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## RESEARCH ARTICLE

### 12214 AGARKUMBHA (FRONTAL EMINANCE) – A SCIENTIFIC PERSPECTIVE OF INTELLIGENCE LEVEL.

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#### Abstract:

In Charaka Sharira it is mentioned that the elaboration of Sharira (body) and its parts are studied properly to know more about human anatomy. Each individual has a different body type as compared to other individuals. As we know how Prakriti describes special characteristic of an individual like Vataja Prakriti- dry body, Pitaja Prakriti – oily body and Raktvardhaka Tvaka, Kaphja Prakriti – full of strength and soft and smooth body. The structure of body reveals much about the diagnosis in case of a disease and patient's history as said in Samhita about Dashvidha Pariksha. It accomplishes structural view as Darshana Pariksha. In the same manner if physical health shows health status, then mental health and mind level are also revealed by Akriti or physical appearance of an individual. Through this article, I have made an attempt to evaluate any connection that links Agarkumbha / frontal eminence with individual's IQ level. As an old famous proverb says "You don't see the brain on one's forehead' (Chinese proverb). But we can judge the intelligence the individual possesses by seeing his frontal eminence.

**Key Words:-**Agarkumbha, Dhee, Bhudhi, Pariksha, Frontal eminence, Intelligence, Stanford –Binet Scale.

#### Introduction:-

Ayurveda is a special gift for all human being on the Earth. Ayurveda is not merely a philosophy but is also an evidence based science. This Parkisha /examination is the main feature to analyze physical level as well as mental level of the individual. Agarkumbha is the term used for frontal eminence or tuber frontale that is situated about 2.5 cm above the supra-orbital margin on each side of the frontal suture. Agarkumbha vary in size in different individuals, are occasionally unsymmetrical, and are especially prominent in young skulls. The outer surface of the bone above them is smooth, and covered by the Galea Aponeurotica<sup>1</sup>.

Many philosophers and scientists are researching on this link between brain, frontal eminence and IQ level; in Ayurveda a much renowned scholar Dr. Gananath Sen was the first to mention this in Pratkasha Shariram. Science is the great antidote to superstitions. Despite of the fact it has its own limitations and tendencies to meticulousness, many delusive beliefs can be conquered easily by experimental explanations. For example, many people once believed that the locus of the mind was in the heart, rather than in the brain. Today, in this area of heart transplantation and detailed cardio-vascular knowledge, we realize that the emotional "heart" really operates through the brain. After all we have confined that organ of mental function that by no means settles the question of the role which that organ plays in regard to consciousness.

So the point is this if Agarkumbha is directly linked with gray matter that is known for intelligence level, this may be pondered here in this article by assessing the intelligence with the help of the Proforma which is established by Psychologist- Stanford–Binet's Intelligence Scale and the comparison of common and more prominent frontal eminence regarding gray matter of frontal lobe with reference of *Agrakumbha* will be observed here.

**Aim & Objectives:-**

Recently study was carried out to assess the relationship of intelligence, occupation, social factors and mental level of individuals diagnosed with anatomical and psychosomatic approach with Agarkumbha/ frontal eminence.

**Material & Methods:-**

1. Simple Random Survey Study.
2. A particular Proforma was prepared regarding the study.
3. 100 volunteers were chosen randomly to rule out the Agarkumbha.
4. The Intelligence was assessed with the help of the Proforma which is established by Psychologist Stanford– Binet Intelligence Scale and observed the comparison of common and more prominent frontal eminence regarding gray matter of frontal lobe with reference of *Agarkumbha*.

**Conceptual Part:-****Ayurvedic Part - Agarkumbha concept:-**

Agarkumbha is frontal tuberosity or frontal eminence found in frontal bone, it is like tuber in frontale refers to one of two rounded elevations on the frontal bone. Its situation is 2.5 cm above the supra orbital margin on each side of the frontal suture. It is like the back of tortoise that is protruded outside. Acharya Gananath Sen mentioned about Agarkumbha in his book of Pratakash Shariram<sup>2</sup>. In this Sen mentioned in Saloka that if Agarkumbha is protruded outside then it shows higher intelligence level in the particular individual but if Agarkumbha is not protruded or inside as from local frontal tuberosity then the intelligence level are not so good or very low called Bhudhi Mandata (less intelligence) in that individual. It shows in this Saloka that Sen linked anatomical view to Mansika / mental level. This is clearly showed by Acharya that frontal bone tuberosity is directly linked with the Budhi/ mind.

It is important point here to think that the frontal tuberosity/eminence is because of brain behind that bone. Acharya Charaka and Susruta mentioned 4 Aungala Pramana of forehead/ Lalata. Further Susruta said that if it is more than 4 Aungala then it is the reason of higher intellectual power in the individual because it more protruded than 3 cm<sup>3</sup>. Dr. K.K.Pandey mentioned that Agarkumbha is 3cm from orbital area<sup>4</sup>. According to modern text books the delineation of human body is from 3 cm from orbital region.<sup>4</sup>

**Modern Concept:-**

Frontal lobe- the frontal lobe is located at the front of the brain, it is one of the four major lobes of the cerebral cortex in the human body. The frontal lobe is located at the front of each cerebral hemisphere in brain. It is separated by parietal lobe and temporal lobe by gyrus and fissures. In this frontal lobe Dopamine regulating neurons are present in the cerebral cortex part. The dopamine related neurons are working on attention, memory i.e. related with short term memory tasks, planning, intelligence or motivation. A new report from the National Institute of mental Health says that frontal area deals with performance and intellectual functions and improper working leads to many mental illnesses.

The bone comprise of three parts/bones- the squamous part, the orbital part and nasal part. The largest area of the frontal bone is the squamous part, encompasses the area of the forehead. Frontal eminence varies in size in different individual which are occasionally unsymmetrical and are especially prominent in young skulls. The surface of the bone above them is smooth and covered by the galea aponeurotica<sup>5</sup>. The brains frontal lobe supports a range of complex cognitive functions and comprises several densely interconnected but structurally heterogeneous sub-regions. They are a major focus of interest in both neuropsychology and differential psychology. The frontal lobe is centrally concerned in both general cognition processes<sup>6</sup>.

Stanford-Binet Intelligence Scale- it is best and most popular intelligence test. It works on cognitive ability of the person. It helps to diagnose developmental or intellectual deficiencies in young children. This measures 5 factors and consists of verbal and non-verbal subtests. Factors are- Knowledge, quantitative reasoning, visual spatial processing, working memory and fluid reasoning.

**Survey part:-****Criteria for assessment:-**

Division of age group:-

- Group I - 21 -30
- Group II - 31-40
- Group III - 41-50
- Group IV- 51-60

**Inclusion Criteria:-**

1. Healthy individual.
2. Individual of both sex, age group 20- 60 years

**Exclusion Criteria:-**

1. Age below- 20 and above 60 years.
2. Patients suffering from skull or spine deformity because it shows improper growth of brain.
3. Patients who have undergone chemotherapy and radiotherapy.
4. Patients having endocrine disorder like hypogonadism, hyperthyroidism.
5. Patients having chemical disorders like- Phenylketonuria.
6. Bleeding disorders, Malignancy, Autoimmune disease, metabolic disorders.
7. If in fetus (individual) life suffer from measles, mumps, rubella, and nutritional deficiency of mother or mother suffers from hypoglycemia or Hb% is less –it leads to improper growth of brain in early life.
8. Nervous system deformity- may be due to hypoxia condition, drown, carbon monoxide consumption.
9. Pregnancy time problem- if early pregnancy occurs, syphilis, smoking by mother, kernicterus etc.
10. Meningitis, Encephalitis, viral infection, celebrities, any drug addiction, Mongolism, Down's syndrome.
11. At birth time using forceps.

**Study Design:-**

The medium of survey was by a questionnaire based on reasoning and simple aptitude points used in daily routine. The method involves filling of the format by answering the questions and lastly seeing their frontal eminence as a reference to their feedbacks to conclude exactness of the topic. The subjects were free to exit out from survey or not to answer any question at any given time as they might be puzzled at that time for any reason. The data recorded and further analyzed the suitable statistical way in the form of graphs by using standford-binet scale as intelligence parameter.

**Simple Questionnaires are made based on qualitative reasoning, aptitude, knowledge:-**

**Q1.** 3, 4,5,6,7 in serial wise what is the next number to this-

- a) 8      b) 7      c) 6      d) 9      e) 5

**Q2.** What is the meaning of 'rich' -?

- a) Huge    b) healthy    c) abundant    d) satisfied    e) old

**Q3.** Which one of the five is least like the other four?

- a) Dog    b) mouse    c) lion    d) snake    e) elephant

**Q4.** Which no. should come next in the series? 1-2-3-5-8-13

- a) 8      b) 13      c) 21      d) 26      e)31

**Q5.** If you rearrange the letters 'CIFAIPC' you would have the name of a (n)-

- a) City    b) animal    c) ocean    d) river    e) country.

**Q6.** If akash sold 15 apples in a working week, what average no. of apples he sells each day?

- a) 3      b) 2      c) 10      d) 6      e)15

**Q7.** 'Pig is to Pork' as cow is to-?

- a) Lamb    b) beef    c) stew    d) cattle

**Q8.** The word 'inclusive' & 'exclusive' have-

- a) The same meaning    b) different meaning    c) is the opposite in meaning.

**Q9.** 'Boat' is to water therefore 'plane' is to-

- a) Fly    b) sky    c) float    d) air

**Q10.** Which one of the five choices makes the best comparison?

- a) 25641    b) 26451    c) 12654    d) 51462    e) 15264    f) I don't know.

### Observation & Result:-

Total 100 patients were recorded for the present study. The data revealed that majority of the volunteers in the group were male i.e., 60 % and 40 % were females in this group. The data shows that majority of the volunteers, i.e., 35 % were in the age group of 31-40 years followed by 30 % in 41-50 years and 20 % in the age group of 21-30 and 15 % were in the age group of 51-60years. The students were 5 % , 10 % belonging to teachers, 10 % in business , 5 % in philosophy and in artist, and 40 % in advocates and remaining 30 % were in defense services have intelligence level. As per the involvement of Agarkhumbha area while doing survey, frontal prominence were more in females than male that is 70 % in females and 30 % were in males. According to age group Agarkhumbha prominence more in age group of 31- 40 years i.e., 35 followed by 30 % in 41 – 50 age group, followed by 20 % in 51-60 years and less in 21-30 years of age i.e., 15 %.

Criteria for intelligence scale according to questionnaire with taking reference from Stanford Binet Intelligence Scale that are in this way-

QUALITY NAME	MARKS
<i>Genius</i>	Over 140
<i>Very superior</i>	120-139
<i>Superior</i>	110-119
<i>Average</i>	90-109
<i>Dull</i>	80-89
<i>Borderline deficiency</i>	70-79
<i>Moron</i>	50-69
<i>Imbecile</i>	20-49
<i>Idiot</i>	Below 20

The IQ scale is a total score that is derived from certain standardized tests that are prototype to assess the human intelligence.

### IQ Scale Range:-

Your IQ is a measure of your intelligence. The higher the IQ the better it is. Your IQ is usually measured over a general IQ scale range and the standard IQ range is as follows:

**140 and over:** If you have an IQ range of 140 and over, it means you are a geniuses or almost genius.

**120 - 139:** With an IQ of 120 to 139, it means you have very superior intelligence and your intelligence is better than most. A superior intelligence means that your intelligence is better than most people but not as high as those with an IQ of 140.

**110 - 119 :** On the other hand, if you have an IQ of 110-119, it means you have a superior intelligence and that means that your intelligence is on middle ground- which means that it is high but not higher than most.

**90 - 109:** When you have an intelligence of 90-109, it means that you have an intelligence of normal or average people. Normal thinking means that you are less intelligent and generally have a slower thinking. So people who cannot get to the solution or are slower in thinking will mean that they have normal intelligence.

**80 - 89:** On the other hand, if you have an intelligence of 80-89, that means you are a dull person. A dull person or boring person means that they generally tend to indulge in things that are too enjoyable. Dull people tend not to indulge in things that are too demanding.

**Below 80:** Give it another try :) maybe you will see the logic behind some questions after several tries. Also make sure you didn't leave some questions unanswered, leaving a question unanswered will give you a 0 point for that question.

#### Normal Distribution & IQ Scores:-

The properties of the normal distribution apply to IQ scores:

**50%** of IQ scores fall between **90** and **110**

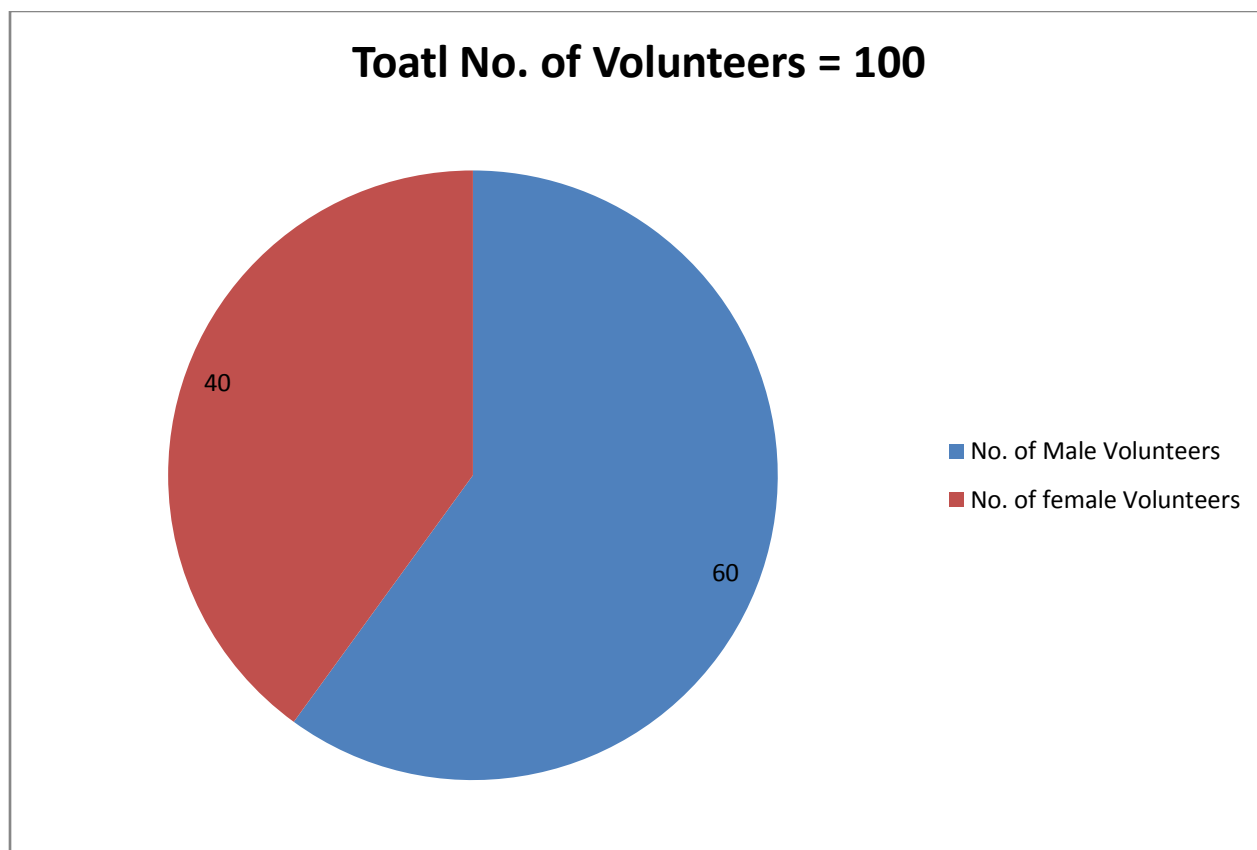
**70%** of IQ scores fall between **85** and **115**

**95%** of IQ scores fall between **70** and **130**

**99.5%** of IQ scores fall between **60** and **140**

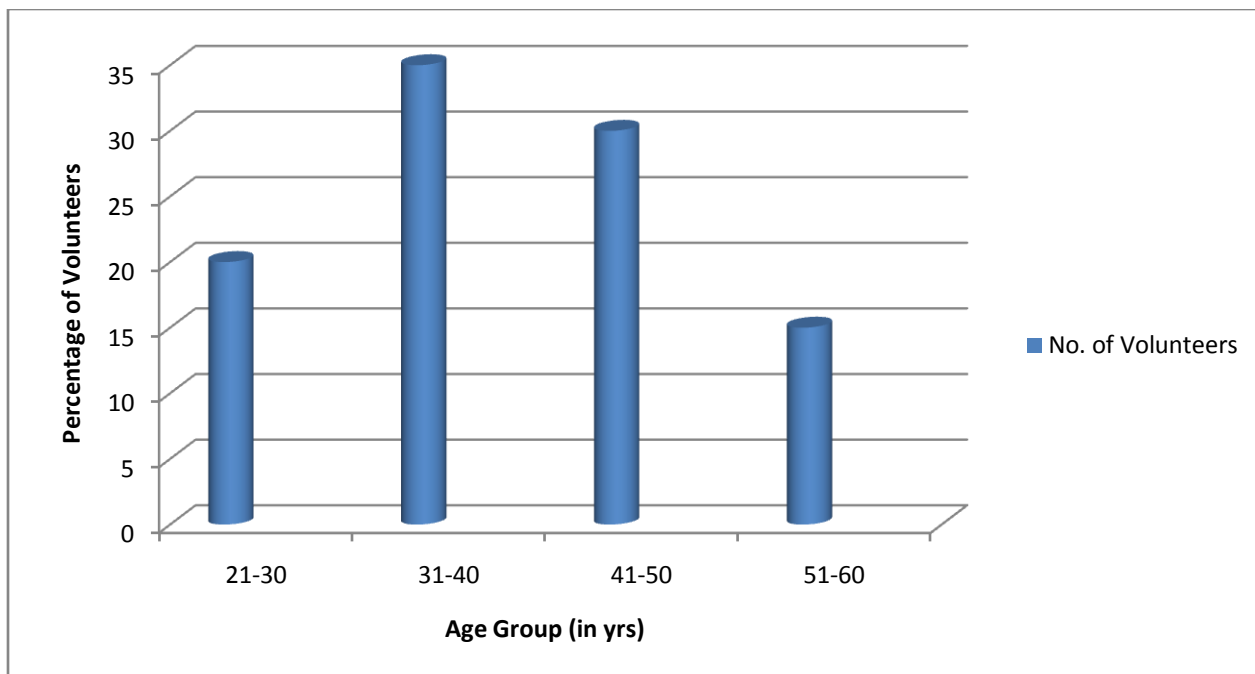
**Table 1:-** total no. Of male & female volunteers.

Total no of volunteers	No of male volunteers	No of female volunteers
<b>100</b>	60	40



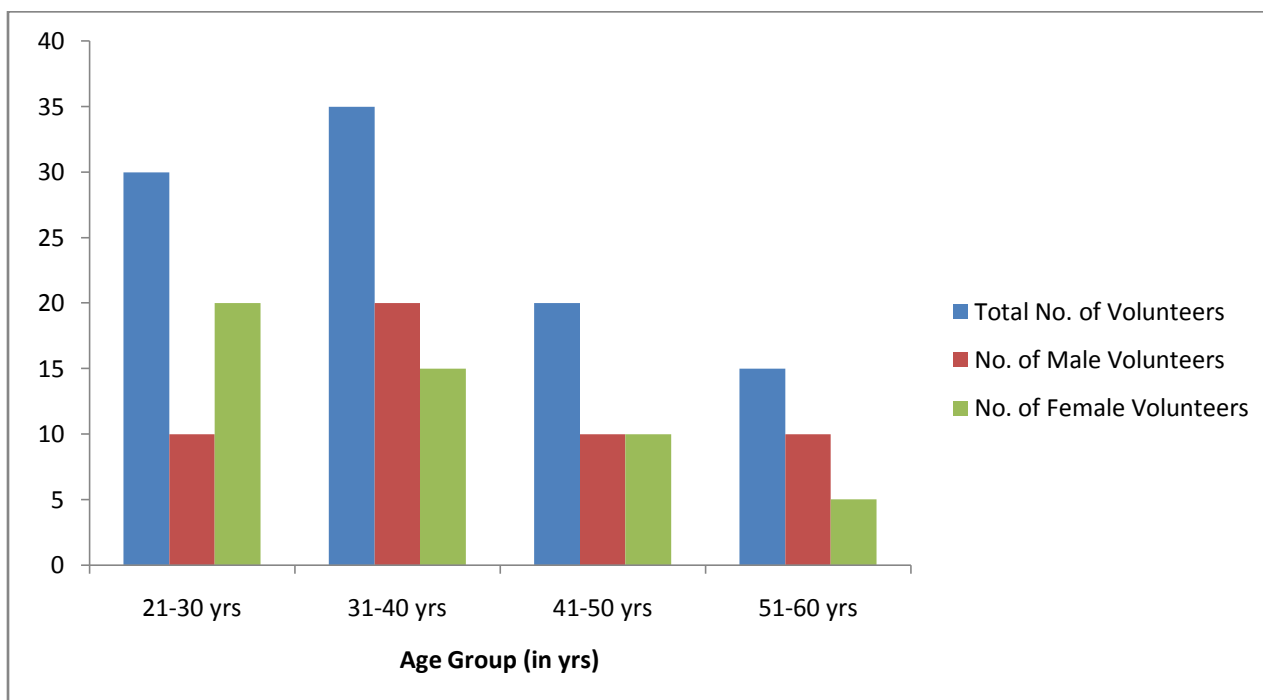
**Table 2:-** showing no. Of volunteers acc. To age

Age Group/ in years	No. of volunteers	%
21-30	20	20%
31-40	35	35%
41-50	30	30 %
51-60	15	15 %
<b>Total</b>		<b>100</b>



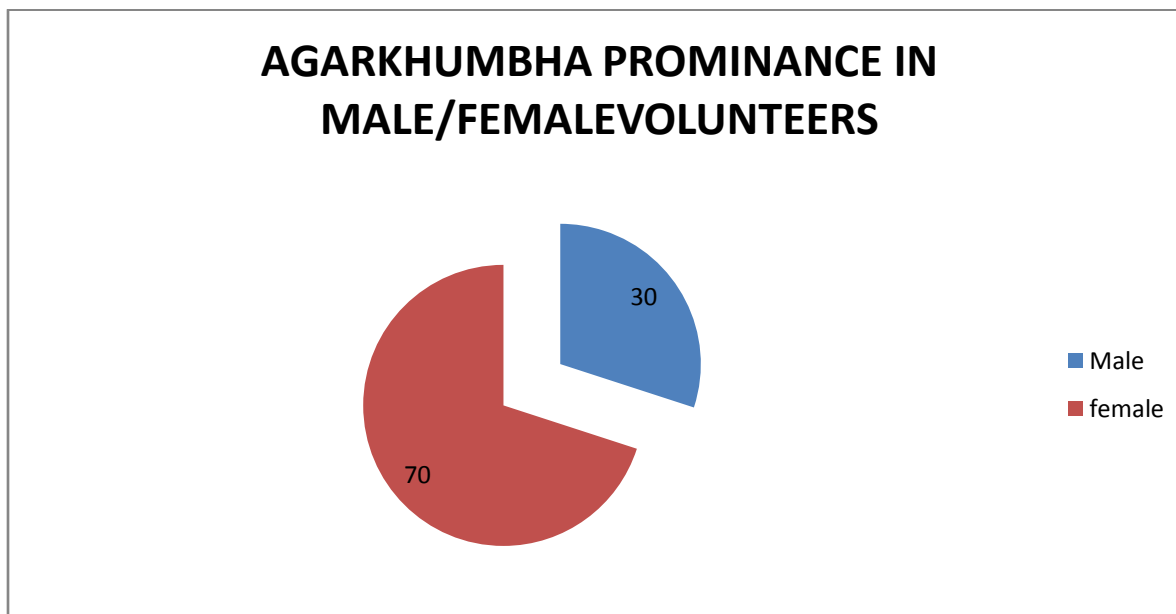
**Table 3:-** showing no. Of male & female volunteers in each age group

Age group/in years	Total No. of volunteers	No. of male volunteers	No. of female volunteers
21-30 yrs	30	<b>10</b>	<b>20</b>
31-40 yrs	35	<b>20</b>	<b>15</b>
41-50 yrs	20	<b>10</b>	<b>10</b>
51-60 yrs	15	<b>10</b>	<b>5</b>



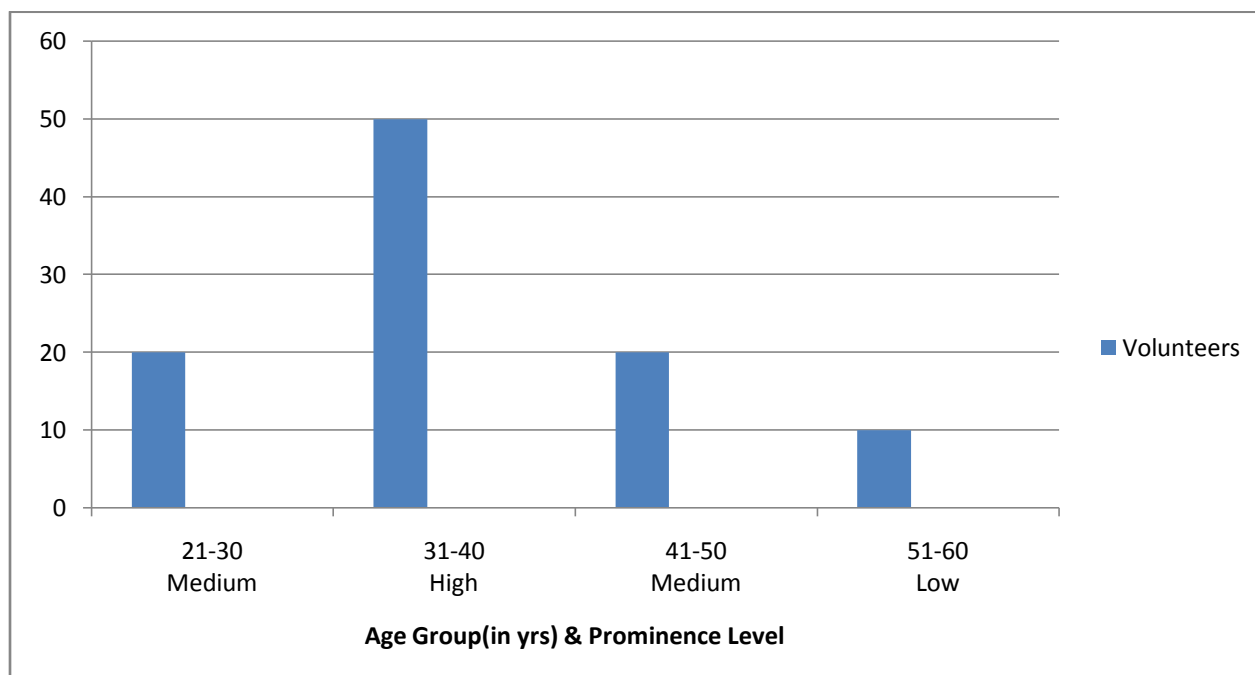
**Table 4:-** Showing Agarkumbha Prominance In Volunteers

Sex	Total volunteers
Male	30
Female	70



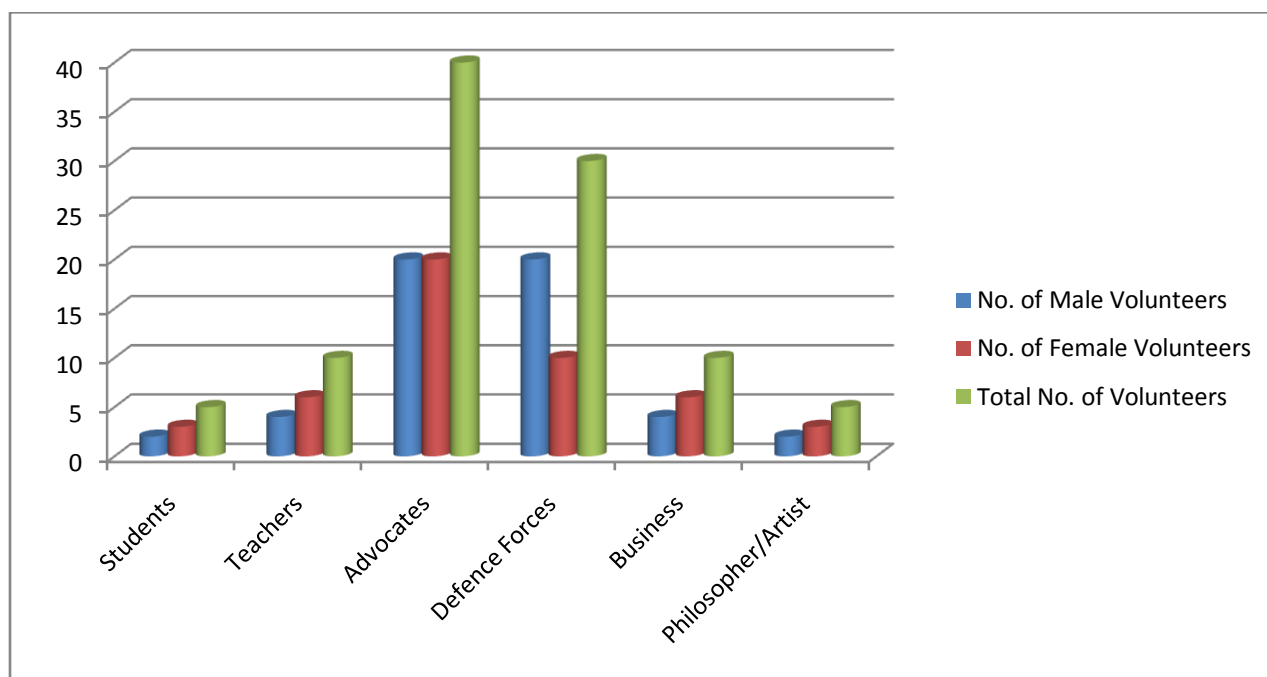
**Table 5:-** Showing Agarkumbha Prominance With Different Age Group

Age group	Volunteers	Prominence level
21-30 yrs	20	Medium
31-40 yrs	50	High
41-50 yrs	20	Medium
51-60 yrs	10	low



**Table 6:-** showing no. Of volunteers acc.to occupation-

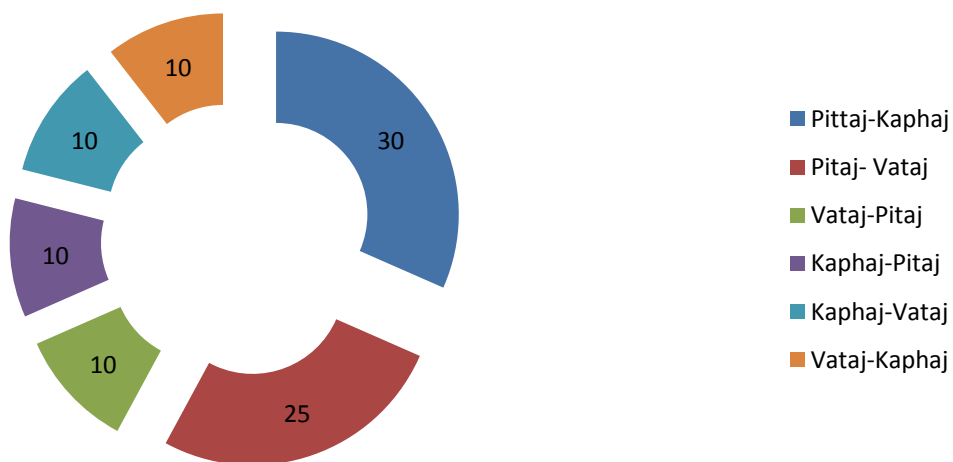
OCCUPATION	NO.OF MALE VOLUNTEERS	NO.OF FEMALE VOLUNTEERS	TOTAL	%
Students	2	3	5	5%
Teachers	4	6	10	10%
Advocates	20	20	40	40 %
Defence forces	20	10	30	30 %
Business	4	6	10	10 %
Philosopers/artist	2	3	5	5 %

**Table 7:-** showing no. Of volunteers acc. To prakriti

PRAKRITI	NO. of volunteers	%
Pittaj-Kaphaj	30	30 %
Pitaj- Vataj	25	25%
Vataj-Pitaj	10	10 %
Kaphaj-Pitaj	10	10 %
Kaphaj-Vataj	10	10 %
Vataj-Kaphaj	10	10 %

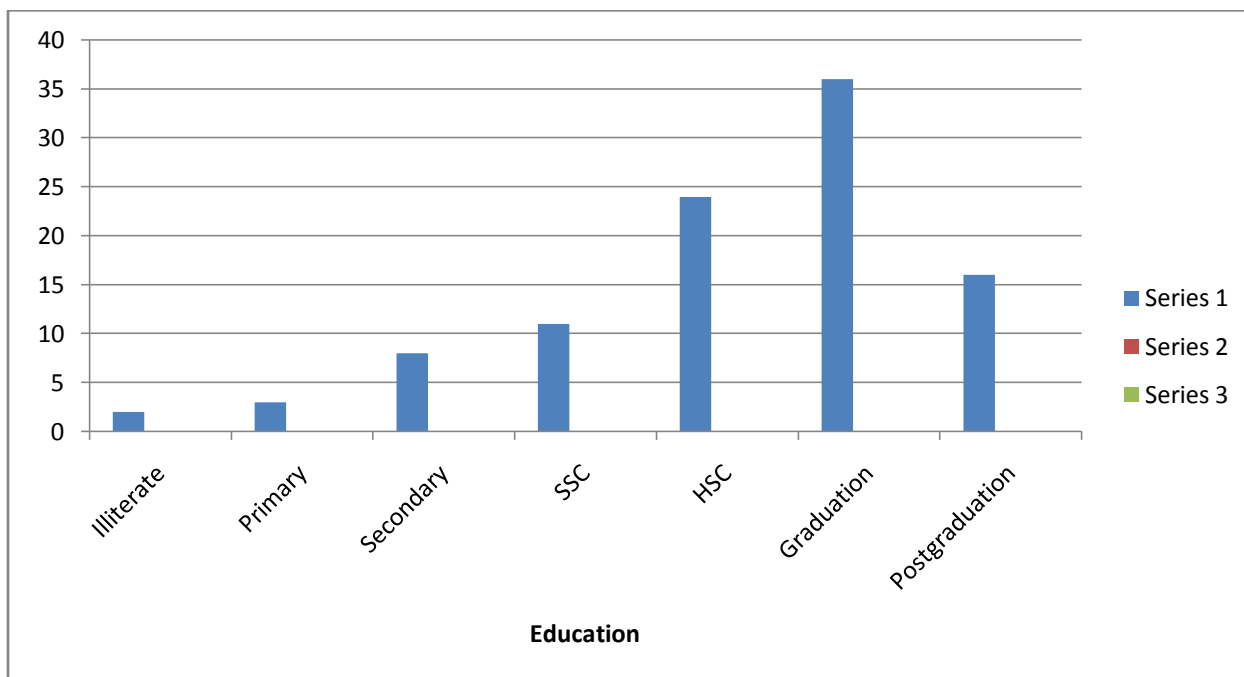


### No. of Volunteers According to Prakriti



**Table 8:-** showing no. Of volunteers according to education

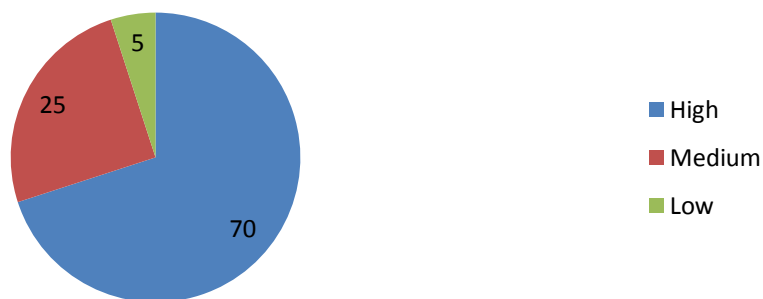
EDUCATION	NO.OF VOLUNTEERS	%
Illiterate	2	2%
Primary	3	3%
Secondary	8	8%
SSC	11	11%
HSC	24	24%
Graduation	36	36%
Postgraduation	16	16%



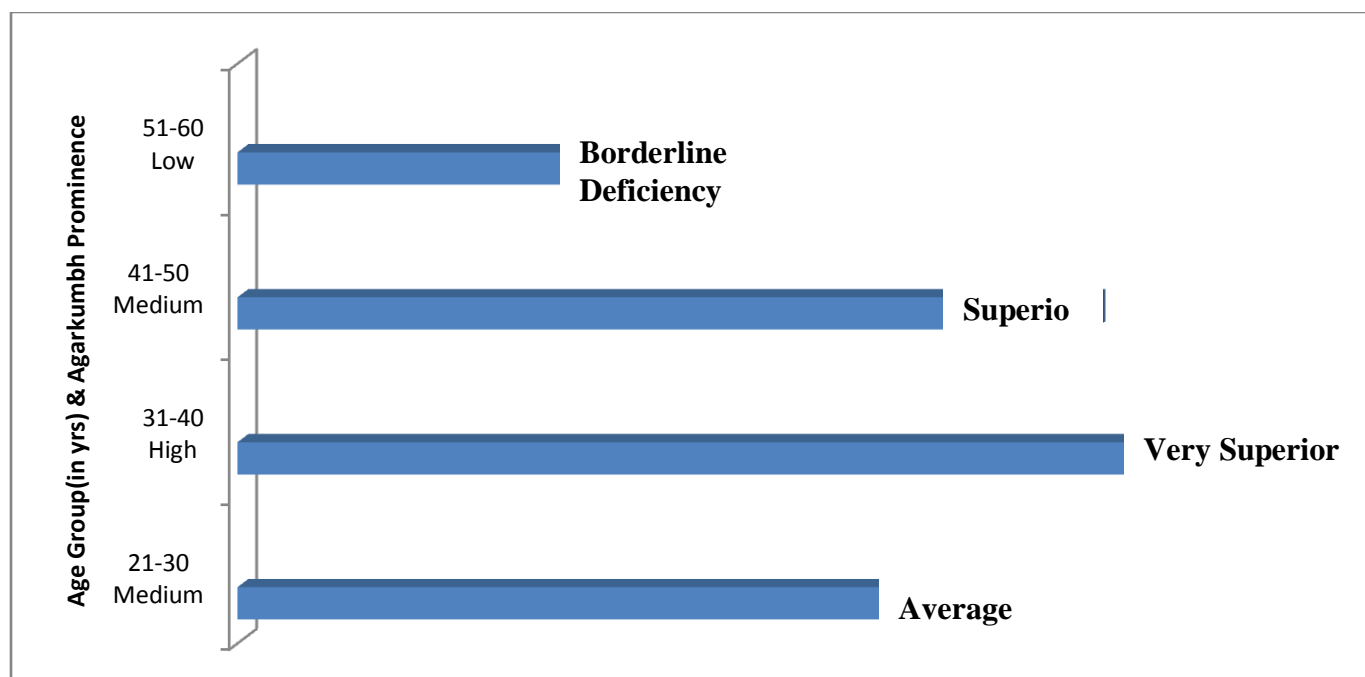
**Table 9** – showing no. Of volunteers according to socio-economic status

SOCIOECONOMIC STATUS	NO.OF VOLUNTEERS	%
High	70	70 %
Medium	25	25%
Low	5	5%
Total		100 %

### NO. OF VOLUNTEERS ACCORDING TO SOCIO-ECONOMIC STATUS

**Table 10:-** Showing Comparison Of Intelligence Level & Agarkumbha In Age Groups-

Age group	Agarkumbha prominence	IQ level
21-30 yrs	Medium	Average
31-40 yrs	High	Very superior
41-50 yrs	Medium	Superior
51-60 yrs	low	Borderline deficiency



**Discussion:-**

All human beings are different from one another in their capability to apprehend complex condition and naturalize efficaciously to the surrounding to catch the idea from different experiences, to prosecute oneself in various forms of reasoning and to overcome obstacles by their thoughts. An individual's intelligence level can't be judged in same circumstances all the time, different behavioral changes in different situations reflect the level of intelligence one possesses. So, it is necessary here to monitor the intelligence level of the individual by seeing their frontal eminence / Agarkumbha to prove his IQ by giving test that gives an appropriate measure of IQ overcoming all the variations if occurs. By considering this we use Stanford-Binet Scale of random sample test to establish the point.

Medha containing Dhi and Dhrti Shakti (grasping and retention power) and Smriti (memory)<sup>7</sup> that directly links with frontal part of the brain containing area 9, 10, 11 of the cerebral cortex. The gray matter is responsible for the Budhi percept of the frontal area. And this eminence shows that if it protruded then the IQ level of the particular human is higher than normal. The factor here used to analyze them was an IQ test that consisted various verbal and non-verbal questions. In this verbal intelligence test measured Gk, factual knowledge, long term memory, social practical judgments, short term memory, numerical reasoning, and concentration power.

**Conclusion:-**

We got the following facts after studying the frontal protuberance as IQ level of various peoples. Intellectual part of frontal bone is a powerful entity, which retains the specific knowledge or the essence of the texts gained by reading, listening or repeating one thing in a time. This area helps to retain the knowledge in the form of personal intelligence level and high Agarkumbha region and this IQ of the individual is used whenever it is to be used. As we know in Ayurveda to asses individual's budhi we consider Dhi, Dhriti, Samriti of that person. Proper Budhi is assured tool for unbiased usage of Anumana Pramana. On compiling lots of different references it can concluded that Acharyas tested some areas of Budhi for IQ level test<sup>8</sup>. The following points are tested – a)- testing of Vijnana (Vijnanam Vyavasayena), b)testing of Raja (Rajah Sangena), c)- testing of Moha (Moham Avijnanena), d)-testing of Virya (Viryam Utthanena-testing of courage,motivation<sup>9</sup>), e)- testing of Smriti (Smritim Smaranena), f) testing of Shraddha (Shraddhamabhiprayena-one's aptitude, one's longings<sup>10</sup>), testing of Medha (Medham Grahana<sup>11</sup> knowledge, Satwika personality). So, it shows many ways of testing Budhi have been explained in classics, and the tests are also found today to test IQ might have derived their bases on the same.

In this it is concluded that as Budhi works as Dhi, Dhriti and Smriti level just as frontal lobe works to observe, to comprehend, to retain and to recall. The pre-frontal area is the site of working memory; memory is a special faculty of brain, which retains the events developed during the process of learning or in experience. Remote memory is stored in prefrontal lobes as an actual biochemical change in neurons and explained on the basis of changes in RNA of cells. Activation of a synapse during learning process may induce a dendrites' growth or a new formation of the axonic connection.

So, it is found in this survey that we can clearly observe intelligence level of an individual by just seeing his frontal eminence as Prataksha Pariksha and to prove this, we can test it by using one of these tests (Stanford Binet Intelligence Scale). And on the Prakriti Pariksha we observe that Pittaja Prakirti individual have higher Medha or more mind i.e. more aptitude level it shows greater intelligence as well and more protruded Agarkumbha. And a Kaphaja individual has Dhritimanta i.e. intelligence level of this individual also has Agarkumbha prominence but less as compared to that of pure Pittaja Prakirti individual.

**Further Scope:-**

The study of Agarkumbha with taking as frontal eminence is to be studied again in detail with more individuals and more tests taking these as starting point will help to promote this theory so that further Agarkumbha researches could be held.

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