The purpose of the present research was to find out the role of Shankhapushpi (Whole plant’s powder) in treating the dementia of Alzheimer’s Type and Multi-infarct Type. Shankhapushpi was to be administered for four months of duration. There were three hypotheses regarding the effect of Shankhapushpi on dementia formulated in Chapter III. In order to verify the hypotheses, the following design was employed:

**Design:**

A double-blind, pre-post, placebo controlled parallel group design was undertaken on patients who suffered from dementia in a 2x2 factorial form to investigate the effect of herbal treatment i.e. Shankhapushpi on dementia.

**Table 3: Showing the design of the present research.**

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>Type of Dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SDAT</td>
</tr>
<tr>
<td><strong>Control Group</strong></td>
<td>Group-1, n =20</td>
</tr>
<tr>
<td>Or</td>
<td>Everyday administration of ordinary powder (3.5g/day with honey followed by a glass of milk) to each patient of SDAT.</td>
</tr>
<tr>
<td>No Shankhapushpi Group</td>
<td>Group-3, n =20</td>
</tr>
<tr>
<td>Everyday administration of Shankhapushpi powder (3.5g/day with honey followed by a glass of milk) to each patient of SDAT.</td>
<td>Everyday administration of Shankhapushpi powder (3.5g/day with honey followed by a glass of milk) to each patient of MIT.</td>
</tr>
</tbody>
</table>
Sample:

A sample of total 80 already diagnosed patients, 40 belonging to Senile Dementia of Alzheimer’s Type (SDAT) and 40 belonging to Multi-infarct Type (MIT) were selected on the basis of availability from PGIMS, Rohtak, Old-age-home, and various other clinics in Rohtak, and through personnel contacts. The age range of these patients was between 45-75 years with mean age of 60 years. The sample included both, male and female patients from both rural and urban background, belonging to various types of SES. The patients having any psychiatric and other serious diseases along with dementia were however, excluded. The duration of suffering varied between 1 to 3 years.

Tools:

(1) To study the effect of Shankhapushpi on dementia rating amongst the patients of both types of dementia, Dementia Rating Scale-2 (DRS-2) by Steven Mattis (2001) was administered.

(2) To assess the improvement in Quality of Life amongst the patients of both types of dementia, Dementia Quality of Life Instrument (DQoL) by Meryl Brod (1998) was administered.

Description of the tools:

Dementia Rating Scale-2 (DRS-2): The Dementia Rating Scale-2 (DRS-2) is a 36-task and 32-stimulus card, to be individually administered instrument, designed to assess the levels of cognitive functioning for individuals with brain dysfunction. The DRS-2 is prepared by Steven Mattis (2001). There are five subscales in it: attention (ATT-8 items); initiation/perseveration (I-P-11 items); construction (CONST-6 items); conceptualization (CONCEPT-6 items); and memory (MEM-5 items). The reliability and validity properties of the DRS-2 are excellent. A test-retest reliability correlation coefficient was .97 with subscale correlation coefficients ranging from .61 to .94. A split-half reliability coefficient was .90 when the DRS-2 was administered on a sample of 25 patients of either senile dementia or organic brain syndrome. The DRS-2 was compared with the mini-mental examination (MMSE), which displayed a significant correlation (r=.82). In addition, correlations with the Wechsler Adult Intelligence scale indicated a correlation of .75 between the WAIS full scale and is very useful in the assessment and progression
Figure 1: Showing how Shankhapushpi (Convolvulus pluricaulis) looks at the ground.

Figure 2: Showing detailed stem of Shankhapushpi (Convolvulus pluricaulis) with leaf and flowers.
of dementia of AIZ, vascular dementia, Parkinson’s disease, Huntington’s disease, and age related dementia (senile dementia), in mental retardation and Down syndrome.

**Dementia Quality of Life Instrument (DQoL):** The Dementia Quality of Life Instrument (DQoL) is constructed by Meryl Brod (1998). The DQoL is designed to assess quality of life of patients with dementia. It was tested on 99 participants (mild to moderate dementia) and found reliable. It is also highly valid as 96% of participants were able to respond the questions appropriately. There are 29 items in this instrument. DQoL measures 5 domains of quality of life: Positive Affect (6 items), Negative Affect (11 items), Feelings of Belonging (3 items), Self-esteem (4 items), and Sense of Aesthetics (5 items). The DQoL included physical functioning, daily activities, discretionary activity such as hobbies, mobility, social interaction, interaction capacity (ability to interact with the environment), bodily well-being, Aesthetics (sensory awareness and enjoyment of surroundings and overall perception). Two-week test-retest reliability for a subset of participants \((n = 18)\) ranged from .64 to .90 \((Mdn = .72)\). The instrument takes approximately 10 minutes to administer.

**About the plant Shankhapushpi (Convolvulus Pluricaulis):**

There are four types of variants in Shankhapushpi named as:

(i) Convolvulus Pluricaulis Choisy (family convolvulaceae).
(ii) Evolvulus alinoids Linn (family convolvulaceae)
(iii) Clitoria ternatea Linn (family Leguminaceae)
(iv) Cancova Decaussata Schutt (family Gentianaceae)

These are distributed over different parts of the country. North India is full of Convolvulus Pluricaulis. All the 4 are quite similar in their chemical constituents and in their appearance also, but not identical. In Ayurveda all the four are called Shankhapushpi. However, in the present study only Convolvulus Pluricaulis was used. Every mention of Shankhapushpi in this report writing refers to Convolvulus Pluricaulis. Following is the description of the plant:

Convolvulus Pluricaulis is a branch of about 10-12 branches reaching a length of 10-35 cm, which spread out from a central stock (Fig. 1). The branches of the plants are straight away and their circumference is about 1-2 mm, which is cylindrical and
pubescent, with a leaf and bud scars. The branches, which radiate from a point look like a rough circle.

The stem is about 10-35 cm long and 0.3 to 0.05 cm broad. The stem is very soft and densely clothed with silky hair. The leaf measures about 1.5 to 2.0 cm, rarely 2 to 2.5 cm in length and about 0.5 to 0.75 cm breath in the middle. Younger leaves are whitish green or light green, soft and pubescent and the older leaves are slightly dark green. The leaves are oppressed to the stem, alternate at an interval of 1 to 1.25 cm. Their shape is linear, thin and elliptical subsessile having trichomes on both the surfaces.

The root of the plant is about 5-8 cm long and spread in 5-7 cm wide area. It is a loosely packed bunch, with a breached brownish cork on its surface and without lateral roots. Flowering tops are abundant, with closed and twisted slightly pink color. The flower measures about 0.5 to 0.75 cm long. The shape of the flower is just like a 'conch' (Shankh). That’s why the plant is called Shankhapushpi or Shankhapushpine. Often the flowers are short, seen in the axil of a bracts either solitary or 2-3 together. Outer leaves those protect a flower are shaped as a capsule. These dry capsules release the seeds. Plenty of these types of capsules are found in the plant. The seeds are black, shiny, hard, planoconvex, about 2 mm, thick, with a slight ridge on the convex surface.

The plant of Shankhpushpi is found everywhere in India in sandy and stony areas and prefers dry climate.

Chemical constituents of Shankhapushpi

Basu and Lamsal (1947) found the presence of chloroform soluble alkaloid namely shankhapushpine in convolulus pluricaulis. This alkloid is being isolated in pure crystalline form. It is an empirical formula i.e. C$_{17}$H$_{23}$NO$_{3}$ (Basu and Dandiya, 1948).

Basu and Bhan (1951) noted the presence of C$_{17}$H$_{23}$NO$_{3}$ which is soluble in chloroform. They also observed two other water soluble bases: first was acetone – insoluble base C$_{3}$H$_{14}$NO$_{6}$, having m.p. 84°, hydrochloride m.p. 214°, picrate m.p. 176°, and the second base was an acetone soluble base. But this was not obtained in crystalline form. Two more derivatives were also prepared by them which named as base hydrochloride, having m.p. 272° and base oxalate having a relatively lower m.p. 154°.

Rakhit and Basu (1958) extracted all the solvents and analyzed left over ashes in the powder form. Total ash was 19.25% containing 12.2 of acid insoluble ash and 5.9%
Figure 3: Showing a close up flowers of Shankhapushpi (Convolutulus pluricaulis).
of water soluble ash. They noted the presence of iron, calcium, potassium, nitrate, and carbonate in the ash. They also analyzed further and found the two crystalline substances showing positive color reactions for sterols I and II having formula $C_{28}H_{50}O_2$, m.p. 124-25° and $C_{40}H_{60}O_5$, m.p. 64-65° respectively. The melting points of the acetate of sterol I and sterol II were 17°<88-89°. The substances formulation of insoluble digitonides has been stated of β-type configuration of the –OH group at 3 position of the sterols.

Whereas, Deshpande and Srivastava (1969) investigated the presence of scopoletin, D-glucose, and maltose in 1% HCl soluble portion and β-sitosterol and ceryl alcohol in nonsaponifiable part.

There is a presence of fatty acid, fatty alcohols and hydrocarbons in 95% aqueous extract of Convolvulus Pluricaulis (Srivastava and Deshpande, 1975). Maximum medicinal activities were reported in leaves and flowers of this plant i.e. convolvulus pluricalis (Mudgal et al., 1972).

To conclude, it can be said that Shankhapushpi contains small amount of sulphates, picrate, ceryl alcohol, β-sitosterol, glucose and maltose, and other components having OH as their components, iron, calcium, potassium, nitrate, carbonate etc. The presence of these contents enhances the possibility to be a neural tonic for Shankhapushpi and thus it enhances energetic level in the organism.

**Procedure of the Experiment:**

**Preparation of Shankhapushpi powder:**

The freshly plucked whole plant i.e. with roots (flowers absent) was taken for identification in the laboratory of nearby Ayurvedic institute i.e. Shri Baba Mastnath Institute of Ayurveda. Then it was also verified by various Ayurvedic experts. After that, it was washed with clean water 2-3 times so that the dust particles or any other harmful bodies do not harm. Then the plant was dried in shade (under the supervision), till the plant became brittle. These were now finely powdered, filtered and then weighed properly. The weight of each quotum was fixed 3.5 gm, as defined in the design.

**Preparation of Ordinary Powder:**

The fresh leaves of spinach and other normally edible leaves e.g. mustard, fenugreek, and coriander were collected in such a proportion that their smell was neutral. After washing the leaves, these were spread and left to be dried for some days in the sun.
When these were dried, these were powdered and filtered. Then the quotums of weight 3.5 gm were prepared.

**Actual Procedure of the Experiment**

A list of the diagnosed patients from Psychiatry, Neurology, and Medicine departments of Pt. B. D. Sharma University of Health Sciences, Rohtak was taken. The number of patients having no accompanying disease was very less. However, these patients were contacted and informed about the purpose of the experiment without revealing the actual effects of Shankhapushpi. They were simply informed that this is an exploratory study to test the effects of some herbal medicines to test if it could benefit the demented patients. They were not informed whether they will be given placebo or Shankhapushpi. A written informed consent was taken. Wherever the patient was not able to follow much, their caretakers gave the information consent in written.

After this, to complete the sample manager of Vridhasharam being run by Manav Sewa Sangh, located at Rohtak was contacted. The permission to work only in the Asharam for men was given, as the researcher is a male. Now these patients were also informed about the work to be done and a written consent was taken. Now a search of female patients was carried out in various others through personal contacts, although, number could not be equaled.

Each subject was now contacted personally and a good rapport was established. Then the S was told that he/she has to consume some powder with honey followed by a glass of milk for some days. Since it had to be a double blind study, the subject was not told about the actual content and its potential effects on him/her. The researcher also did not know about the content of the powder. The subjects were allocated to various groups by the supervisor as a confederate. After the confirmation by the subject, the task was explained to him/her so as to ensure that the subject had understood very clearly what is required from him/her. Following instructions were given:

**A. Instructions and Performance for Dementia Rating Scale-2 (DRS-2):**

The test administration was begun by completing all of the demographic information contained in the shaded box at the first page of the Scoring Booklet. Then DRS-2 was proceeded to administer.
i) Attention (ATT) Subscale

This subscale is composed of eight tasks (Tasks as in booklet: A, B, C, D, AD, AE, AH, and AJ) with a maximum of 37 points. Both auditory-visual and verbal-nonverbal tasks of attention were presented.

Task A. Digit Span

Instructions for forward digit span: “I’m going to say some numbers and when I’m through I want you to repeat the numbers in the same order... Say them just the way I did ... Say what I say.”

Instructions for backward digit span: “Now when I say some numbers I want you to say them backward... For example, if I say 1-2, you would say 2-1... Understand? ... Ready?” Now the numbers were presented at the rate of one digit per second.

Task B. Two Successive Commands

Instructions: “I’m going to give you some commands... Do what I say and then relax.” There were two commands, and both were given. The participant had to perform two things simultaneously, e.g. open your mouth, and close your eyes. Responses were recorded.

Task C. Single Command

Instructions: “I’m going to give you some commands ... Do what I say and then relax.” Here four single commands were given by the investigator and the participant had followed them.

Task D. Imitation

Instructions: “Watch me... Do what I do ... Imitate what I’m doing... Do this.” Here instead of giving commands, four items were performed by the investigator and the participant had to follow them.

ii) Initiation / Perseveration (I/P) Subscale

This subscale is composed of 11 tasks (Tasks E, F, G, H, I, J, K, L, M, N, and O) with a maximum of 37 points. This subscale assesses the participant’s ability to initiate, switch, and terminate a specific activity with fluency and without perseveration or inappropriate intrusion of a prior activity. Both oral-verbal and graphomotoric skills are assessed.
Task F. Simple Verbal Initiation / Perseveration

Instructions: “Look at me … Look at what I’m wearing … I’d like you to name all of the things I’m wearing.” It is clearly given in the manual that if the examiner is not wearing eight articles of clothing that are clearly visible, the examiner should hold at least two objects (e.g., pen, book). Besides shirt, trouser, shoes, belt, chain, and ring the investigator held two articles in his hands required to perform the task i.e. notebook and pen. Now the instructions were modified as follows: “Look at me … Look at what I’m wearing and holding… I’d like you to name all of the things I’m wearing and holding.” Prompting was allowed (e.g., yes, shirt or sweater, shoes or slipper etc.). The time limit for responses was 60 seconds. However, it was not stated to the participant. Then the responses were recorded verbatim, for one minute.

Task G. Consonant Perseveration

Instructions: “bee”… Say “key” … Say “gee” … Now say “bee-key-gee”. This was repeated four times.

Task H. Vowel Perseveration

Instructions: “bee”… Say “bah” … Say “boh” … Now say “bee-bah-boh”. This was also repeated four times.

Task I. Double Alternating Movement 1

Instructions: “Watch me… Do what I’m doing… Do this.” While demonstrating the movement (both hands out, left palm up, right palm down, switch hand positions simultaneously at a rate of once per second), “Palm up, palm down, now switch.” Demonstration was continued to the movements until it is clear that the participant understands the task. Then subject was instructed to keep doing it until asked to stop. Now five repetitions were made and the performance of the subject was recorded properly.
**Task J. Double Alternating Movements 2**

Instructions: "Now do this... Fist, fingers out, switch." Demonstration was continued to the movements until it is clear that the participant understands the task. Then "Keep doing it until I tell you to stop." Now five repetitions were made and the performance was recorded.

**Task K. Alternate Tapping**

Instructions: "Now do this... Tap left, and then right, then left, then right...Just like this." The demonstration was continued to the movements until it is clear that the participant understands the task. Then subject was asked to keep doing it until asked to stop. Ten repetitions of tap left/tap right were made and performance of the subject was recorded.

**Task L. Graphomotor Design 1**

Instructions: After giving page and a pen or pencil to the participant Card 1 was presented and instructed "Copy this entire design." The investigator pointed to entire "ramparts' design by moving finger from left to right of the design and again instructed, "Start right here" (pointing to participant’s left side of the page approximately 1 inch from top).

**Task M. Graphomotor Design 2**

Instructions: Card 2 was presented and said "Copy this (point to the circle)... Put it here" (pointing to the page approximately 1 inch below the "ramparts” reproduction).

**Task N. Graphomotor Design 3**

Instructions: Card 3 was presented and said "Copy this (point to the “X”)... Put it here” (pointing to the page approximately 1 inch below the “circle” reproduction).

**Task O. Graphomotor Design 4**

Instructions: Card 4 was presented and said “Copy these (pointing to the XOXO design) ... Put them here” (pointing to the page approximately an inch below the “X” reproduction).
iii) Construction (CONST) Subscale

This subscale is composed of six tasks (Tasks P, Q, R, S, T, and U) with a maximum of 6 points. The tasks require reproduction of stimulus designs which vary in difficulty from copying a diamond within a square to producing a signature. For this following instructions were given: “I will show you some designs. You have to draw some designs one by one as I show them to you.”

In this subject had to draw 6 construction designs from task P to task U, i.e. drawing of vertical lines, square, and diamond, and then produce a signature. Responses were recorded verbatim.

iv) Conceptualization (CONCEPT) Subscale

This subscale assesses the ability to abstract, that is, to induce similarities and detect differences among verbal and visual stimuli. Six tasks (Tasks V, W, X, Y, Z, and AB) are presented with a maximum of 39 points. The tasks vary from tests of verbal abstraction to recognition of an abstract concept.

**Task V. Identities and Oddities**

Instructions: Card 10 was presented and said “Look at these three designs ... Which two are the same ... Which are the most alike?” Now Cards 11-17 were presented with the same question. After the participant responded to Card 17, Card 10 was again presented with the instructions, “Look at these three designs ... Tell me which one is different from the others ... Which one doesn’t belong with the others?” Now Cards 11-17 were again presented with the same question.

**Task W. Similarities**

Instructions: Instructed “In what way are a ..... and a ...... alike?... How are they the same?” “For example, in what way are a mango and an orange alike? How are they the same?” Participant’s responses were recorded verbatim. If both an abstract and a concrete response were given, the participant was asked “Which is the best answer?”

**Task X. Priming Inductive Reasoning**

In this task Card 11 was presented and said “Name three things that people eat.” Participant’s answers were recorded verbatim. Now subject was asked, “How are a ...., ...., and a .... Alike? ... How are they the same?” Participant’s
responses were again recorded. If the participant could not name three things that people eat or the response was incorrect, he was prompted by saying “A sandwich, an apple, and a cookie are things that people eat.” Now the participant was asked “How are a sandwich, an apple, and a cookie alike?... How are they the same?” If the participant could not respond or stated incorrectly how the three food items are alike, he was told, “Well, a sandwich, an apple, and a cookie are all things that people eat.”

Card 12 was presented by saying “name three things that people wear.” Participant’s answers were recorded verbatim, following the same procedure.

Card 13 was presented by saying “Name three things that people ride” and the same procedure was followed.

Task Y. Differences

Instructions: “I’m going to name three things ... You tell me which one doesn’t belong with the others, which one is different.” For example ‘dog-cat-car’ was asked. The responses of the participant were recorded.

Task Z. Similarities – Multiple Choices

Instructions: For each item two objects (e.g., apple-banana) were presented and the response alternatives (e.g., both animals, both fruit, both green). “.... and .... Are they both......, both ......, or both......?” (e.g., both animals, both fruit, both green). The participant’s replies were recorded.

Task AA. Recall-Sentence Reading

Instructions: Card 18 was presented by saying “Read this sentence aloud. Remember the sentence because I’m going to ask you to repeat it later.” The sentence was read by the participant aloud. They were later asked to recall the sentence while performing the memory tasks.

Task AB. Verbal Recall-Sentence Initiation

Instructions: This task also serves as an item for recall in Task AG. Say “Make up a sentence using the words “man” and “car”... Remember this sentence also because I’m going to ask you to repeat it later.” The sentence made up by the participant was recorded. This sentence was also asked to recall later.
v) Memory (MEM) and Attention (ATT) Subscales

The Memory subscale is composed of five tasks (Tasks AC, AF, AG, AI, and AK) with a maximum of 25 points. Verbal and nonverbal items were presented in recall and recognition memory paradigms and the responses of the participant were recorded.

Task AC. Orientation (MEM)

Instructions: Items AC1-AC9 were standard orientation questions referring to day to day presence of awareness of immediate and the other social surroundings. The instructions were given as “Please answer these questions asked by me.” These were asked as in the order list in the Scoring Booklet and recorded the responses verbatim.

Task AD. Counting Distraction 1 (ATT)

Card 19 was presented by instructing “Point out and count all of the As.” The responses were recorded. Various vowels written in jumbled way were written on this card.

Task AE. Counting Distraction 2 (ATT)

Card 20, which was as Card 19, was presented by instructing in the same way “Point out and count all of the As.” This was also the similar card. The responses were recorded.

Task AF. Verbal Recall-Reading (MEM)

Instructions: “Remember the sentence that you have read some time prior, when I had asked you to remember it... Tell it to me.” The participant’s response was recorded verbatim. This refers to task AA.

Task AG. Verbal Recall-Sentence Initiation (MEM)

Instructions: Instructed “Remember the sentence you made up, when you were asked to make it?... Tell it to me.” The response of participant was recorded verbatim. This refers to task AB.

Task AH. Verbal Recognition-Presentation (ATT)

Instructions: This task serves as a presentation of items for later recognition (Task AI) and is scored as an Attention Task. Card 21 was presented to the participant after instructing “Read this list of words aloud four times so that
you will remember each word." The response given by the participant was recorded.

**Task AI. Verbal Recognition (MEM)**

Instructions: Instructed “I’m going to show you some words, two at a time… For each pair of words, you pick the one that was on the list you just read some time ago at the time of last task.” Now Cards 22 to 26 were presented, one at a time and responses were recorded.

**Task AJ. Visual Matching (ATT)**

This task presents designs for later recognition (Task AK) and is also scored as an Attention Task. Cards 27 and 28 were given by saying “The designs on this card (point to Card 28) are exactly the same as the designs on this card (point to Card 27)... When I point to a design on my card, you point to the same one on your card... Now, which design is the same as this one?” Then Card 27 and Card 28 were presented and the responses were recorded.

**Task AK. Visual Memory (MEM)**

Instructions: “I’m going to show you some designs, two at a time... For each pair of designs, choose the one we have just been working with... Point to the one you have just seen.” Then Cards 29-32 were presented, one at a time and responses were recorded verbatim.

**B. Instructions for Dementia Quality of Life Instrument (DQoL):**

“There are some statements about what have you have been doing recently.” The DQoL Performa was taken and the task was performed. Now the subscales of DQoL were presented in sequence. Wherever, the subject felt confusion, it was cleared by the researcher. The subjects respond on the following three scales:

The subjects were instructed in manner as follows:-

**Scale 1:** This first scale is about enjoying things by the subject. The five point scale asks about the degree of enjoyment i.e. enjoyed not at all, a little, some, quite a bit, or a lot. The subjects were instructed “I am going to ask you some questions about how you have been doing recently. I would like you to use this scale to answer the questions that I’m going to ask.” Then the subjects were given a full page copy of scale 1 to give the answers and the record was maintained.
Scale 2: Instruction: “This scale is about how often the individuals have had certain feelings. The five points on the scale are never, seldom, sometimes, often, or very often.” Then the subjects were instructed in same manner as for scale 1, and scale 2 was presented. Now the subjects were given a full page copy of scale 2 to give the answers and the responses were recorded.

Scale 3: scale 3 consisted of only one question i.e. ‘Overall- How would you rate your quality of life?’ The subjects were given this question top reply on the following five point scale: bad, fair, good, very good, or excellent.

These three scales present a view of five aspects of quality of life i.e. self-esteem, positive affect, negative affect, feeling of belonging, and sense of aesthetics.

As it was a double-blind study, therefore, a confederate was arranged to decide the treatment to be given to each S. After the completion of the administration of both the scales a fixed quantity of powder i.e. 3.5 gm of Shankhapushpi powder mixed with honey was given to the experimental groups and 3.5 gm of ordinary powder mixed with honey was given to the control groups. All the Ss had to take a glass of milk after the dose daily.

After completion of 2 months of treatment a post test was taken on the same scales i.e. DRS-2, DQoL. The treatment was continued. Again another post testing was done after completion of 4 months of treatment on same scales. Then, the treatment was stopped. Overall, the Ss were tested three times i.e. once before giving the treatment, secondly after completing 2 months and thirdly after completing 4 months.

After performing the task the scoring was done with the help of manual after every test and the data was tabulated for analysis. The groups were differentiated with the help of confederate.