



Age Associated Cognitive Decline In Different Prakritis

Dr. Nitesh Gupta¹, Dr Rashmi Tiwari²

¹B.A.M.S MD (Ay)

Assistant Professor, Dept. of kriya Sareera Govt. Ayurveda College, Vadodara

Email: - drniteshgupta02@gmail.com

&

²B.A.M.S MD (Ay)

Assistant Professor, Dept. of Agadatantra, Govt. Ayurveda College, Vadodara

Email: - ursrashmi07@gmail.com

ABSTRACT: - Background & Objectives: - Because of increasing life expectancy and falling death rate, the population of world is becoming older. The number of aged persons increased and Geriatrics complaint like dementia, MCI, Alzheimer's demands more medical attention. Changes in cognitive abilities are part of normal ageing process. There are of course individual differences in the age at which cognitive state begins to decline as well as in the rate at which these losses takes place. Understanding the genetic make up of an individual is the key to personalized therapy. Hence it becomes necessary to categorize individuals on the basis of broad phenotypic clusters. *Prakriti* has genetic connotation that could provide a tool for classifying human population based on broad phenotype. So now at this moment this study is carried out to evaluate the cognitive functions in different *Prakritis* with respect to ageing and to analyze and interpret the study results with modern medicine and *Ayurveda* perspective to formulate useful guideline.

Keywords: - Cognitive Functions, Ageing, Genes, *Prakriti*

INTRODUCTION

Changes in cognitive abilities are part of normal ageing process. There are of course individual difference in the age at which cognitive and intelligence state begin to decline as well as the rate at which this loss takes place.¹ Throughout life our mental capacity and brain functions are under continuous alteration, regardless of health, sickness or injury, some changes are part of positive development while others are debilitating. Ageing was recently described as a neurocastrophe, involving increased oxidative stress, disturbed energy homeostasis, accumulation of damage proteins and lesions in nucleic acid, making ageing the primary risk factor for development of neurodegenerative disease.² Fortunately, progress has been made in understanding of factors underlying individual difference in cognitive and brain ageing and rapid rise of knowledge and technology in molecular genetics endeavor to identify the genes in the CNS that influence human brain and cognition. Genomic variations, such as single nucleotide polymorphism (SNPs) give rise to rich phenotype variation, holding the promise to substantially increase the understanding of the biology of brain and cognitive ageing. Over the past 25 years, psychologists have documented many changes that occur in cognitive functions with age. But they have not succeeded till now in their attempt to discover a single fundamental cognitive mechanism that may control all the age related impairments. Modern medicine has developed based on general principle of physiology, pathology, diagnostic and treatment. On the other hand, *Ayurveda* upholds individual physiology, pathology, diagnostic and personalized therapy. Hence it becomes necessary to categorize individuals on the basis of broad phenotypic clusters. Here *Ayurvedic* approach of *Prakriti* comes into play.³

MATERIAL & METHODS

RESEARCH QUESTION

- Is there any significant difference in cognitive functions of different *Prakritis* with respect to ageing process

AIMS & OBJECTIVE

- To evaluate the cognitive functions in different *Prakritis* with respect to ageing.

- To analyze and interpret the study results with modern and Ayurvedic perspective and to formulate useful guidelines

HYPOTHESIS

- Null hypothesis: - There is no significant difference in cognitive functions of different *prakritis* with respect to ageing.
- **Alternate hypothesis** :- There is significant difference in cognitive functions of different *prakritis* with respect to ageing

TYPE OF STUDY

- Analytical study (Observational study).

SOURCE OF DATA

- Government Ayurveda college and hospital, Pariyaram , kannur

INCLUSION CRITERIA

- Healthy individuals of age groups between 50-60 years
- Healthy individuals with educational level 0-10 standard
- Both sexes

EXCLUSION CRITERIA

- Individuals with congenital defects
- Individuals with hormonal imbalance
- Individuals with chronic illness
- Individuals of higher education
- Psychic disorders

RESEARCH DESIGN

This observational study was conducted in Govt. Ayurveda College Hospital, Pariyaram, Kannur District, Kerala under the department of Kriya sareera. The study was conducted by selecting and registering randomly healthy subjects being the workers, staff and by standers from kannur Ayurveda College and hospital and among healthy subjects from kannur district, chosen by the survey undertaken. Individuals were selected on a regular basis satisfying inclusion and exclusion criteria. Total 200 samples of different *prakritis* are collected and divided in to four groups based on age and education. Each group includes 50 individuals.

- Group 1 was age between 50-55 years with education standard 0-5.
- Group 2 was age between 50-55 years with education standard 6-10.
- Group 3 was age between 56-60 years with education standard 0-5.
- Group 4 was age between 56-60 years with education 6-10.

The *prakriti* of individuals in each group were assessed based on the questionnaires.^{4,5,6} After attaining reliable results their cognitive functions are assessed based on Mini-Mental scale examination.⁷ The demographic data of each individual was collected. The other relevant data like personal records, vital data, clinical findings, dietary habits, bowel and bladder history, findings of *Dasavidha pareekshya bhavas* and *Astavidha parikshya bhavas*, etc, were assessed. After evaluation of *prakriti* and cognitive functions in all Groups, groups were compared on the basis of age.

- Group 1 was compared with Group 3
- Group 2 was compared with Group 4.

The study results were subjected to statistical evaluation using statistical software for analysis and interpretation.

- For analysis of significant difference between different *prakritis* ANOVA method was applied.
- For comparison of different *prakritis* in respect to each other Post Hoc Tests was applied.
- For comparison of each *prakritis* in different groups, independent t test was applied and the results were obtained.
- Lastly valid conclusions were made.

OBSERVATION

Comparison of total cognitive function between different groups

Group	Mean	N	S.D
Group 1	24.5	50	2.3
Group 2	26.94	50	1.97
Group 3	21.84	50	2.66
Group 4	24.3	50	2.58
Total	24.4	200	2.99
f = 37.904, p < 0.001			

Comparison of total cognitive functions between different occupations

Occupation	Mean	N	S.D
Sedentary	20.5	4	2.89
Sed.& mental strain	25.39	31	2.55
Physical strain	23.73	91	3.31
Mental & physical strain	25.01	74	2.37
Total	24.4	200	2.99
f = 6.492, p < 0.001			

Comparison of total cognitive function between different socioeconomic status

Socioeconomic status	Mean	N	S.D
Below	22.55	38	3.29
Moderate	24.72	143	2.71
Above	25.63	19	2.93
Total	24.4	200	2.99
f = 10.656, p < 0.001			

Comparison of total cognitive function between different income distributions

Income	Mean	N	S.D
> 25000	28	1	0
13000-25000	26	21	2.79
5000-12999	24.89	117	2.5
<5000	22.84	61	3.29
Total	24.4	200	2.99
F = 10.451, P < 0.001			

Comparison of total cognitive function between different educational level

Education	Mean	N	Std. Deviation
0-5 std	23.17	100	2.81
6-10 std.	25.62	100	2.64
Total	24.4	200	2.99
t = 6.350, p < 0.001			

Comparison of total cognitive functions between age distributions

Age	Mean	N	S.D
50-55	25.72	100	2.46
56-60	23.07	100	2.89
Total	24.4	200	2.99
t = 6.991, p < 0.001			

Comparison of total cognitive function between sex distributions

Sex	Mean	N	S.D
Male	24.73	126	2.71
Female	23.82	74	3.35
Total	24.4	200	2.99
t = 2.089, p < 0.05			

Comparison of total cognitive function between different prakritis

Prakriti	Mean	N	S.D
Vata	24.93	27	1.77
Pitta	25.67	27	1.94
Kapha	21.15	34	2.86
Vatapitta	25.65	37	2.55
Pittakapha	24.22	37	2.69
Vatakapha	22.85	20	2.3
Sama	27.33	18	1.81
Total	24.4	200	2.99
F = 19.63, p < 0.001			

Orientation score in relation to different prakritis

Prakriti	Mean	N	S.D
Vata	8.59	27	0.89
Pitta	8.81	27	0.92
Kapha	6.85	34	1.05
Vatapitta	8.73	37	0.96
Pittakapha	8.24	37	1.21
Vatakapha	7.75	20	1.07
Sama	9.22	18	0.65
Total	8.26	200	1.23
F = 18.03, p < 0.001			

Registration score in relation to different prakritis

Prakriti	Mean	N	S.D
Vata	2.81	27	0.4
Pitta	2.93	27	0.27
Kapha	2.5	34	0.51
Vatapitta	2.89	37	0.31
Pittakapha	2.89	37	0.31
Vatakapha	2.45	20	0.51
Sama	3	18	0
Total	2.79	200	0.41
F = 8.789, p < 0.001			

Attention & calculation score in relation to different prakritis

Prakriti	Mean	N	S.D
Vata	3.22	27	0.51
Pitta	3.22	27	0.64
Kapha	2.5	34	1.05
Vatapitta	3.41	37	0.93
Pittakapha	2.95	37	1
Vatakapha	2.95	20	0.76
Sama	4	18	0.84
Total	3.13	200	0.94
F = 7.231, p < 0.001			

Recall score in relation to different prakritis

Prakriti	Mean	N	S.D
Vata	2.22	27	0.42
Pitta	2.41	27	0.57
Kapha	1.85	34	0.74
Vatapitta	2.59	37	0.6
Pittakapha	2.24	37	0.68
Vatakapha	1.9	20	0.31
Sama	2.56	18	0.62
Total	2.25	200	0.65
F = 6.751, p < 0.001			

Language score in relation of different prakritis

Prakriti	Mean	N	S.D
Vata	8.07	27	0.47
Pitta	8	27	0.48
Kapha	7.29	34	0.97
Vatapitta	8.19	37	0.7
Pittakapha	7.92	37	0.76
Vatakapha	7.75	20	0.55
Sama	8.56	18	0.51
Total	7.94	200	0.76
F = 8.651, p < 0.001			

- Group 1 was compared with Group 3

Prakriti	Group 1 50-55 years, 0-5 edu.			Group 3 56-60 years, 0-5 edu.			t value	p value
	M	N	S.D	M	N	S.D		
VATA	25.38	8	0.92	23	7	0.82	5.265	0.001
PITTA	25.75	8	1.67	23.50	6	1.38	2.680	0.05

KAPHA	21.13	8	2.17	18.91	11	1.64	2.543	0.05
VP	25.67	9	1.80	23.50	8	1.93	2.395	0.05
PK	24	6	0.89	21.38	8	2.88	2.141	0.05
VK	23.43	7	1.40	20.33	6	1.51	3.844	0.05
SAMA	27	4	0.82	25.52	4	1.50	2.049	0.05

- Group 2 was compared with Group 4.

Prakriti	Group 2 50-55 years,6-10ed			Group 4 56-60 years, 6-10edu			t value	p value
	M	N	S.D	M	N	S.D		
VATA	27.20	5	1.30	24.71	7	1.38	3.144	0.001
PITTA	28	6	0.89	25.43	7	0.79	5.519	0.001
KAPHA	24.75	8	1.39	20.57	7	2.44	4.150	0.001
VP	28.40	10	1.35	24.60	10	2.17	4.701	0.001
PK	26.42	12	1.56	24	11	2.19	3.065	0.05
VK	24.33	3	0.58	24.50	4	2.52	0.110	> 0.05
SAMA	28.50	6	1.87	28	4	0.82	0.496	> 0.05

DISCUSSION

This article assumed that *Prakriti* has genetic connotation that could provide a tool for classifying human population based on broad phenotype clusters. The *Prakriti* classification is based on differences in Physical, Physiological and Psychological characteristics and is independent of racial, ethnic or geographical considerations. It may provide an appropriate method of classifying phenotypes to be considered collectively for genotyping. that is expected to become basis of customized or designer medicine.⁸ In *Sama prakriti*, all three *doshas* are in balanced state and the qualities of three *doshas* are in balanced form which maintains the homeostasis of body, necessary for better functioning of body and mind. As per modern science, one can say that in *Sama prakriti*, all the factors responsible for cognition such as synapse formation, strength of synapses, removal of unnecessary synapse, growth factor acting on specific receptor to regulate protein-protein interaction, inhibition and generation of action potential, neuronal firing rate and pattern, concentration of neurotransmitter and their regulation are in balanced state which is similar as described in homeostasis of three *doshas* in *Ayurveda*. *Vata prakriti* also shows good cognition that verifies that

grasping power of *Vata prakriti* is more as mentioned in *Ayurvedic* classics. This may be due to because of *ashukari* and *sheegra* property and also because of *rajo guna* dominance. One can say that in *Vata prakriti*, tendency to form new synapses is more and transmissions of nerve impulses are fast. Neuronal firing rate are also more in *Vata prakriti*. Especially *Prana vayu* is responsible for controlling the function of *Buddhi* and *Manas* while *udana vayu* helps in recalling the past experience. *Pitta prakriti* also shows good cognition that verifies *medhavi* character of *Pitta prakriti*. This may be due to *tikshna guna* and dominance of *satwa* and *raja guna*. One can say that in *Pitta prakriti*, transmission and generation of nerve impulses may be fast and all growth factors and neurotransmitters may be in appropriate quantity. Especially *Sadhaka pitta* is responsible for *Buddhi* and *Medha*. In *Vatapitta prakriti*, qualities of both *Vata* and *Pitta* are present. So, their cognition is also good. *Kapha prakriti* shows poor cognition that verifies grasping power of *kapha prakriti* individuals is less and initiation of work is slow as mentioned in *Ayurvedic* classics. This may be due to *manda*, *snigdha* and *pichiilla* qualities and dominance of *tamo guna*, one can say that in *Kapha prakriti*, strength of synapses is good and hence memory is good. All other domains of cognition are poor because formation of new synapses may be slow, transmission of nerve impulses may be slow and obstruction in transmission may be more due to sliminess and unctuousness. In *Pittakapha* and *Vatakapha prakriti* due to involvement of *kapha* their cognition is moderate and it depends on the proportion of *kapha* in them.

With advancing age, *Vata dosha* is naturally dominant⁹ and in *Vata prakriti* its effects are worsened. This may be due to *rukshata* and *kharta* qualities of *Vata*. Here one can say that volume of brain reduces along with blood flow as age advances. Number of nerve fibers of brain reduces with advancing age. Increase of *Vata dosha* causes *vishamagni*, which leads to malformation of *rasadi dhatu* and ultimately causes *dhatukshaya*. Due to improper metabolism, free radical is developing which is main causative factor for cognitive decline with increase of age. Along with this formation of defective proteins which accumulate and causes catastrophic damage to cells, tissues and organs occurs with increase of age. *Dhatukshaya* at this level can be considered as reduction in brain volume, reduction in number of nerve fibers and various neurotransmitters etc. In *Pitta prakriti* also with increase of *Vata dosha* with advancing age, the *agni* of *Pitta prakriti* become deranged and ultimately leads to malformation of *rasa dhatu*, hence *dhatukshaya* occur similar to *Vata prakriti*. In *Kapha prakriti* individuals, with increase of *Vata dosha* with advancing age the anabolic and preservative nature of *kapha* is deranged. In *Sama prakriti* all three *doshas* are in balanced state, hence effects of ageing is less on *Sama. prakriti*. Similarly in all other *prakritis* there is significant decline of cognitive functions with age.

CONCLUSION

Changes in cognitive abilities are part of normal ageing process. In *Ayurveda* the ultimate cause of ageing is deterioration of *Dhatu*, *Srotases*, *Malas*, *Indriyas* which are under constant interaction with the *tridoshas*. In the context of *Jarajanyavikaras*, *Vata dosha* is predominant; *Pitta* is irregular, while the *kapha* is in depleted state. With advancing age, *Vata dosha* is naturally dominant and in *Vata prakriti* its effects are worsened. In *Pitta prakriti* also with increase of *Vata dosha* with advancing age, the *agni* of *Pitta prakriti* become deranged and ultimately leads to malformation of *rasa dhatu*, hence *dhatukshaya* occur similar to *Vata prakriti*. In *Kapha prakriti* individuals, with increase of *Vata dosha* with advancing age the anabolic and preservative nature of *kapha* is deranged. In *Sama prakriti* all three *doshas* are in balanced state, hence effects of ageing is less on *Sama. prakriti*. Similarly in all other *prakritis* there is significant decline of cognitive functions with age.

“There is significant difference in cognitive functions of different *prakritis* with respect to ageing

Total cognitive functions

- Higher in less aged person in comparison to more aged person
- Higher in higher educated persons in comparison to less educated person
- Higher in males than females
- Higher in physical and mental working occupation in comparison to sedentary occupation
- Higher in high and moderate socioeconomic status in comparison to low socioeconomic status
- Highest in *Sama prakriti*.
- *Pitta*, *Vata*, and *Vatapitta* also showed higher values.
- Lowest value found in *kapha* & *Vatakapha prakriti*

- Comparing individuals having low education with advancing age showed highest decline in Vata prakriti.
- Other prakritis showed significant decline except Sama prakriti.
- Comparing individuals having higher education with advancing age showed significant decline in every prakritis except Sama and Vata kapha prakritis.

INDIVIDUAL FUNCTIONS

- Orientation was higher in Sama, Pitta and Vatapitta and lowest in kapha prakriti.
- Registration was higher in Sama, Pitta, Vatapitta & Vata prakriti and lowest in kapha & Vatakapha prakriti.
- Attention & calculation was highest in Sama prakriti, higher values obtained in Vata, Pitta & Vatapitta and lowest in kapha prakriti.
- Recall was higher in Sama, Vatapitta & Pitta and lower in kapha & Vatakapha prakritis.
- Language was higher in Sama and Vatapitta and lowest in kapha prakritis

REFERENCES:-

- 1) A genetic association analysis of cognitive ability and cognitive ageing using 325 markers for 109 genes associated with oxidative stress or cognition Sarah E Harris¹, Helen Fox², Alan F Wright³, Caroline Hayward³, John M Starr⁴, Lawrence J Whalley² and Ian J Deary¹
- 2) Ageing and neuronal vulnerability Mark P. Mattson*[‡] and Tim Magnus* Nature Reviews | Neuroscience Volume 7 | April 2006 |
- 3) Bhushan, P. et al. (2005). Classification of human population based on HLA gene polymorphism and the concept of Prakriti in Ayurveda. J. Alt. Compl. Med. 10:879-889.
- 4) Charaka Samhita Vimana Sthana, 8/96,97,98
- 5) Sushruta Samhita Sareera Sthana, 4/64-67,68-71,72-76
- 6) Astanga Sangraha Sareera Sthana, 3/84-89.,90-95,96-102
- 7) Folstein MF, Folstein SE, McHugh PR: "Mini-mental state: A practical method for grading the cognitive state of patients for the clinician." J Psychiatr Res 1975;12:189-198.
- 8) Patwardhan, Bhushan & Joshi, Kalpana (2009, January 23). Ayurvedic Genomics: Integration for Customized Medicine
- 9) Sushruta; Sushruta Samhita, Ayurveda Tattva Sandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskrit Samsthan, Varanasi 20th edition, 2001sutrasthana35/29-31

: