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Effects of multidisciplinary collaborative nursing combined with cognitive stimulation therapy on cognitive function, quality of life, and daily activities in patients with Alzheimer's disease

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ABSTRACT

Alzheimer's disease (AD) is a neurodegenerative condition that disrupts neuropsychological activity and hinders the development of mental capacity. Efficient AD therapy is a major challenge in biological studies. Alzheimer's condition cannot be cured with any particular medication. The purpose of this study is to investigate the impact of multidisciplinary collaborative nursing and cognitive stimulation therapy (MCN-CST) on daily activities, quality of life, and cognitive performance in AD patients. The inclusion/exclusion method is initially used to gather information about AD patients. Control and investigative teams were formed with its own set of functions. The control group gets a regular course of treatment, whereas, the investigation group receives MCN-CST. To ensure that our study is as practical and useful, we compare our findings to existing nursing approaches. The ANOVA and Chi-Square tests are used to assess the conditions of Alzheimer's patients. There was a scientifically significant improvement in the overall level of their

medical condition after implementing MCN-CST. Nursing protocols developed MCN-CST is beneficial in improving patients' quality of life, cognitive function, and daily activities. It is encouraged to do intensive research using many samples drawn from a wider range of people.

Keywords: *Canadian; diagnostic assessment; Fetal Alcohol Spectrum Disorder (FASD); prenatal alcohol exposure; preschool child*

INTRODUCTION

Alzheimer's disease (AD) has been assigned by WHO as a "worldwide human care concern" since there is no definitive cure. Regarding the origin of AD and its potential therapeutic targets, there are only a few clear ideas and theories at this time. The formation of neurofibrillary filaments and Aβ plaques, as well as neuronal loss and neurodegenerative, are the characteristics of this neurobiological disorder. Additionally, those who have diabetes, pressure, or coronary illness are more likely to acquire AD later in life. Treatment slows the course of illness pathology depending on this theory. For persons over 60 years, AD is the main cause of dementia. AD affects 50% to 75% of those with dementia.[1] According to global statistics, women are more likely than men to have AD, and the risk rises even more with age. People's lifestyle is likely the main reason for a rise in AD incidence in emerging nations. Despite there is no evidence of memory problems, some patients with diagnostic signs of Alzheimer do not exhibit any physiological associated with the condition may not worried about apparent memory loss. Concerned well is a term used to describe this situation. Drug and alcohol usage, as well as mental diseases, may cause these symptoms.[2] Research indicates that the pathophysiology condition involves inflammatory chemicals and excessive microglial cells and astrocytes stimulation. The dual effects of neuroinflammation on the brain include removing deposited amyloid beta and producing cytotoxic chemicals that exacerbate amyloid beta accumulation and lead to neurodegeneration. Numerous studies showed a significant buildup of inflamed mediators around Neurofibrillary tangles (NFTs) and amyloid plaques, which strongly suggests that neuroinflammation plays a role in AD.[3] The pathogenesis of AD is shown in Figure 1.

It shows several elements that contribute to the development of AD. The two main ones are tau hyperphosphorylation and amyloid plaques. The course of the illness is mainly caused by other variables, such as neuroinflammation, reactive stress, cholinergic deficiency, mitochondrial malfunction, and autophagy inability.[4] A multidisciplinary collaboration nursing is a group of medical specialists, including nurses, nutritionists, general practitioners, and other specialists, who collaborate to provide high-quality and integrated care to patients. Professionals from all divisions of the care hierarchy, including assistants, nurses,

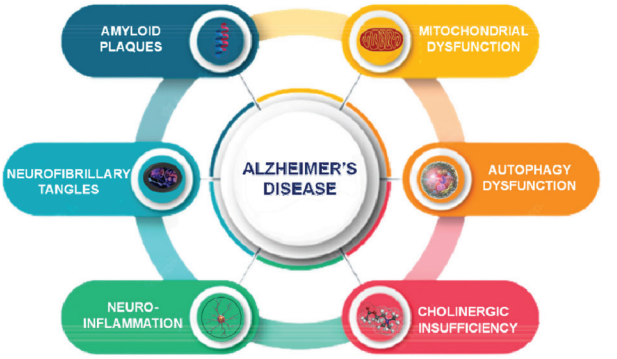

FIG 1. Pathophysiology of Alzheimer's disease.

medical assistants, physiotherapists, psychologists, anesthetists, and visiting physicians, often make the multidisciplinary team. These groups take care of patients more skillfully.[5] Every specialist in the multidisciplinary healthcare group is accountable for providing services or treatments in which they are expertise. A multidisciplinary group is comprised of several medical specialists from one or more organizations that collaborate to provide high-quality treatment.[6] Cognitive stimulation therapy (CST) is a psychological treatment that is advised for persons who have AD. It has a lot of potential. CST focuses on activating many intellectual processes at once, usually through teamwork emphasizing social contact, to enhance overall intelligence and maintain functionality. This method differs from cognitive training, which emphasizes the individual, as it repeated practice of prescribed mental performance to target discrete cognitive skills (such as memory). CST differs from intellectual recovery, a person-centered method that concentrates on enhancing life by creating methods for carrying out desired activities or processes.[7] Therefore, we evaluate the consequences of CST and multidisciplinary collaborative nursing (MCN) on daily activities, quality of life, and cognitive function in AD patients in an attempt to enhance the high-quality life for these patients.

Scope of the study

- Patients are recruited through inclusion and exclusion criteria. Data were partitioned into two components: control and investigation teams.
- While the control team gets conventional care, the investigation team receives MCN-CST.
- The healthiness of the patient is evaluated using the ANOVA and Chi-square tests.
- By comparing MCN-CST treatment with conventional nursing practices, its impact is examined.

LITERATURE SURVEY

Mukhopadhya and Banerjee et al.[8] offered the Aducanumab antibody for treating Alzheimer. Aducanumab's authorization is predicated on a decrease in the A concentration in the brain, which serves as a proximate indicator for this route. The scholarly community has, however, been split between pessimistic and optimistic approaches over its worldwide acceptance.[9] The primary concerns of the antibody include its inability to reach therapeutic objectives in the studies, and reported integrity difficulties, cost-effectiveness, possible side effects, need for routine observation, and criticism of the "amyloid burst theory". Chung et al.[10] suggested low-dose ionizing radiation (LDIR) treatment as a therapy for AD and found that it reduced synapse degradation and loss of neuronal tissue in the frontal cerebrum and hippocampus, increased cognition and memorization abilities contrasted to the group, and enhanced neuronal deterioration. Additionally, the brain tissue was considerably reduced. But it did not reduce the amyloid protein level in the brain. Park et al.[11] described a focused ultrasound-mediated blood-brain barrier (FUS-BBB) opening that has been successfully employed in preliminary experiments to remove amyloid plaque and enhance intellectual functioning. Additionally, it may improve cognitive performance and lessen the load of A and phosphorylated tau. Theofanidis et al.[12] evaluated and synthesized the most recent medical indications for nursing procedures with important diagnostic concerns for people with Alzheimer in hospitals and households. This research confirms that nurses caring for Alzheimer need to provide ongoing support as part of a holistic care model (HCM) that incorporates the patient's family and caregivers. Wu et al.[13] discussed nutritional support for the clinical nursing path (NSCNP) and examined the influence of nursing on the nutrient condition and quality of life for senior Alzheimer patients. It demonstrates that nutritional support was attributed to greater nursing effectiveness and quality of life while taking

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the professional nursing approach. Liu et al.[14] recommended using stem cells as a treatment for AD. With the development of stem cell research and the diversification of these cells into various kinds of neuronal and glial cells of the central nervous system, it now has better properties of self-renewal, multiplication, specialization, and crossover.[15] Stem cell therapies for AD have shown promise in recent preclinical research. Lilamand et al.[16] claimed that the ketogenic diet is a recognized therapy for drug-resistant epilepsy. It has been hypothesized that they are interested in neurodegeneration like AD because ketone cells may lessen brain b-amyloid buildup, enhance the transport channel for neurotransmitters, and decrease neuroinflammation.[17] Even though there are several treatments available for AD, none of them have been successful in enhancing patients' day-to-day functioning, quality of life, or cognitive abilities. Hence, to improve the high-quality life for Alzheimer patients, we investigate the impact of CST and MCN on daily activities, quality of life, and cognitive function.

Problem statement

The brain shrinks and cerebral cells die as a consequence of AD, a devastating neurological illness. As the most common form of dementia, Alzheimer's disorder affects a people's ability for independent activity and is defined by a continuous decline in intellectual, behavioral, and moral capacities. Advanced disease-related issues, including dehydration and malnutrition, cause severe impairment of cerebral activity and ultimately result in death. As a result, we examine how MCN-CST affects AD patients' daily activities, quality of life, and cognitive function.

PROPOSED METHODOLOGY

In this research, the efficiency of MCN-CST in treating AD is being investigated. An inclusion/exclusion strategy is first used to gather data on Alzheimer's patients. Additionally, two teams with different roles were formed: control and investigation teams. The control groups get standard treatment, while the investigation group receives MCN-CST. Patients with MCN-CST are evaluated using the ANOVA and Chi-Square tests. MCN-CST may be beneficial for Alzheimer's patients, and those patients' health was assessed. Figure 2 shows the research workflow that was employed.

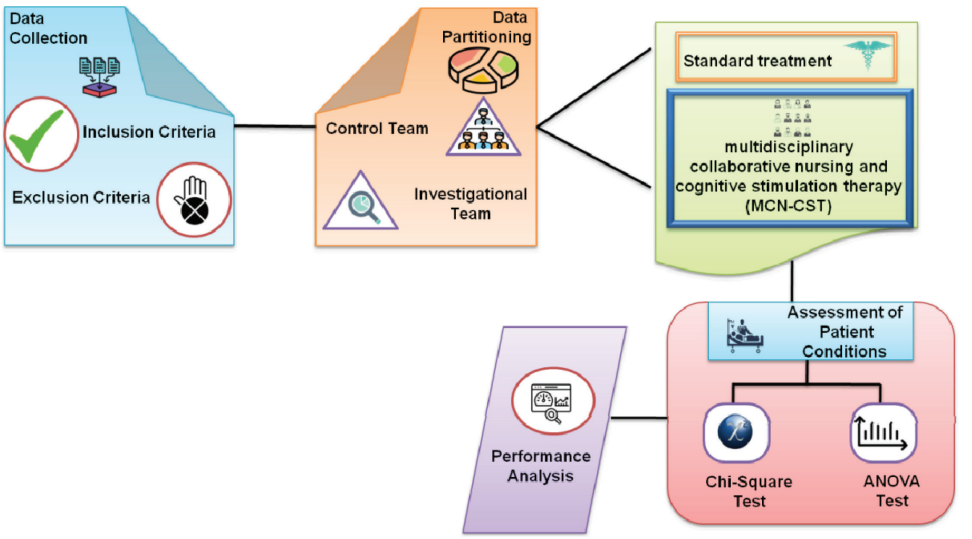

FIG 2. Research workflow.

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Data collection

An experiment using randomization and controlled conditions was carried out. From March to September 2018, 38 patients diagnosed with severe AD were recruited from the rehabilitation center at Xuanwu hospital affiliated with Capital Medical University. The patients were divided into two groups: the intervention group (n = 19) and the control group (n = 19).[18]

Inclusion criteria

The following inclusion criteria were satisfied by the participant:

- Clinically diagnosed with Alzheimer with the rating of Clinical dementia rating (CDR) 1 point and requiring the professional care assistance.
- Formal caregivers must be accessible to patients for a minimum of 4 days per week and a minimum of 4 hours per day. They are also required to be able to accompany patients during each visit.
- Be capable of providing informed agreement.
- Showed some capacity for both communication and comprehension.
- Have sufficient sight and hearing ability to participate in activities.
- Had been taking anticholinesterase inhibitors as per their doctor's orders for more than 3 months.

Exclusion criteria

- Alzheimer caused by various brain disorders, such as degenerative neurological diseases of the centralized neurological system, lesions, microcephaly, and pathogens of the central nervous system (syphilis, AIDS, and Creutzfeldt-Jakob disease).
- A significant neurological disability that prevents the accomplishment of activities, such as hand hemiparesis, dyslexia, vision impairment, etc.
- A serious mental disease and other types of psychological disorder.
- Did not suffer from any significant physical disease or impairment that prevented involvement
- Participated in other types of cognitive treatment during the previous 3 months.

Data partitioning

Here, the information is separated into two groups: the control and the investigation teams.

Control team

This group includes patients who meet the demographic requirements listed in the inclusion criteria and receive treatment in line with standard practices for assessing patients' health.

Standard treatment

In the majority of instances, it is essential to be admitted to the hospital for therapy, which often involves the administration of antibiotics and other forms of medicine. To treat mild to serious cases of AD, a medicine called memantine, an "N-methyl D-aspartate (NMDA) antagonist," is often administered by a doctor. The primary benefit of this medicine is a reduction in symptoms, which may make it possible for some individuals to continue doing specific day-to-day activities for a little longer than who are not taking the prescription. For instance, memantine may enable people in the latter phases of AD to preserve their ability to access the restroom separately for many more months. This is beneficial not only for the person who has AD but also for the caregivers. It is thought that memantine controls glutamate, an essential neurotransmitter in the brain. When it is created at large levels, glutamate has the potential to cause the death of brain cells. Because NMDA antagonists and cholinesterase inhibitors both function in distinct ways, it is possible for a doctor to prescribe a combination of the two kinds of medication. A person diagnosed with AD should follow their doctor's orders when taking

certain medications. These include sleep aids, anti-anxiety pills, anticonvulsants, and antipsychotics.

Investigation team

According to the inclusion criteria, all 19 patients on this team receive the MCN-CST treatment.

Multidisciplinary collaborative nursing

MCN practice is an interconnected group strategy for patient care. The formation of therapeutic programs that are focused on the patient and the actual provision of care and both are considered to be shared responsibilities in multidisciplinary nursing. The method of assessing available treatment choices and arranging therapy is done in collaboration and includes not just patients but also the patients' relatives. A group of experts drawn from two or more fields who collaborate on a specific task either alone or in combination is referred to as a multidisciplinary team. This kind of team may collaborate on the task in any manner. When discussing healthcare, "collaboration" refers to a process involving concern-solving, shared accountability for selection-making, and the capacity to carry out a treatment strategy while collaborating toward a collective objective. It has been determined that there are two essential components: (i) the development of a cooperative activity that discusses the sophistication of patient needs and (ii) the regular group interactions that incorporate the point of view of each specialist and in which representatives of the team appreciate and believe one another. Consultations through telemedicine, exchanges mediated by computers, collaborative care, and visits to patients' homes might fall under this category. Teams engage in a variety of collaborative tasks, which enables them to exchange relevant data about patients, organize treatment, recognize issues, establish remedy strategies, and set common objectives. The framework of nursing is a five-component prototype with the following attributes: 'interdependence,' through which group specialists contend that their tasks are reliant on one another, 'freshly-formed professional fields,' whereby combined actions can accomplish as much more than what could be accomplished by operating unilaterally, 'task adaptability,' which necessitates fewer centralized connections, and 'collaborative possession of priorities,' which contains exchanging obligation all across the complete entity. Primary care may be provided by multidisciplinary groups that include many experts. These experts may include doctors, nurses, pediatricians, dentists, physiotherapists, social workers, psychologists, nutritionists, pharmacists, secretarial personnel, and executives. Figure 3 shows the modal of MCN.

In addition, since primary care is based on the patient, the specializations of the medical experts who treat an individual and the allocation of their duties (for example, which will be the head of the group) fluctuate depending on the requirements of the patient. It has been shown that patients with diabetes, anxiety, depression, and other disorders fare better when their healthcare teams collaborate to provide integrated treatment focused on the patient. This practice is regarded to be the greatest priority.

Cognitive stimulation therapy

CST is an intellectual activation procedure that was developed as an organized and analytically acceptable approach to cognition stimulus. CST is widely regarded as the scientific proof treatment of selection for treating cognitive abnormalities of moderate to risk Alzheimer's of any cause, including cerebral Alzheimer's. This is the case even though CST was not the first developed to treat dementia. In addition, CST is the only therapy worldwide, which has continuously shown substantial gains in cognition and quality of life. These advancements have been made by the usages of the similar CST method that has been regionally adapted following defined principles. CST consists of at least 14 periods of focused tasks, which are frequently connected to objectives, such as childhood physical activity, food, current events, sound faces/scenes, an association

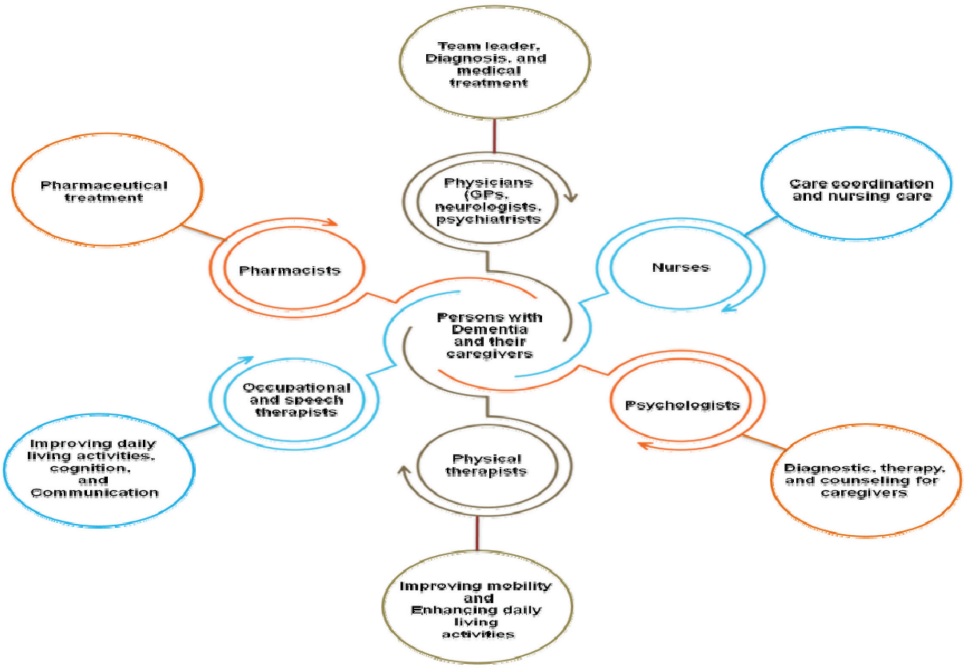

FIG 3. Multidisciplinary collaborative nursing modal.

of words being innovative, classifying items, viewpoint, financial use, mind games, memory games, and team quiz are normally done twice per week. Each meeting of CST is designed to challenge participants' cognitive capacities as well as foster social connections with the other participants and controllers. CST was created to activate individuals implicitly and naturally, lowering the fear that often comes with being "thrust into the focus." For instance, during the faces workshop, patients presented various historical faces. We spoke about the similarities and differences between the personalities, as well as whom we thought was more appealing. Typically, this made it possible for individuals to remember names without being specifically queried. The multi-sensory stimulus was used throughout training, such as matching familiar sounds to images. Reminiscence was used as a method of orientation, for instance, by contrasting the values and coinage of old and modern. Lastly, each program was planned to be adaptable, offering a variety of activities to meet the requirements and capacities of the groups. Several studies indicated that overall cognitive functioning is the area in which CST is most effective in treating people with minimal to progressive AD. However, certain cognitive areas, specifically memory, awareness, and verbal fluency appear to be greatly improved in Alzheimer patients.

Assessment of patient condition

The statistical analysis underpins gathering data, application of pertinent evaluations, and persuasive presentation of outcomes. Statistics are necessary for making discoveries, informed decisions, and forecasts. To assess the patient's condition, the Chi-square and ANOVA tests are used.

Chi-square test

A chi-squared test is a statistical evaluation based on measurements of a randomized set of elements (symbolized as 2 [A chi-square (χ^2) statistic is a measure of the difference between the observed and expected frequencies of the outcomes of a set of

events or variables.]). Generally, it includes a contrast between two sets of quantitative data. Analyzing and distributing categorical variables were the subject of this assessment. It was referred to as Pearson's chi-squared test as a consequence. By assuming that the default hypotheses are true, the chi-square test is utilized to calculate how probable the findings would be. A hypothesis is a likelihood that a special criterion or a specific assertion is true, which we may test. A sum of squared errors over the sampling distribution is often utilized to generate chi-squared tests. The chi-squared test is used to determine if the actual and anticipated values vary. Chi-square may be expressed mathematically as in Equation 1.

$$X^2 = \sum \frac{\left(\text{Observed value} - \text{Expected value}\right)^2}{\text{Expected value}} \quad (1)$$

The possible value is often referred to as the P-value. It is described as the possibility of receiving a response that is either greater intense than the real findings or identical to those findings. The P-value, or degree of peripheral importance, is a measure of how likely an event is to occur that is used in premise testing. Instead of using the rejecting point, the P-value is utilized to show the lowest relevance level at which the null assumption would be discarded. There is more support for the alternate hypotheses when the P-value is minimal. P-value is a quantity that ranges from 0 to 1. The level of relevance is a predetermined cutoff that the investigator should establish. The standard value is 0.05. The P-value computation equation is expressed as in Equation 2.

$$Z = \frac{\hat{P} - P^0}{\sqrt{\frac{P^{0(1-P^0)}}{n}}} \quad (2)$$

Analysis of variance (ANOVA) test

The statistical analysis method known as analysis of variance (ANOVA) divides the structured and arbitrary components of the measured data variation within a data set into two categories. The depicted data are affected by the methodical variables but not by the unpredictable ones. The ANOVA test is utilized by investigators to determine how extraneous factors in predictive research affect the reliable measure. The ANOVA equation is a powerful statistical tool that is frequently utilized to demonstrate variance between two or more variables or elements using significance tests. The ANOVA complete form and how we construct ANOVA will aid us in demonstrating how to do many analyses of various groups. The following is the ANOVA equation denoted in Equation 3.

$$F = \frac{\text{Mean sum of squares due to treatment}}{\text{mean sum of squares due to error}} \quad (3)$$

Essentially, using the ANOVA test method will let us compare more than two groups at once to see whether they are connected. The F statistic, commonly known as the F-ratio or ANOVA statistics, is the result of the ANOVA statistics equation, and it enables us to analyze recurrent collections of data points to ascertain the variation across and within instances. The result of the ANOVA equation F-ratio statistic will constantly be approaching one or equal to one if there is no real distinction between the categories under consideration for analysis (analysis of variance example). For the variability both across and within data, the ANOVA equations are denoted in Equation 4.

$$F = \frac{\sum_{j=1}^{k} \sum_{j=1}^{l} (\bar{x}_j - x_j)^2}{df_\omega} \quad (4)$$

Where x denotes data points, x_j denotes the mean of data points, and df_ω denotes the degree of freedom of data points.

PERFORMANCE ANALYSIS

This article goes into great depth about the MCN-CST intellectual analysis. The effect of

MCN-CST on the Alzheimer's patients who performed the statistical analysis is also discussed in this section. The results of the investigation and control teams are compared and evaluated. LDIR, FUS-BBB, HCM, and NSCNP are used in nursing. The criteria used to assess the impact of MCN-CST include cognitive function, quality of life, activities of daily life, and satisfaction level.

Cognitive function

An essential part of carrying out daily tasks is by cognitive function, the capacity to think logically, understand, and recall. One of the aspects of total brain wellness is cognitive function. Intellectual memory, numeric reasoning, problem solving, and decision making are a few examples of cognitive function. In Figure 4, the cognitive function is depicted. It demonstrates that MCN-CST is more efficient when analyzing cognitive function.

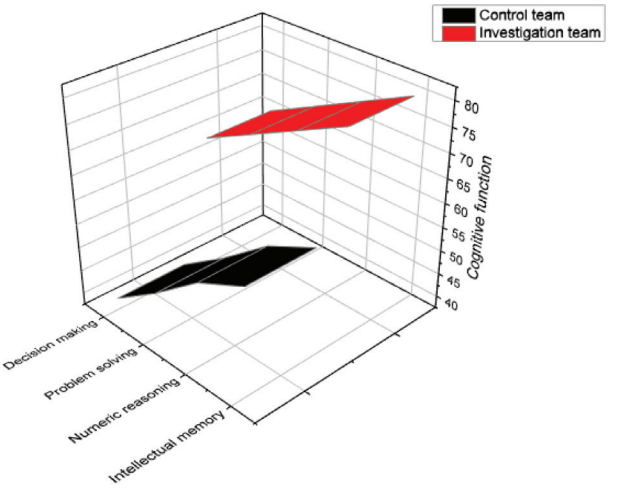

FIG 4. Cognitive function.

Quality of life

Quality of life is a profoundly subjective measurement of pleasure that is an integral element of a wide variety of activities that people participate in throughout their lives. Figure 5 illustrates a comparison of it with existing techniques. It proves that MCN-CST is superior in terms of quality of life.

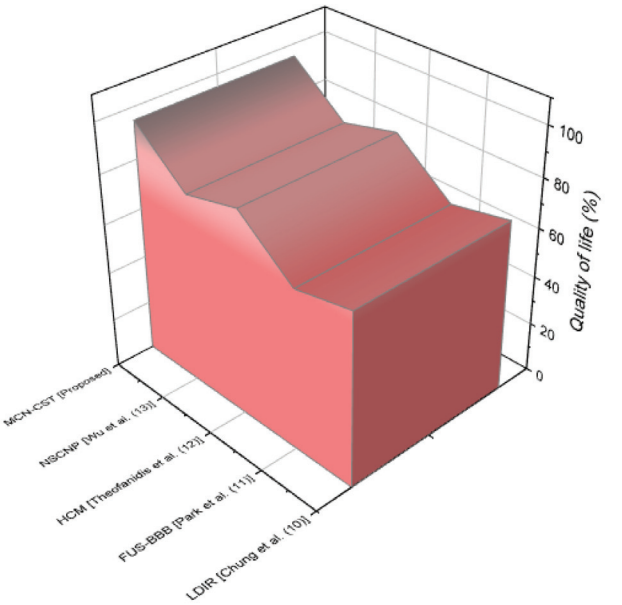

FIG 5. Quality of life.

Activities of daily life

Physical care and maintenance are examples of activities that fall under the category of "daily activities." That includes sleep, eating, social interaction, and workplace participation. It is depicted in Figure 6. It shows that the activities of daily life are enhanced by the MCN-CST approach.

Satisfaction level

The satisfaction level of treatment is defined as their expression of satisfaction and enjoyment as a consequence of their accomplishment. In addition to beliefs and knowledge, enjoyment drives therapy and nursing behavior. Patients who received MCN-CST treatment had better levels of patient satisfaction. Figure 7 shows the satisfaction level for both existing and suggested nursing.

Statistical analysis

Chi-square test

The Chi-square test was used to analyze the impact of MCN-CST on Alzheimer's patients.

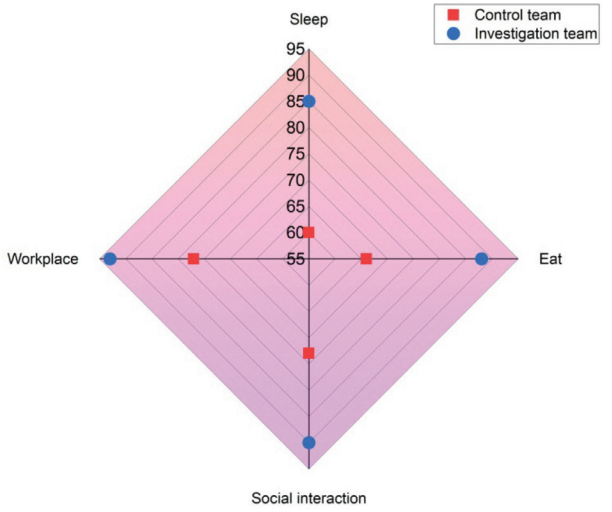

FIG 6. Activities of daily life.

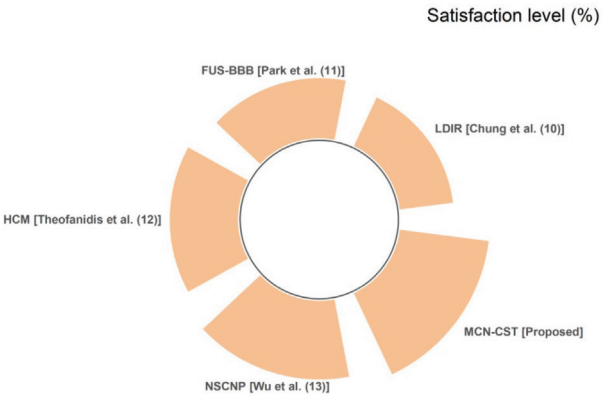

FIG 7. Satisfaction level.

Table 1 denotes the Chi-square test of MCN-CST treatment.

ANOVA test

ANOVA test was used to analyze the impact of MCN-CST in Alzheimer's patients. Table 2 shows the ANOVA test of MCN-CST treatment.

Typically, a P-value of 0.05 or less is regarded as scientifically substantial. The ANOAV and Chi-square test results for the effect of MCN-CST in Alzheimer patients are less than 0.05 P-value.

TABLE 1. Chi-square test results.

Features	P-value
Cognitive function	0.03
Activities of daily life	0.035
Quality of life	0.02

TABLE 2. ANOVA results.

Features	P-value
Cognitive function	0.026
Activities of daily life	0.021
Quality of life	0.033

It demonstrates that the MCN-CST treatment is very effective in Alzheimer's patients.

CONCLUSION

The loss of brain neurons and degradation of the cerebella tissue are the effects of the progressive neurodegenerative illness known as AD. Mild recall impairment is the first sign of the disorder, which develops gradually and might lead to interaction and contextual knowledge reduction. A method of organizing and delivering patient care that is based on recent studies and the nurse's clinical knowledge is referred to as "MCN-CST." In other words, this research focuses on how MCN-CST improves Alzheimer patient overall health. The ANOVA and Chi-square tests are compared and provide improved findings for MCN-CST therapy in patients. This study may improve the accuracy of MCN-CST treatment's ability to evaluate the health of Alzheimer's patients. Previous nursing techniques were contrasted, such as nutritional support for a clinical nursing route, FUS-BBB, LDIR, HCM, and NSCNP. Cognitive function, quality of life, daily activities, and satisfaction level are utilized to evaluate the effectiveness of MCN-CST. It shows the improved efficacy of MCN-CST in helping Alzheimer's people. Future research may

examine many novel strategies for enhancing the functionality of MCN-CST.

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