

International Journal of Research in Indian Medicine

Comparative clinical study of *Kushmanda ghrita* and *Yashti ghrita* *Pratimarsha nasya* as memory booster

Waghmare Deepali^{1*}, Nakade Mamata²

1. PG Scholar,

2. Professor and HOD

Dept. of Panchakarma, Dr. D.Y. Patil College of Ayurveda & Research centre,
Pimpri, Pune, Maharashtra, India

*Corresponding author: Email id - dipalee.waghmare@gmail.com

Abstract: Memory is one of the fundamental processes of brain, without it we are capable of nothing but simple reflexes and stereotyped behaviours. It is retention of information over time influencing future acts and is most important aspect to differentiate from one individual from other as human beings, recognizing individual self. Thousands of years of wisdom filled Ayurveda, one of the main Indian medicine systems, described *Medhya rasaynas*, special herbs which acts exclusively on human brain. *Kushmanda* and *Yashti* are two of many other *medhya rasaynas* mentioned in these ancient texts. *Go ghrita* is also known for its *medhya* property; therefore compound of these drugs is used in this study. *Nasya*, one of main Panchakarma therapy, acts on head and neck related disorders, is applied here. Since *medhya rasayna* acts on brain, its comparative effect as memory boosting is evaluated. Healthy volunteer between age group of 20-40 years were selected for this study. As a result both *Kushmanda ghrita* and

Yashtighrita were found to be equally effective as memory boosters.

Keywords:

Panchakarma, Pratimarsha nasya, Medhya rasayana, Kushmanda ghrita, Yashti ghrita, Memory, PGI memory scale.

Introduction:

Right from the beginning of human civilization, the interest of the humans has been in conquering all aspects of life. Since Vedic period, all sages have been focused on understanding and in controlling the psychological conditions in human beings. For the successful survival of man in this competitive world, there is a need for promotion of psychological health and management of various psychological and psychosomatic problems. Brain is the organ that is responsible for what we call the mind. It is the basis for thinking, feeling, perceiving, learning, memory, curiosity and behaviour.

Memory is one of the fundamental processes of brain. It is nothing but

retention of information over time for influencing future acts. It is perhaps the most vital aspects that differentiate humans. Poor Memory, lower retention and slow recall and are common problems in today's stressful and competitive world with laterally occurring negative emotions that may led to memory loss, amnesia, anxiety, high blood pressure, dementia, to more ominous threat like schizophrenia and Alzheimer's diseases and in that case the person is not able to make full use of his or her potentials.

In processing perspective, there are three main stages in the formation and retrieval of memory by:

- 1- Encoding
- 2- Storage
- 3- Retrieval, Recall or Recognition.

All three of these processes determine whether something is remembered or forgotten. Modification in daily life due to technological advances and busy life schedule does not permit a person in indulging some basic health preserving procedures. Moreover, in our day-to-day life due to addictions such as tobacco, alcohol, irregular food habits, sleeping disturbance, suppression of natural urges, stress, depression, night awakening & day sleeping, increased levels of environmental pollution, etc. All of these ultimately affect the cognitive function of brain leading to forgetfulness and further memory related disorder. *Medhya rasayana* like *Kushmanda* and *Yashti* can be used in panchakarma, especially in *Nasya* therapy for its cognitive function. This study will be helpful in further research of medicinal formulation like

this i.e. single drug study to enhance memory.

AIM:

To observe and compare changes in memory with *Pratimarsha nasya* of *Kushmanda ghrita* and *Yashti ghrita*.

1. To study concept of Memory according to Ayurveda.
2. To study the concept of Memory according to Allopathy.
3. To study the concept of Nasya and Pratimarsha nasya.
4. To evaluate efficacy of Pratimarsha nasya with Kushmanda ghrita for memory boosting.
5. To evaluate efficacy of Pratimarsha nasya with Yashti ghrita for memory boosting.

Material and Methods:

60 healthy volunteers were selected randomly, within the age group of 20-40 yrs, from OPD of Dr. D. Y. Patil College of Ayurveda & Research centre, Pimpri, Pune, irrespective of sex, occupation and socio-economic status.

Volunteers were equally divided between group A and group B. Each group contained 30 volunteers.

Drugs used in this study were made in college pharmacy following quality control protocols.

SELECTION OF SUBJECTS- INCLUSION CRITERIA:

- 1) Healthy volunteers willing to enhance their memory capacity.
- 2) Sex: Male / Female
- 3) Age: 20 to 40 Years.
- 4) Healthy volunteer who gave written consent.

5) Healthy volunteer fit for nasya.

EXCLUSION CRITERIA:

- 1) Healthy Volunteer having age less than 20 years & above 40 years.
- 2) Patient contraindicated for Nasya according to Ayurveda.
- 3) Diabetes, cardiovascular, renal diseases or any other disease affecting multiple body systems.
- 4) Pregnant woman and woman in Post partum stage.

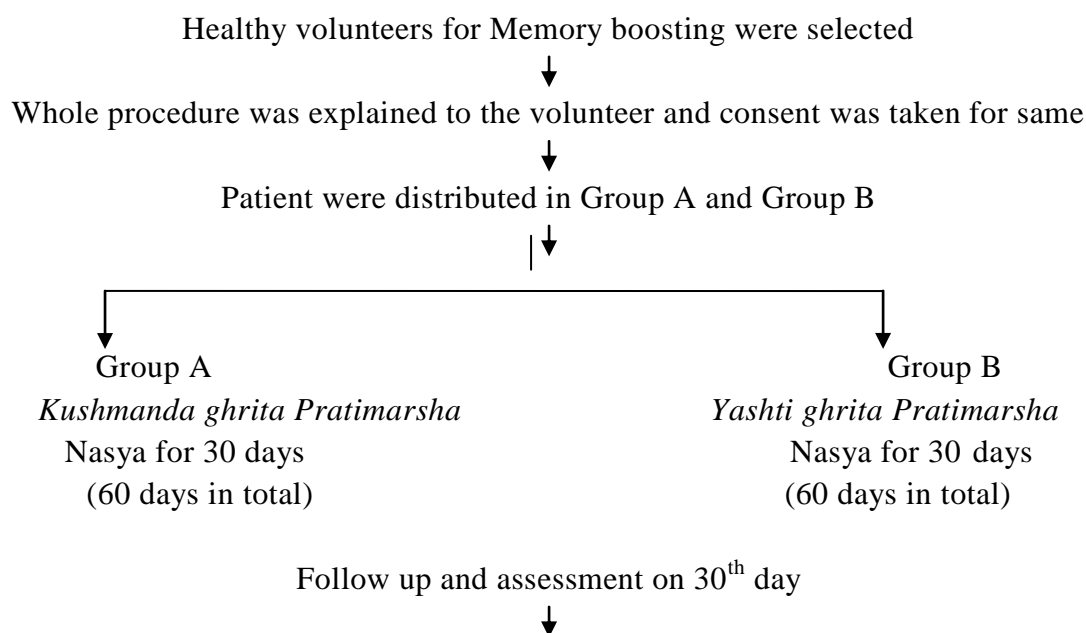
DRUG ADMINISTRATION:

WITHDRAWAL CRITERIA:

- 1) Occurrence of serious adverse events.
- 2) When investigator felt that the protocol has been violated.
- 3) Healthy volunteers absent for continuous 2 days were considered dropped out.
- 4) Volunteers who were not willing to continue the trial.

| Title | Group A | Group B |
|---------------------|---|---|
| Therapy | Pratimarsha nasya | Pratimarsha nasya |
| Dose | 2 drops per nostril | 2 drops per nostril |
| Kala | Twice a day, post meals | Twice a day, post meals |
| Duration of therapy | 60 days | 60 days |
| Follow up | 30 th and 60 th day | 30 th and 60 th day |
| Material of therapy | <i>Kushmanda ghrita</i> | <i>Yashti ghrita</i> |

STUDY DESIGN:



International Journal of Research in Indian Medicine

Final follow up and assessment on 60th day



Statistical analysis of assessed data



Discussion



Conclusion

CRITERIA OF ASSESMENT:

PGI memory scale was used to assess memory of volunteers by scoring pattern. It consists of 10 sub tests with maximum score as follows:

| Serial number | Sub tests | Maximum score |
|---------------|-----------------------------|---------------|
| 1 | Remote memory | 8 |
| 2 | Recent memory | 5 |
| 3 | Mental balance | 9 |
| 4 | Attention and concentration | 28 |
| 5 | Delayed recall | 10 |
| 6 | Immediate recall | 12 |

| | | |
|----|-------------------------------|----|
| 7 | Retention of similar pairs | 5 |
| 8 | Retention of dissimilar pairs | 15 |
| 9 | Visual retention | 13 |
| 10 | Recognition | 10 |

Observation:

Observations were made by using statistical analysis with Wilcoxon signed ranks test to calculate changes within each single drug, before and after treatment and Mann Whitney test to calculate change comparatively between two drugs.

1) Remote Memory -

| Remote Memory | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|---------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 7.40 | 0.675 | 7.90 | 0.305 | 6.8 | 3.638 | <0.001 HS |
| Group-B | 7.43 | 0.504 | 7.93 | 0.254 | 6.7 | 3.873 | <0.001 HS |

| Remote Memory | Mean difference score | Sd | Mann-Whitney Z | P |
|---------------|-----------------------|-------|----------------|--------------|
| Group-A | 0.50 | 0.572 | 0.127 | 0.899 |
| Group-B | 0.50 | 0.509 | | |

International Journal of Research in Indian Medicine

Group A: Mean score before treatment is 7.40 and after treatment is 7.90. The change in percentage is 6.8 which is highly significant.

Group B: Mean score before treatment is 7.43 and after treatment is 7.93. The change in percentage is 6.7 which is highly significant.

2) Recent Memory:

| Recent memory | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|---------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 4.20 | 0.484 | 4.90 | 0.305 | 16.7 | 4.583 | <0.001 HS |
| Group-B | 4.10 | 0.481 | 4.77 | 0.430 | 16.3 | 4.472 | <0.001 HS |

| Recent memory | Mean difference score | Sd | Mann-Whitney Z | P |
|---------------|-----------------------|-------|----------------|-------|
| Group-A | 0.70 | 0.466 | 0.275 | 0.783 |
| Group-B | 0.67 | 0.479 | | |

Group A: Mean score before treatment is 4.20 and after treatment is 4.90. The change in percentage is 16.7 which is highly significant.

Group B: Mean score before treatment is 4.10 and after treatment is 4.77. The change in percentage is 16.3 which is highly significant.

3) Mental Balance:

| Mental Balance | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|----------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 6.50 | 1.042 | 7.93 | 0.640 | 22.0 | 4.594 | <0.001 HS |
| Group-B | 5.97 | .718 | 7.27 | 0.691 | 21.8 | 4.786 | <0.001 HS |

| Mental Balance | Mean difference score | Sd | Mann-Whitney Z | P |
|----------------|-----------------------|-------|----------------|-------|
| Group-A | 1.43 | 0.774 | 0.919 | 0.358 |
| Group-B | 1.30 | 0.596 | | |

Group A: Mean score before treatment is 6.50 and after treatment is 7.93. The

change in percentage is 22 which is highly significant.

International Journal of Research in Indian Medicine

Group B: Mean score before treatment is 5.97 and after treatment is 7.27. The

change in percentage 21.8 which is highly significant.

4) Attention and concentration:

| Attention and Concentration | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|-----------------------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 14.10 | 2.310 | 16.53 | 2.675 | 17.2 | 4.822 | <0.001 HS |
| Group-B | 11.90 | 1.423 | 13.50 | 1.408 | 13.4 | 4.902 | <0.001 HS |

| Attention and Concentration | Mean difference score | Sd | Mann-Whitney Z | P |
|-----------------------------|-----------------------|-------|----------------|-----------|
| Group-A | 2.43 | 1.165 | 2.996 | 0.003 Sig |
| Group-B | 1.60 | 0.621 | | |

Group A: Mean score before treatment is 14.10 and after treatment is 16.53. The change in percentage is 17.2 which is highly significant.

Group B: Mean score before treatment is 11.90 and after treatment is 13.50. The change in percentage is 13.4 which is highly significant.

5) Delayed recall:

| Delayed Recall | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|----------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 9.20 | 0.805 | 9.80 | 0.407 | 6.5 | 4.025 | <0.001 HS |
| Group-B | 9.07 | 0.640 | 9.90 | 0.305 | 9.2 | 4.456 | <0.001 HS |

| Delayed Recall | Mean difference score | Sd | Mann-Whitney Z | P |
|----------------|-----------------------|-------|----------------|-------|
| Group-A | 0.60 | 0.563 | 1.519 | 0.129 |
| Group-B | 0.83 | 0.592 | | |

Group A: Mean score before treatment is 9.20 and after treatment is 9.80. The

change in percentage is 6.5 which is highly significant.

International Journal of Research in Indian Medicine

Group B: Mean score before treatment is 9.07 and after treatment is 9.90. The

change in percentage is 9.2 which is highly significant.

6) Immediate recall:

| Immediate Recall | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|------------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 9.97 | 0.490 | 11.03 | 0.669 | 10.6 | 4.725 | <0.001 HS |
| Group-B | 10.07 | 0.521 | 11.30 | 0.535 | 12.2 | 4.710 | <0.001 HS |

| Immediate Recall | Mean difference score | Sd | Mann-Whitney Z | P |
|------------------|-----------------------|-------|----------------|-------|
| Group-A | 1.07 | 0.583 | 1.096 | 0.273 |
| Group-B | 1.23 | 0.626 | | |

Group A: Mean score before treatment is 9.97 and after treatment is 11.03. The change in percentage is 10.6 which is highly significant.

Group B: Mean score before treatment is 10.07 and after treatment is 11.30. The change in percentage is 12.2 which is highly significant.

7) Verbal retention of similar pairs:

| Verbal retention of Similar pairs | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|-----------------------------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 4.70 | 0.466 | 5.00 | 0.000 | 6.4 | 3.000 | 0.003 Sig |
| Group-B | 4.97 | 0.183 | 5.00 | 0.000 | 0.6 | 1.000 | 0.317 |

| Verbal retention of Similar pairs | Mean difference score | Sd | Mann-Whitney Z | P |
|-----------------------------------|-----------------------|-------|----------------|-----------|
| Group-A | 0.30 | 0.466 | 2.748 | 0.006 Sig |
| Group-B | 0.03 | 0.183 | | |

Group A: Mean score before treatment is 4.70 and after treatment is 5.00. The change in percentage is 6.4 which is significant.

Group B: Mean score before treatment is 4.97 and after treatment is 5.00. The change in percentage is 0.6.

8) Verbal retention of dissimilar pairs:

International Journal of Research in Indian Medicine

| Verbal Retention of Dissimilar pairs | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|--------------------------------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 13.43 | 1.382 | 14.93 | 0.254 | 11.2 | 4.011 | <0.001 HS |
| Group-B | 13.53 | 1.408 | 14.70 | 0.651 | 8.6 | 3.477 | 0.001 Sig |

| Verbal Retention of Dissimilar pairs | Mean difference score | Sd | Mann-Whitney Z | P |
|--------------------------------------|-----------------------|-------|----------------|-------|
| Group-A | 1.50 | 1.306 | 1.096 | 0.273 |
| Group-B | 1.17 | 1.315 | | |

Group A: Mean score before treatment is 13.43 and after treatment is 14.93. The change in percentage is 11.2 which is highly significant.

Group B: Mean score before treatment is 13.53 and after treatment is 14.70. The change in percentage 8.6 which is significant.

9) Visual retention:

| Visual retention | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|------------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 11.77 | 0.817 | 12.53 | 0.681 | 6.5 | 4.413 | <0.001 HS |
| Group-B | 11.27 | 0.828 | 12.07 | 0.785 | 7.1 | 4.347 | <0.001 HS |

| Visual retention | Mean difference score | Sd | Mann-Whitney Z | P |
|------------------|-----------------------|-------|----------------|-------|
| Group-A | 0.77 | 0.568 | 0.181 | 0.857 |
| Group-B | 0.80 | 0.610 | | |

Group A: Mean score before treatment is 11.77 and after treatment is 12.53. The change in percentage is 6.5 which is highly significant.

Group B: Mean score before treatment is 11.27 and after treatment is 12.07. The change in percentage is 7.1 which is highly significant.

10) Recognition:

| Recognition | BT | | AT | | % Improvement | Wilcoxon Signed Ranks | P |
|-------------|------|----|------|----|---------------|-----------------------|---|
| | Mean | Sd | Mean | Sd | | | |

International Journal of Research in Indian Medicine

| | score | | score | | | Test Z | |
|---------|-------|-------|-------|-------|-----|--------|-----------|
| Group-A | 8.87 | 0.900 | 9.57 | 0.626 | 7.9 | 4.379 | <0.001 HS |
| Group-B | 8.47 | 0.860 | 9.23 | 0.568 | 9.0 | 4.300 | <0.001 HS |

| Recognition | Mean difference score | Sd | Mann-Whitney Z | P |
|-------------|-----------------------|-------|----------------|-------|
| Group-A | 0.70 | 0.535 | 0.182 | 0.856 |
| Group-B | 0.77 | 0.679 | | |

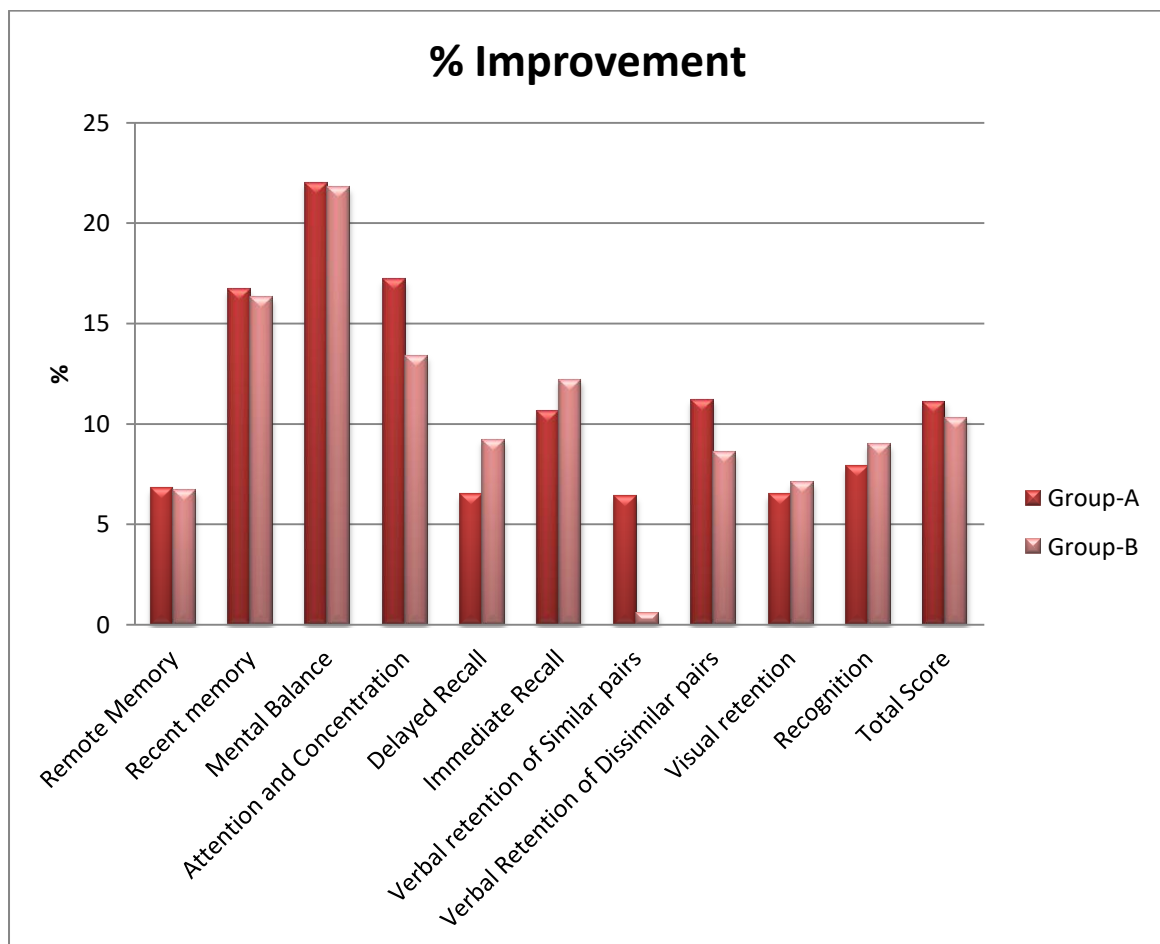
Group A: Mean score before treatment is 8.87 and after treatment is 9.57. The change in percentage is 7.9 which is highly significant.

Group B: Mean score before treatment is 8.47 and after treatment is 9.23. The change in percentage is 9.0 which is highly significant.

11) Change in Memory (Total score):

| Total score | BT | | AT | | % Improvement | Wilcoxon Signed Ranks Test Z | P |
|-------------|------------|-------|------------|-------|---------------|------------------------------|-----------|
| | Mean score | Sd | Mean score | Sd | | | |
| Group-A | 90.13 | 6.367 | 100.13 | 4.890 | 11.1 | 4.795 | <0.001 HS |
| Group-B | 86.77 | 3.256 | 95.67 | 2.631 | 10.3 | 4.797 | <0.001 HS |

| Total score | Mean difference score | Sd | Mann-Whitney Z | P |
|-------------|-----------------------|-------|----------------|-------|
| Group-A | 10.00 | 2.491 | 1.872 | 0.061 |
| Group-B | 8.90 | 2.218 | | |



roup A: Mean score before treatment is 90.13 and after treatment is 100.13. The change in percentage is 11.1 which is highly significant.

Group B: Mean score before treatment is 86.77 and after treatment is 95.67. The change in percentage is 10.3 which is highly significant.

12) Memory overall test scores:

| Sub-tests | % Improvement | |
|--------------------------------------|---------------|---------|
| | Group-A | Group-B |
| Remote Memory | 6.8 | 6.7 |
| Recent memory | 16.7 | 16.3 |
| Mental Balance | 22.0 | 21.8 |
| Attention and Concentration | 17.2 | 13.4 |
| Delayed Recall | 6.5 | 9.2 |
| Immediate Recall | 10.6 | 12.2 |
| Verbal retention of Similar pairs | 6.4 | 0.6 |
| Verbal Retention of Dissimilar pairs | 11.2 | 8.6 |

International Journal of Research in Indian Medicine

| | | |
|-------------------------|------|------|
| Visual retention | 6.5 | 7.1 |
| Recognition | 7.9 | 9.0 |
| Total Score | 11.1 | 10.3 |

13) Overall effect (Comparative effect between Group A and Group B):

| Overall Effect | No. of cases | |
|------------------------------|--------------|---------|
| | Group-A | Group-B |
| No change (<25%) | 30 | 30 |
| Mild change (25% – 49.9%) | | |
| Moderate change (50% -74.9%) | | |
| Good change (75% +) | | |

Comparatively, with statistical analysis, overall memory effect between group A and group B is not significant.

Result:

Based on observations made in the clinical study, the following conclusions can be drawn.

- Both *Kushmanda ghrita* and *Yashti ghrita pratimarsha nasya* individually shows highly significant result in Remote memory, Recent memory, Mental balance, Attention and concentration, Delayed recall, Immediate recall, Visual retention, Recognition and overall memory score.
- Kushmanda ghrita pratimarsha nasya* shows significant result in verbal retention of similar pairs and highly significant result in verbal retention of dissimilar pairs.
- Yashti ghrita pratimarsha nasya* shows significant result in verbal retention of dissimilar pairs and non significant result in verbal retention of similar pairs.

- Comparatively, *Kushmanda ghrita pratimarsha nasya* and *Yashti ghrita pratimarsha nasya* shows significant results in attention and concentration and verbal retention of similar pairs. Hence *Kushmanda ghrita pratimarsha nasya* boosts these sections of memory compare to *Yashti ghrita*.
- Apart from memory changes, majority of volunteers also notified general feeling of refreshment, loss or decreased hair fall and diminish greying of hair.
- Finally, to conclude this study, according to overall effect on memory, statistically no significant result was found, that is *Pratimarsha nasya* of both *Kushmanda ghrita* and *Yashti ghrita* are equally effective as memory booster.

Discussion:

Present lifestyle of youth as well as other age groups, with lack of exercising and insufficient physical work due to increase in luxurious settlement along with increasing stressful life with

competitive world is affecting psychological health of humans. This is impacting cognitive function, in this context hampering memory. Preventive as well as curative measures should be taken to tackle this before such stage of forgetfulness leads to grave diseases like dementia.

Panchakarma therapy of Ayurveda is bio purification method to remove and balance vitiated *doshas* to prevent and treat diseases. *Nasya* is one of panchakarma therapy which deals with head and neck related disorders. Hence in this study Pratimarsha nasya is used, for memory enhancement, which can be given daily to patients for longer duration without any ill effects owing to its small dosage. Due to *medhya* properties of *Kushmanda* and *Yashti*, these drugs along with *Go ghrita* were used. Action of *Snehana Nasya* karma it could be hypothesized that it acts on local as well as on systemic levels by the direct contact with the nerve terminals by uptake of the drugs through nasal mucosa. *Nasya dravya* reaches the *Shringataka* marma of head which is *Sira Marma* and formed by the *Sira* of *Nasa*, *Akshi*, *Kantha* and *Shrotra*. The drug spread by the same route and removes vitiated *dosha* of *Urdhwajatru* that is head and neck region, and excretes them. In this context, Sushruta clarified that *Shringataka marma* is a *Sira marma* formed by the union of *Sira* supplying to nose, ear, eyes and tongue. Therefore drugs can enter in above mentioned *Sira*, which is administered in nasal route and pacify the *Doshas*.

Conclusions:

Kushmanda ghrita and *Yashti ghrita pratimarsha nasya* are equally effective as memory booster.

References:

1. Dr. Ganesh K Garde, Saartha Vagbhata, Marathi translation, Chaukhamba surabharati prakashan, Varanasi, reprint 2009.
2. Brahmanand Tripathi, Astang Hriday, Chaukhamba Samskrit Pratistan, Delhi, reprint 2009.
3. Dr. Haridas Kasture, Ayurvediya Panchakarma vinyan Ilahabad: Shri. Baidyanath Ayurved Bhavan, 2007 , 10th Edition.
4. Shree.Vaidya Shankarlalji Jain:VANGASEN; Hindi commentary, by Khemraj Shri Krishna Das Prakashan, Mumbai Edition 2003
5. Bramhanand Tripathi, Charaka samhita, Hindi commentary, by Chaukhamba Surabharati Prakashan, Varanasi, Edition: 2011, Vol. 1
6. Bramhanand tripathi, Charaka samhita, Hindi commentary, by Chaukhamba Surabharati Prakashan, Varanasi, Edition: 2011, Vol. 2
7. Dr. Vasant C. Patil, Principles and Practice of Panchakarma; Chaukhamba Publications, New Delhi, Edition – 4, 2014
8. Mahajan B.K., Methods in Biostatistics, Jaypee brother, New Delhi: Medical Publisher (P) Ltd, Edition – 6.
9. Chaurasia B. D., Human Anatomy, Edition – 5, 2010, Vol. 3

10. Sastry J. L. N., Illustrated Dravyaguna Vijnana, Chaukhamba Orientalia, Varanasi, Edition: 2012.
11. Thripathi Ravidatta, ASHTANG SANGRAHA: Hindi commentary, by Chaukhamba Sanskrit Pratishthan, Delhi and Edition: 2001
12. Abhinava manas roga vigyana – Dr. Rajendra Bhatnagar, Reprint 2008.
13. Bhavaprakas Nighantu; by Acharya Bhava Mishra with Hindi commentary by K. Chunecker, 7th Edition, Chaukhambha Amar Bharati, Varanasi (1989).
14. Bhavprakash by Bhavmishra, Chaukhambha Orientalia, Varanasi
15. Dr.C.R. Agnives, Concept of mind, Vaidya Ratnam Ayurved College, Kottakkal.
16. Satya Pal Gupta, Psychopathology in Indian medicine; Chaukhamba Sankrit Prakasan, Delhi.
17. Manoj Shamkuvar, Panchakarma Samgraha, Shri Dhanwantari book publisher, 4th edition, 2019
18. Astanga Hrudaya Volume-I and Volume-II (1991): English translation and notes by K. R. Srikant Murthy Krishndas Acedamy, Varanasi.
19. Ahuja niraj (2002) 5th edition – a short text book of psychiatry.
20. Arthur C. Guyton, Text Book of Medical Physiology, Reprint 2010.
21. Dr. Vasant Patil, Essentials of practical Panchakarma therapy, Chaukhamba publications, Reprint 2019
22. Acharya Priyavata Sharma, Dravyaguna Vigyan, vol. II, Chaukhambha Bharati Academy, Varanasi, reprint 2009.
23. Pu. La. Kantikar, 7th edition, reprint, 2011.

Ethical committee permissions details:
Ethical committee reference number by Institutional Ethical Committee- AY/PG/035/2018-19/IEC

Cite this article:

*"Comparative clinical study of Kushmanda ghrta and
Yashti ghrta Pratimarsha nasya as memory booster."
Waghmare Deepali, Nakade Mamata*

Ayurline: International Journal of Research In Indian Medicine 2020; 4 (2) : 1-13