that patients with dementia suffer from some degree of sensory deprivation that may affect the quality of their care. Sensory stimulation includes using pleasant odors, positive visual stimulation by using images, touching patient as well as using light music (9). Although positive effects of this approach are short term and ??? returns to its previous state by removing the stimulation, these small changes can lead to significant clinical changes in patients (10).

At present, multi-sensory rooms are used in mental health care settings (11), pain clinics and pediatric settings (12). Progressive neuronal loss in dementia leads to reduced processing of sensory stimuli and confusing normal stimuli. Using this method in people with specific cognitive conditions such as dementia may have positive outcomes (13).

Generally, there is no definite proof that these stimuli collectively known as multi-sensory stimulation or Snoezelen room are effective, but some studies have investigated memory therapy, aroma therapy, music therapy, and massage therapy separately and have shown their positive effect. The effect of these stimuli as multi-sensory stimulation and in Snoezelen room has been shown only in studies on people with learning disabilities and those on patients with Alzheimer's

disease is still being conducted around the world.

Studies by Namazi *et al.* in Ohio University, United States, Ozdemir and Akdemir in Turkey, Berg *et al.* in Martin Luther King University in Germany and other ongoing studies have not demonstrated the effectiveness of this type of intervention and there is still room for further research.

Investigations performed in Iran by the authors of present article suggest that administrators and staff of different nursing homes do not have information about this treatment method to treat patients with Alzheimer's disease. Given the insufficient knowledge and that the effectiveness of multi-sensory stimulation on cognitive status of patients with Alzheimer's disease have been demonstrated, the current study was designed and implemented with the aim of determining the effect of multi-sensory stimulation on cognitive status of patients with Alzheimer's disease in Fereshtegan elderly care center in Shiraz.

### Materials and Methods

In this research, single blind clinical trial design was used. Research setting was the private Fereshtegan elderly women care center located in Amir Kabir Boulevard, Shiraz. Research population included all elderly women with mild to moderate Alzheimer's disease based on mini-mental state examination questionnaire score (MMSE=10-26) with at least primary education and ability to speak and appropriate communication consented to participate in this study. Diagnosis of Alzheimer-type dementia was based on patients' medical records and its verification was based on DSM-IV-TR criteria by a psychiatrist. Patients with mild to moderate Alzheimer's disease were distinguished from patients with severe Alzheimer's disease by a questionnaire. Patients with advanced and severe Alzheimer's disease with speech disorders due to advanced dementia and

severe psychiatric disorders such as schizophrenia and cognitive impairment including delirium and dementia caused by other diseases as well as patients with sitting disability were excluded from the study. Sampling was done by simple random method and samples were assigned randomly to two experimental and control groups with an equal number of subjects.

Data collection tools included a researcher-made demographic questionnaire, patients' psychiatric records, and MMSE questionnaire. MMSE questionnaire is a useful screening test widely used that was designed in 1975 by Folstein *et al.* (14). This questionnaire evaluates the function of navigation, time, attention and concentration, calculation, recall, construction and comprehension. The maximum score on this exam is 30 and its validity and reliability have been confirmed in studies of Froughan *et al.* (15).

Brief cognitive status exam (BCSE) test is the most common screening instrument for cognitive impairment in the world that is translated into different languages and has been standardized in different cultures. This test measures different cognitive functions and provides an overall assessment of cognitive status of the subjects. Many academic and administrative institutions in the world use this test as one of the classification criteria of cognitive impairment. Despite the weaknesses in BCSE test such as subjects' cultural impact, this test has become the alphabet for exchanging information in regard to cognitive impairment (15).

Among population of elderly patients with dementia in the center under study, 52 patients were divided to two experimental and control groups (each group 26 patients) and were assigned to each group by random assignment technique. Demographic information form and MMSE questionnaire were completed for both groups. Then, treatment program was conducted only for experimental group and

control group did not receive any special training. Before starting treatment program, patients were given information about the details of the program. Then, 20 sessions of multi-sensory stimulation, each lasting 45 to 60 minutes were performed on patients in a hall prepared for this purpose in the morning and afternoon included a non-directive and enabling approach, multi-sensory experience and attempts to stimulate all senses. After the end of the course, mini-mental state examination questionnaire was given to patients to complete again.

The hall was decorated by simple colorful papers selected by an expert with master's degree in psychology. Comfortable lounge chairs were placed in the hall based on the number of participants in sessions and a laser light projector was installed to project shapes on the wall. In addition, a music player with enough power to play instrumental light music was placed based on participants' preference. Two beds were placed on two sides of the hall for massage, and were separated from the rest of the hall to respect participants' privacy by curtains in a way that the person receiving the massage could see the end of the hall, but the rest of the participants could not see him. Air spray fragrance was provided according to participants' preference. Also selected stories of the Shahnameh by Ferdowsi, the poems of Hafiz, Saadi, Parvin Etesami and Maulana Jalal ad-Din Muhammad Rumi were selected by patients and were considered for various sessions. By survey of

participants in the study, morning sessions started at 10 am and afternoon sessions started at 16 pm. Massage was performed only in afternoon sessions. At the beginning of the research and on the twentieth session, mini-mental state examination questionnaire was given to participants and they were asked to respond the questions. To check the normal distribution of the data, Kolmogorov-Smirnov test was used and to compare the mean scores before and after multi-sensory intervention, paired t-test was used. Data analysis was performed in SPSS-16 software.

The present study's protocol was approved by the Ethics Committee of Islamic Azad University, Tehran Medical Unit.

### Results

After checking normal distribution of the data by Kolmogorov-Smirnov test, homogeneity of two groups was investigated. It should be noted that the final analysis was performed on 25 subjects of experimental group and 26 subjects of control group.

The mean age of participants in the study was 68.27 years in the experimental group and 68.19 years in the control group. Twenty subjects of the experimental group and 19 subjects of the control group were married and the rest were single, divorced, or widowed. Seventeen subjects of the experimental group and 16 subjects of the control group had elementary education and the rest had higher than elementary education.

Table 1: Comparison of mean difference and the results of paired t-test to compare MMSE mean answers in the experimental and control groups before and after intervention

Statistic Group	Status	Mean	Standard deviation	t-value	Degrees of freedom	Significance level
Experimental	Before	16.12	3.32	-8.40	24	0.001
	After	18.12	2.81			
Control	Before	15.69	3.19	0.768	25	0.449
	After	15.57	3.04			
The difference between before and after intervention	Experimental Control	2.00 -0.11	1.20 0.76	7.58	49	0.001

According to Table 1, responses to mini-mental state examination questionnaire in the experimental group after performing multi-sensory stimulation program improved compared to before program and there is a significant difference between them ( $p=0.001$ ). In the control group, no significant difference was observed in mean responses to the questionnaire before and after implementation of multi-sensory stimulation ( $p=0.449$ ). There is no significant difference between responses to mini-mental state examination questionnaire in control and experimental groups before implementation of multi-sensory stimulation program ( $p=0.641$ ). Performing multi-sensory stimulation program in the experimental group significantly improved responses to mini-mental state examination questionnaire compared to control group ( $p=0.003$ ).

According to Table 1, comparison of mean differences in both experimental and control groups indicates that mean difference in the experimental group is 2.11 points higher than mean difference in the control group and there is a significant difference between both groups in terms of mean score ( $p=0.001$ ).

### Discussion

The overall objective of the current study was to determine the effects of multi-sensory stimulation on cognitive status in patients with mild to moderate Alzheimer's disease in nursing home. Based on the results, it can be said that there is a significant difference between mean scores of the experimental group before and after implementation of multi-sensory stimulation program and control group after application of multi-sensory stimulation program. In other words, application of multi-sensory stimulation program has improved cognitive status in patients with Alzheimer's disease.

According to findings of the present research, this hypothesis is accepted that multi-sensory stimulation is effective on

cognitive status of women patients with mild to moderate Alzheimer's disease.

In study of Graf *et al.* titled "the effects of light therapy on mini-mental state examination scores in patients with Alzheimer's disease", it was revealed that the response of the group that was exposed to daily light for an hour was better than the group that did not experience this stimulant and the results are consistent with the findings of the current study (16). The results of a study conducted by Nirbhay Singh *et al.* on 30 male patients with the aim of reviewing touch stimulation effects on improvement of cognitive status, aggression and quality of life in patients with Alzheimer's disease by semi-empirical method indicate that the effects of multi-sensory stimulation on cognitive status of patients is significantly positive ( $p=0.001$ ) and this result is consistent with the results of the present study (17). A study conducted by Ozdemir and Akdemir on 27 patients, titled "the effects of multi-sensory stimulation on cognition, anxiety and depression levels of mildly-affected Alzheimer's patients in nursing homes in Turkey" showed that the method used had a positive effect on cognitive status, depression and anxiety in the patients ( $p=0.001$ ), which support our findings (18). In a study by Collier *et al.* titled "The use of multi-sensory stimulation to improve functional performance in older people with moderate to severe dementia" performed in the south of England on 30 patients in nursing homes (17 patients in experimental group, 13 patients in control group) in a randomized single blind design by using random assortment, the effects of multi-sensory stimulation on functional performance were evaluated and the results showed that there was a significant improvement in performance of patients in multi-sensory stimulation group compared to control group. Findings of the research support performance of multi-sensory stimulation in patients with dementia (19). Baker *et al.* evaluated short-term effects of



multi-sensory stimulation on behavior, mood and cognition in patients with dementia in a hospital in the Netherlands by using a randomized controlled design. Although mood, behavior and confusion showed improvement and patients were happier and more active after treatment in this research, no significant change was observed in their cognitive status that this is in contrast with the results of the present study (20).

According to similar studies, it can be concluded that multi-sensory stimulation is effective on cognitive status of women patients with Alzheimer's disease in nursing homes and it leads to improved cognitive status.

### Conclusion

Multi-sensory stimulation can be an effective method to improve cognitive

status in patients with Alzheimer's disease. The results obtained from observations indicate that multi-sensory stimulation is useful for cognitive status of such patients and they will experience a better life after this treatment method. Although the results of this research were satisfactory, it is suggested that this study be conducted in a larger scale.

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### Conflict of interest

None to declare.

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