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# Research on the application effect of cognitive stimulation therapy in patients with Alzheimer's disease based on expert consultation and semistructured interviews

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## ABSTRACT

The awareness and utilization of psychological therapies for Alzheimer's disease have increased significantly in recent years. Limitations on the utilization of pharmacological therapy for Alzheimer's disease in China have corresponded with this surge in greater studies in the field. For individuals who have Alzheimer's disease, cognitive stimulation therapy (CST) is a quick self-help that is founded on the theories of quality and cognitive functioning. People with Alzheimer's disease often participate in cognitive behavioral programs; however, their expense has never been studied. Being part of a meta-analysis, we analyze the application effectiveness of a CST program that is based on recent research for Alzheimer's disease patients. A CST group therapy was given to 91 Alzheimer's patients, who resided in healthcare settings or the general public, multiple times per week for 8 weeks; the other 70 people with Alzheimer's disease got a medical therapy. Costs were computed, and resource utilization was tracked for 8 weeks both before and after the therapy. It was determined by a value study. In the value study, cognition and quality of life were

the major and tertiary outcomes, respectively. Contours of cost-effectiveness and acceptance were drawn. It was driven based on expert consultation and semistructured interviews. In Alzheimer's disease, CST improves intelligence and standard of living, and there was no difference in implementation expenditures between the categories. Regarding both outcome metrics, there is a significant chance that CST seems to be more expensive than conventional therapy within realistic expectations. The efficacy of CST for Alzheimer's patients is superior to conventional treatment, and it could be the greater value. The outcomes contrast well with pharmacological studies for Alzheimer's. Many people with Alzheimer's disease may benefit significantly from CST groups.

**Keywords:** *Alzheimer's disease; cognitive stimulation therapy; implementation expenditures; intelligence; the standard of living.*

## INTRODUCTION

Caregiver partners or other relatives frequently look after Alzheimer's patients who reside in the household. According to the estimates, 51–91% of the women worldwide are concerned with Alzheimer's patients, often as wives or children. Alzheimer's is a degenerative illness that affects around 50 million people worldwide.[1] Patients continuously undergo intellectual and functional loss. As individuals age, Alzheimer's disorders become more common; those above the age of 75 are at most risk. Disorder, issues with communicating and recognizing people and locations, and a diminished capacity to carry out everyday tasks are among the vast variety of signs.[2] There are several types of approaches to Alzheimer's disease: proactive medical treatment, search for disorder medications, and improved care and assistance. According to recent research, early or middle learning and health-related behavior improvements, as well as simulation and model-based behavioral therapies, for somewhat elderly adults at recognized dementia risk may protect roughly 40% of Alzheimer's disease.[3] Such precautionary measures must be taken, but the results will not show up right away. There have not been many advances in the hunt for treatments that may change illness; in any event, the costs of brand-new drugs and their related indicators may be formidable barriers to their broad use. Consequently, providing the greatest treatment to every Alzheimer's patient and their caregivers should be a top priority.[4]

However, several caregivers often enjoy rewarding caregiving in their daily lives, experiencing enrichment and satisfaction when they provide care. Despite the continual cognitive deterioration, many individuals who are living with an individual who has Alzheimer's disease cherish companies that require familiarity in regular living that expresses respect and understanding and a feeling of closeness.[5] Alzheimer's disease (ID), which affects 1% of the community, is characterized by the poor cognitive and adaptable performance that first appears before the age of 18. The frequency of Alzheimer's is 7.5 times greater in people. It is expected to rise as an individual ages.[6] People with Down's syndrome over the age of 40 are mostly at risk of being diagnosed, with one continuous research showing that all 97% would eventually acquire Alzheimer's disease in more than 25 years span. The primary cause of death in persons

having Down's syndrome is indeed Alzheimer's. The increase in risk and rapidly progressive Alzheimer's seen in patients with less intellectual capacity brought on by or before the concussion.[7] Due to these limitations, we analyze the application effect of cognitive stimulation therapy (CST) in patients with Alzheimer's disease based on expert consultation and semistructured interviews.

The remainder of this study is structured as follows. The section that follows immediately presents the related works and issues recommendations, which is followed by an examination of the impact of CST on expert consultation and semistructured interviews with Alzheimer's patients. The above section is followed by the findings and analyses, and finally the conclusion.

## ASSOCIATED LITERATURE

Patients with Alzheimer's were given a 15-week multicomponent organization rehabilitation in Denmark (N = 44). A systematic procedure was used to examine the appropriateness of the treatment, such as whether individuals with Alzheimer's disease and their families considered the treatment valuable, as well as to observe and evaluate changes in respondents' physiological and cognitive functional ability. This approach included an interview process, findings, test results of cognitive and physical working, and an interviewer-assisted survey on life satisfaction. The research was done from June 2018 to August 2019.[8]

Andrade et al.[9] investigated the impact of failover cluster excitatory transcranial direct current stimulation (tDCS) coupled with cognitive stimulation (CS) for 2 months on cognition and brainwaves in individuals having Alzheimer's disease, as well as the correlation underlying them. Alzheimer's incidence has also been rising, especially in developing nations, yet treatment options are nevertheless few.[10] Psychological–behavioral challenges, in addition to the standard of living for those with advanced dementia, may be improved using cognitive therapies, which are widely acknowledged as effective strategies. They were randomly assigned with either 13 sessions of CST with normal treatment (TAU; n = 23) or TAU (n = 24) over 7 weeks in a single survey. Measurements of modifications to the cognitive, standard of living, negative affect, caretaker load, and functioning were made.[11]

Rai et al.[12] examined the portability of an individual cognitive stimulation therapy (iCST) application strategy and the practicality of carrying out a large-scale randomized controlled trial to contrast the therapeutic potential of the iCST application strategy with that of normal treatment for individuals with Alzheimer's disease.[13] One of the most common substantial proof therapies for Alzheimer's disease patients is the interventions for improving treatment. They also evaluate the efficacy of an Italian adaption of the CST paradigm in the immediate and long-term after the completion of therapy and 3 months later.[14]

One-hundred and twelve elderly individuals with Alzheimer's disease were included in a separate, multicenter, prospective randomized experiment. The primary efficacy metric was cognitive, with satisfaction with life, interaction, independence, anxiousness, depressive symptoms, and overall well-being serving as supplementary indicators.[15] They also checked if the advantages of CST vary by setting, age, and degree of executive functioning. Alvares et al.[16] created criteria for culturally modifying CST by the constructive approach to modifying treatment. They converted the English CST booklet into German using this neighborhood methodology, which included two modification phases, multiprofessional group discussions, and two training CST classes (n = 13) in circumstances that were typical of the German medical system. Pre–post comparisons of common measures on cognition, sadness, satisfaction with life, and consciousness were used to analyze the effectiveness in both groups.[17] Having impact values within the same level as in prior randomized controlled trials, they were capable of reproducing earlier results of better

cognition as evaluated. In addition, consciousness improved after CST compared to before, suggesting that CST may activate intellect via a favorable, self-rewarding process.[18]

## DESIGN METHODOLOGY

For those with moderate to advanced Alzheimer's disease, CST is a quick, research intervention. The 14 or more sessions of thematic activities that constitute group CST therapy often occur in 2 weeks. Sessions are designed to participate fully and excite those who have Alzheimer's disease while also offering a superior learning atmosphere and the privileges of grouping. The benefits of CST seem to be around the same magnitude as those associated with the pharmaceutical Alzheimer therapies that are now on the market based on expert consultation and semistructured interviews. Figure 1 indicates the working mechanism of this study.

### *Sample collection of data*

For 8 weeks, 91 Alzheimer's individuals diagnosed in healthcare facilities or the broader population received CST group treatment numerous times weekly; the remaining 70 Alzheimer's patients underwent therapeutic interventions. A discussion with the director was scheduled after 169 potential social care and daycare facilities were approached. For inclusion, centers needed at least eight target respondents. Due to their inability to provide enough respondents, several centers were disqualified.[19] Table 1 depicts the characteristics of patients with Alzheimer's disease.

### *Partitioning of data*

A record of the respondents at the center was created by the investigator performing the evaluations. The evaluator subsequently put them in the correct order, gave each one a number ranging from 1 to 10, and provided the document to the

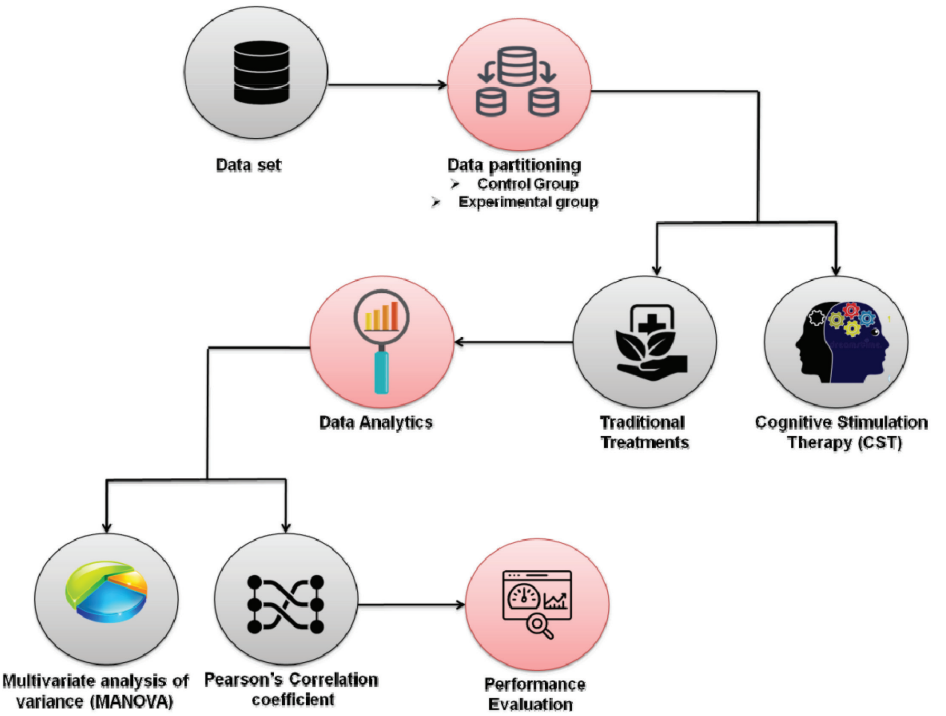


**FIG 1.** Working mechanism chart.

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**TABLE 1.** Fundamental characteristics of Alzheimer's disease patients.

| Patient's characteristics | CST & carer training | Control group | t-test |
|---|---|---|---|
| Average age (years) | 75.4 (5.51) | 76.8 (6.55) | 76.8(7.47) |
| **Gender** | | | |
| Gents (%) | 11 (52.4) | 15 (62.5) | 9 (41.5) |
| Ladies (%) | 10 (45.6) | 9 (35.4) | 13 (55.4) |
| State of residence | | | |
| Personalized lodging (%) | 20 (95.1) | 20 (81.1) | 23 (98) |
| Assisted living (%) | 0 (0) | 01 (4.1) | 0 (0) |
| Live-in assistance (%) | 1 (4.8) | 2 (12.5) | 0 (0) |
| **Category of Alzheimer's diagnoses** | | | |
| Alzheimer's disease (early onset) (%) | 0 (0) | 0 (0) | 1 (3.2) |
| Alzheimer's disease (late onset) (%) | 18 (71.4) | 11 (46.5) | 10 (41.4) |
| Alzheimer's disease (atypical/mixed) (%) | 1 (4.8) | 2 (7.5) | 5 (25.1) |
| Cerebral disease (%) | 0 (0) | 3 (13) | 1 (3.2) |
| Alzheimer's disease sub-cortical (%) | 2 (9.5) | 1 (3.2) | 2 (7.5) |
| Parkinson's disease–related dementia (%) | 0 (0) | 4 (15.4) | 1 (3.3) |
| Unknown dementia (%) | 3 (14.3) | 2 (7.6) | 1 (7.6) |
| **Degree of dementia** | | | |
| Weak (%) | 15 (70.2) | 17 (73.0) | 16 (25.1) |
| Strong (%) | 6 (25.6) | 5 (24.0) | 5 (25.1) |
| **Surviving with a caregiver** | | | |
| Yes (%) | 18 (84.6) | 15 (73.1) | 18 (81.5) |
| No (%) | 3 (14.2) | 4 (18.8) | 3 (15.3) |
| **Relation to the caregiver** | | | |
| Spouse (%) | 15 (80.0) | 16 (68.8) | 15 (71.8) |
| Partner (%) | 0 (0) | 0 (0) | 1 (3.3) |
| Parents (%) | 3 (15.0) | 4 (18.5) | 3 (15.4) |

investigator leading the qualitative research at this facility. All evaluation results had the physician's identity hidden.

*Experimental group*

The physician then selected digits from a counters selection and wrote them on parallel discs. A name list was constructed from the first five numbers to be chosen for inclusion in the experimental group without any limits.

*Control group*

The other three to five individuals were assigned to the control group, who went about their regular business during the groups. "Basic tasks" in the majority of care facilities comprised performing nothing. Other facilities (social care and day centers) typically offered activities such as cards, piano and humming performances, creative arts projects, and participation programs. Until the test was finished in the center, the evaluator was kept in the

dark about this distribution. Based on the results of the research design, they calculated that 64 participants within every group would need to have 80% ability to recognize a distinction between the means of two positions. Using two different t-tests with a 0.05 significance threshold, this was predicated on the assumption that the universal platform variability was 4.0.

### *Treatments or therapy*

*Traditional treatment*

Patients and their caregivers participated in different degrees in each of the 9-week 60-min sessions that made up the treatment protocol. Across the course of therapy, caregivers recorded the participant's attitude and tracked the intensity and length of enjoyable experiences. Along with using behavior control techniques, they kept an eye on variations in sadness. The melancholy phase, the behavioral treatment for sadness in Alzheimer's disease, and the value of enjoyable experiences were all covered in the introduction session. The subject of the next four sessions was locating, scheduling, and enhancing enjoyable activities for the patients. During treatment, suggestions were gathered, and fun games were planned with the assistance of the Joyful Event Management Agenda. Caretaker issues including despair, tension, pressure, and rage were handled starting in the sixth session. The development of a sense of community and the planning of enjoyable activities for individuals were suggested for caretakers to help with the patient's condition. The next three sessions explored methods for identifying and dealing with behavioral issues that prevented participants from enjoying themselves. This involved detecting certain behavioral issues, examining the causes and effects of these issues, and coming up with challenging techniques for improving the behaviors in question. The last session was dedicated to creating strategies for sustaining enjoyable activities and solutions after concluding the therapy's progress.

*Cognitive stimulation therapy*

Cognitive stimulation therapeutic options concentrated on a series of exercises demanding mental abilities and executive function. Investigators led the session for the intervention group in settings involving five to eight respondents each. The treatment took place twice a week for 7 weeks, totaling 14 appointments. Every session started with a collaborative song, followed by a warm-up workout, and a primary sector focused on the week's subject. Programs were created to be as comprehensive as feasible and were adapted to the team's ability. Two additional sessions were conducted on the same day, split by a brief break, to encourage participation and lower commuting expenses and hurdles. Each session lasted around 45 min. Hence, we analyzed the patients on CST with Alzheimer's disease based on expert consultation and semistructured interviews.

### *Data analytics*

Analysis of data is the act of taking actual data and turning everything into documentation that people can utilize to make decisions. Data analysis is designed in a range of corporate, scientific, medical, and sociology sectors. It has many dimensions and methods and encompasses several methodologies through many designations. Analysis of the data contributes to much more logical decision-making and thus more efficient corporate operations in the competitive global economy. Inspection, purging, transformation, and modeling of data are all steps in the data analysis process, which is utilized to collect accurate data, validate inferences, and uncover patterns.

*Multivariate analysis of variance (MANOVA)*

The purpose of multivariate analysis of variance (MANOVA) is to examine the interaction between many layers of independent factors and predictor variables. The variables must adhere to normative specifications to use MANOVA in therapies. In similar situations as ANOVA, MANOVA is employed when there are numerous random and dependent factors in the model that the participants are asked

to assess. Whenever homogeneity is breached, MANOVA is also regarded as a respectable substitute for the factorial design ANOVA. Equation 1 depicts the general form of MANOVA. MANOVA in matrix form is represented in Equation 2.

$$Z = XB + E \tag{1}$$

$$Z = \begin{bmatrix} Y_{1,1} & Y_{1,2} & \cdots & Y_{1,m} \\ Y_{2,1} & Y_{2,2} & \cdots & Y_{2,m} \\ \vdots & \vdots & \ddots & \vdots \\ Y_{n,1} & Y_{n,2} & \cdots & Y_{n,m} \end{bmatrix} = \begin{bmatrix} Y_1 Y_2 \ldots Y_m \end{bmatrix} = \begin{bmatrix} y_1^T \\ \vdots \\ y_n^T \end{bmatrix} \tag{2}$$

The n × d matrix X may not always be of complete rank d. It is depicted in Equation 3.

$$X = \begin{bmatrix} x_{1,1} & x_{1,2} & \cdots & x_{1,d} \\ x_{2,1} & x_{2,2} & \cdots & x_{2,d} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n,1} & x_{n,2} & \cdots & x_{n,d} \end{bmatrix} = \begin{bmatrix} v_1 v_2 \ldots v_d \end{bmatrix} = \begin{bmatrix} x_1^T \\ \vdots \\ x_n^T \end{bmatrix} \tag{3}$$

B in Equation 1 is indicated in Equation 4, and E in Equation 1 is depicted in Equation 5.

$$B = \begin{bmatrix} \beta_{1,1} & \beta_{1,2} & \cdots & \beta_{1,m} \\ \beta_{2,1} & \beta_{2,2} & \cdots & \beta_{2,m} \\ \vdots & \vdots & \ddots & \vdots \\ \beta_{d,1} & \beta_{d,2} & \cdots & \beta_{d,m} \end{bmatrix} = \begin{bmatrix} \beta_1 \beta_2 \ldots \beta_m \end{bmatrix} \tag{4}$$

$$E = \begin{bmatrix} \in_{1,1} & \in_{1,2} & \cdots & \in_{1,m} \\ \in_{2,1} & \in_{2,2} & \cdots & \in_{2,m} \\ \vdots & \vdots & \ddots & \vdots \\ \in_{n,1} & \in_{n,2} & \cdots & \in_{n,m} \end{bmatrix} = \begin{bmatrix} e_1 e_2 \ldots e_m \end{bmatrix} = \begin{bmatrix} \epsilon_1^T \\ \vdots \\ \epsilon_n^T \end{bmatrix} \tag{5}$$

The interconnections and related significance levels of the predictor variable have an impact on the efficacy of MANOVA.

*Pearson's correlation coefficient*

The linear correlation of two types of data is measured by the Pearson's correlation coefficient. It is effectively a balanced evaluation of the covariance because the proportion seen between the covariance of two parameters and the products of its standard deviation must be between −1 and 1. Equation 6 is used to determine the Pearson's correlation coefficient.

$$\rho_{x,y} = \frac{cov(X,Y)}{\sigma_X \sigma_Y} \tag{6}$$

Whenever used in a community, the Greek symbol ρ (rho) is usually used to denote Pearson's correlation coefficient, also known as the "community correlation analysis" or the "population Pearson's correlation coefficient." The covariance in Equation 6 is denoted in Equation 7. $\mu_x$ and $\mu_y$ are found by using Equations 8 and 9.

$$cov(X,Y) = E\left[(X - \mu_x)(Y - \mu_y)\right] \tag{7}$$

$$\mu_x = E[X] \tag{8}$$

$$\mu_y = E[Y] \tag{9}$$

$$\sigma_X^2 = E\left[\left(X - E[X]\right)^2\right] = E\left[X^2\right] - \left(E[X]\right)^2 \tag{10}$$

$$\sigma_Y^2 = E\left[\left(Y - E[Y]\right)^2\right] = E\left[Y^2\right] - \left(E[Y]\right)^2 \tag{11}$$

$$\begin{aligned} E\left[(X - \mu_x)(Y - \mu_Y)\right] &= E\left[\left(X - E[X]\right)\left(Y - E[Y]\right)\right] \\ &= E[XY] - E[X]E[Y] \end{aligned} \tag{12}$$

Equations 10, 11, and 12 are the variables of the above equations.

Hence, the Pearson's correlation coefficient is also written as in Equation 13.

$$\rho X,Y = \frac{E[XY] - E[X]E[Y]}{\sqrt{E\left[X^2\right] - \left(E[X]\right)^2}\sqrt{E\left[Y^2\right] - \left(E[Y]\right)^2}} \tag{13}$$

If either $\sigma_X$ and $\sigma_Y$ are 0, infinity, or indeterminate, Pearson's correlation coefficient does not exist.

## PERFORMANCE EVALUATION

The availability of services for healthcare is frequently utilized as a justification for not introducing

innovative therapies to meet the requirements of patients with Alzheimer's disease. Medical resources are often usually limited in comparison to demands or wishes. In reality, when the advantages of improved medical conditions and life quality are significant, there may be sound economic and social grounds for expansion in Alzheimer's disease. Therefore, this research explored the application efficacy of a CST service developed in care facilities and day centers. In our study, we analyze the group result, pretest, posttest, and results of the CST with Alzheimer's disease.

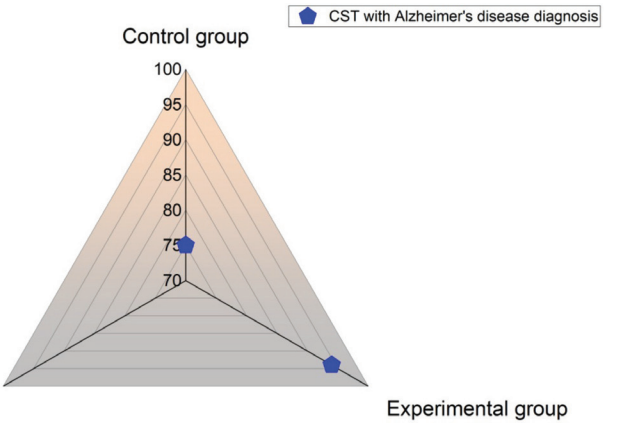


**FIG 2.** Results of CST diagnosis in groups.

### *Group test*

Initially, the control and experimental groups are investigated. Figure 2 depicts the results of the groups. In the control group, the traditional treatment is available, while in the experimental group the CST with Alzheimer's disease is discussed. Compared to the control group, the experimental group has a better diagnosis of this disease within a limited time. The control group has 75% of CST with Alzheimer's disease diagnosis, and the experimental group has 94% of CST with Alzheimer's disease diagnosis. It denotes that the CST with Alzheimer's disease diagnosis is very effective in practice.

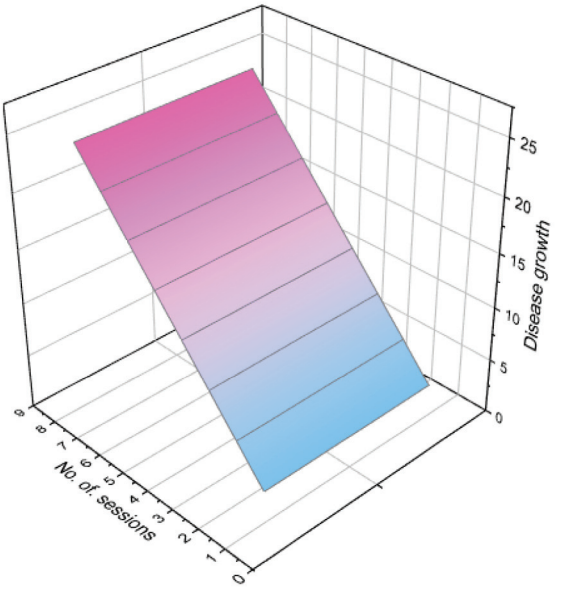


**FIG 3.** Pretest.

### *Pretest result*

The pretest is conducted and analyzed to determine the patient's health by CST with Alzheimer's disease. Figure 3 represents the results of the pretest. This therapy is conducted through sessions. Hence, a pretest is conducted with a number of sessions and the growth of the disease. On analysis, it is clear that the pretest is comparatively worst because when the number of sessions during the test increased, the disease growth also increased, while there was no impact on session attendance.

### *Posttest result*

Further, the posttest is conducted, and the results are gathered. Figure 4 indicated the posttest results. After the CST, the patient's health improved gradually. Here, we also compared the number of sessions and disease growth. Whenever the patients attend the sessions, the progression in the disease decreased eventually, which confirmed that CST treatment is highly effective for the patient's health.

### *Patient's health status*

Health status is predicted before and after undergoing the treatment. We have already seen

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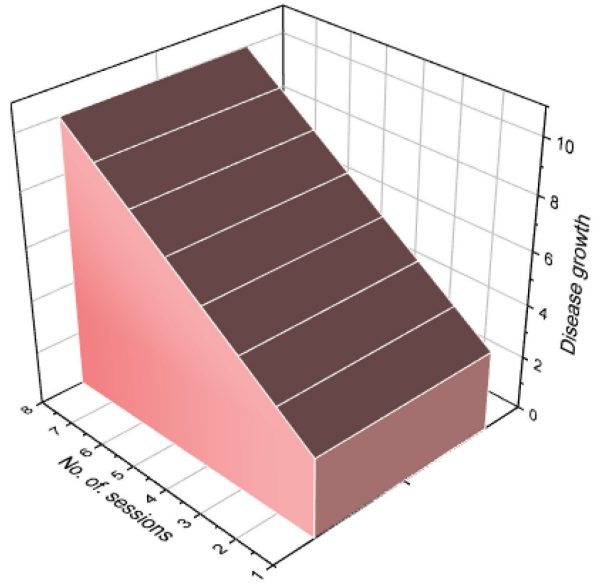


**FIG 4.** Posttest.

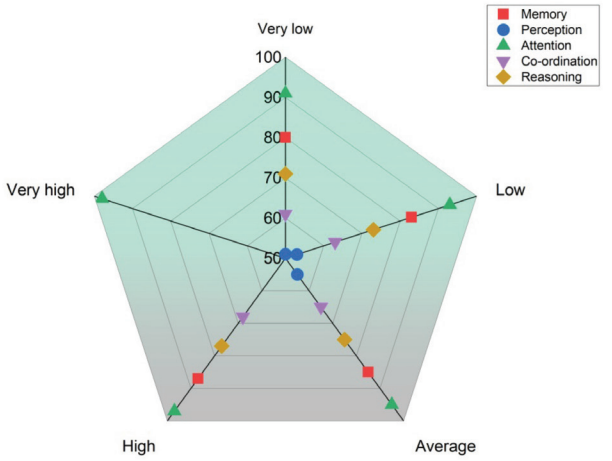


**FIG 5.** Patient's health level after treatment.

the pretest results. Through analysis, we predict the patient's health status post treatment. Figure 5 displays the health status of patients after taking CST. After undergoing CST, each patient's memory, perception, attention, coordination, and reasoning abilities are analyzed. From the figure, it can be noted that the patients' health status has improved well.

## CONCLUSION

In conclusion, patients who received CST improved more in the areas of application and decreased in the areas of lethargy and sadness than would people who get primary health care. Based on expert consultation and semistructured interviews, this study involves CST as a therapeutic choice for people with strong to severe Alzheimer's disease diagnoses. Although it could be less costly to offer CST by teaching nurses, caregivers, or employees of care facilities, we are unsure whether the results would vary. Our findings indicate that the utilization of CST may need to be expanded to preserve a patient's identity, mental health, and resilience in the event of cognitive loss.

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