ANATOMICAL CONSIDERATION OF BUDDHI IN AYURVEDA

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ABSTRACT
Buddhi (Intellect) is the first manifestation of unmanifested (Avyakta) Prakriti, it is also known as Mahata, Upalabdhi, Pratyaya, and Gyana (intellection, apprehension, cognition). Conjunction of Purush and Prakriti manifest Mahana or Buddhi (intellect) element. Acharya Charak has accepted this doctrine, while he describes the process of creation. He quotes that the Buddhi (intellect) originates from Avyakta, Ahankara from Buddhi and Panchamahabhuta from Ahankar.¹ In this modern era of competition a person requires constant alertness and sharpness in the intellect. The ability to Grahana (grasping) and Dharana (retaining) with such alertness or sharpness and to use this retained knowledge at the right time and right place is the key for success in every walk of life. Grahana (grasping) and Dharana (retaining) capacity is of prime importance because than only this knowledge can be retrieved by Smriti. This is importance of Buddhi.

KEYWORDS: Buddhi, Indriya, Smriti.

INTRODUCTION
Buddhi is the psychological faculty for reasoning and logic. Buddhi is described as Indriyabuddhi i.e. Cakshubuddhi, Srotabuddhi etc. So it is advance stage or the process leading to true knowledge. This particular article is a book, chair or pen etc, this disease is gastric ulcer or duodenal ulcer etc. and this drug are anti inflammatory etc. are decided by Buddhi or intellect attribute.² Objects are perceived with the help of Gyanendriya (cognitive organs) together with Manas. The perception is purely mental in the beginning and practical
advantages and disadvantages are ascertained thereafter. The Buddhi or intellect which determines the specific properties of the object impels an individual to act or to speak intelligently. \[3,4\] The action of Ahankara or ego is also included in that of intellect.\[5\] Perceptive faculty of living beings shapes itself depending upon contact, it has with the various sense faculties.\[3,4\]

**Observation and Discussion:** Buddhi on the basis of sensual perception is divided into PanchendriyaBuddhi and Mano-Buddhi. \[6\]

**Mano-Buddhi:** The intellect emanated through Manas is known as Mano-Buddhi. It is responsible for the factors like Tatva Gyaṇa, Dharan, Grahan etc..

**Indriya-Buddhi:** The Buddhi being related to each of the Panchendriya is classified into five varieties i.e. Srotra-Buddhi (sound perception), SparshanBuddhi (tactile perception), RupaBuddhi (visual perception), RasanaBuddhi (taste perception), and GhranaBuddhi (smell perception). Each IndriyaBuddhi imparts instant knowledge of concerned Indriya Gyaṇa or sensual information.\[7\]

Buddhi is of two types Smrīti (memory) and Anubhava (knowledge).

The attribute of intellect or cognition (Buddhi) is of two types.

1. Smrīti (memory)
2. Anubhava (experience)

**Table Showing the classification of Buddhi**

<table>
<thead>
<tr>
<th>Buddhi</th>
<th>Anubhava (experience)</th>
<th>Smrīti (memory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yatharthā Anubhava (Valid knowledge)</td>
<td>Ayatharthā Anubhava (Invalid knowledge)</td>
<td></td>
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<tr>
<td>Pratyakṣa</td>
<td>Anumiti</td>
<td>Upamiti</td>
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<td>Manas Buddhi</td>
<td>Srotra Buddhi</td>
<td>Rasana Buddhi</td>
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<td>Srotra Buddhi</td>
<td>Sparsa Buddhi</td>
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<td>Rasana Buddhi</td>
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<td>Ghrana Buddhi</td>
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BuddhiGunas (according to Mahabharat) Ishtanishtavipathi - Feeling of liking and disliking.
1. Vyavasaya-Vyavasayotsaha -Enthusiasm to do activities an initiating capacity
2. Samadhita - 'Cittavritti-nirodhah (undistractibility)
3. Pratipatti -To acquire knowledge by-
   i. Pratyaksh (sensual perception)
   ii. Anumana (inference)
   iii. Sabda (verbal testimony)
   iv. Upamana (analogy)
4. Grahana - Grasping power (one of the features of intelligence)
5. Dharana - Retaining power of learnt knowledge, (The feature of intelligence)
6. Tatva Gnya - Conceptual thinking
7. Dhi -Power to distinguish good from bad
8. Dhriti - Firmness or resolution
9. Smruti - stored previous experience

This concept of Buddhi can be conveniently correlated with the concept of intelligence. Intelligence depends upon the ability to observe, to comprehend, to retain and to recall.\[8\]

**Anatomical consideration of Indriya Buddhi Sthan**

A. Srotra Buddhi (sound perception) or auditory areas\[9\]

**Temporal lobe -**

1. **Auditosensory area (Area 41, 42)**

   **Location** - Middle part of superior temporal gyrus and anterior transverse temporal gyrus (Heschl’s gyrus) in the floor of lateral sulcus.

   **Function** - Centre for hearing, consciousness of sound, its quality, pitch, frequency, direction etc. qualities of sounds are perceived.

   **Lesion** - Impaired hearing.

2. **Auditopsychic area – rest of superior temporal gyrus (Area 22)**

   **Function** - Correlation of sounds received with the past experience and interpretation of the sound heard.

   **Lesion** - Auditory aphasia or Agnosia.
B. Sparshan Buddhi (tactile perception) or touch areas\textsuperscript{[10]}

Parietal lobe

Sensory association (parietal area)

- **Sensory motor areas** - many motor fibres arise outside motor cortex from areas which are regarded as purely sensory.

- **Primary somatomotor area** - Area 4 (motor area) lies in the pre-central gyrus. It controls voluntary movements of contra-lateral half of the body. Those parts of body which carry out most skilled movements for e.g. fingers & thumb have largest area of cortical representation. The part in paracentral lobule are for foot and perineum.

- **Frontal eye field** – Area 8 – it is a part of primary somatomotor area it has cortical control of oculomotor nuclei.

- **Supplementary somatomotor area** – Area 6 (primary motor area) it about on primary somatomotor area, it co-ordinates voluntary actions of area 4 and extra pyramidal system and is, therefore involve in the integration of voluntary movements.

- **Primary somatosensory area** – Area 3, 1 & 2 (sensory area) Sensation derived from skin are appreciated in anterior part of area and proprioceptive sensation in the posterior part of area.

Cortical representation – Opposite half of body is represented in an inverted manner.

In the lower part of post central gyrus – face, oral cavity, pharynx and abdomen. In the lower part-from below upwards – head, neck, trunk and lower limb.

In the posterior part of paracentral lobule - foot and external genitalia.

Function – Area 3 receives both exteroceptive (pain temperature and touch) and conscious proprioceptive sensations.

Areas 1 and 2 integrate them with accurate localization and quality of sensation.

Lesson – Loss of appreciation of sensation of opposite side but some recognition pain and temperature remains.
Supplementary-somato sensory area – This area lie between lower end of primary area and lateral sulcus. This area is associated with appreciation of pain and understanding shape thus enabling recognition of an object.

C. Rupa Buddhi (visual perception) or visual areas\cite{9,10}

Occipital Lobe

1. Visuosensory (striate area area 17).

Location – On the medial surface of occipital lobe and lies in the lips and depths of posterior part of calcarine sulcus i.e. in the lingual gyrus and cuneus.

Function – Receives temporal retina of same side and nasal retina of opposite side i.e. right cortex receives left half of the field of vision, recognition of colour, form, size, motion, etc. of an object.

Cortical representation – Upper retinal quadrant in upper lip and the lower retinal quadrant in lower lip of calcarine sulcus. The macular fibres in caudal 1/3 of the area. Peripheral fibres in the anterior part.

Lesion – Homonymous hemianopia of opposite side with macular sparing.

Visuopsychic area (area 18, 19) – Parastriate (18) and Peristriate (19) – These two areas surround the striate area (17) except anteriorly.

Function – Correlation of visual impression reaching area 17 with the past experience and interpretation of the same.

Lesion – Visual Agnosia, i.e. objects seen cannot be interpreted properly.

Occipital eye-field area (Area 19) – Peristriate area – On stimulation conjugate deviation of eyeball to opposite side and constriction of pupil. Fibres arise from area 19 pass through posterior limb of internal capsule to nuclei of cranial nerves which supply the muscles of eyeball. These fibres form the reflex pathway for accommodation reflex which is partly voluntary control. Lesion causes loss of accommodation.

1. Frontal eye-field – Area 6, 8.

Location – Posterior part of middle frontal gyrus.
**Function** – Horizontal conjugate movements of the eye. Stimulation causes conjugate deviation of eyes to opposite side.

**Lesion** – Loss of horizontal conjugate movements of eye.

**D. Rasana Buddhi (taste perception) or gustatory areas** \(^{[10]}\)

They are concerned with muscular activities inherent in speech and with understanding of language and are concentrated on one hemisphere usually this is left hemisphere in right handed and vice-versa. Five brain areas are functionally concerned with speech.

a. **Motor speech area**

1. **Broca’s area – area 44 & 45** – It is a part of primary somatomotor area.
   
   **Location** – Pars triangularis and pars orbitalis of inferior frontal gyrus on superolateral surface on the left side of right handed person.
   
   **Function** – Co-ordination of movements of tongue, lips, larynx and other movement employed in production of voice and articulation of speech.
   
   **Lesion** – Sensory aphasia – Impairment of understanding of spoken or written words. Superior area is part of supplementary somatomotor area & lies on medial surface.

b. **Sensory areas**

1. **Area 39** – It occupies angular gyrus and is reading center since it is concerned with visual word images.
   
   **Location** – Inferior parietal lobule including supramarginal and angular gyrus.
   
   **Function** – Understanding of written and printed words.
   
   **Lesion** – Sensory aphasia – Impairment of understanding of spoken or written words.

   **Area 40** – It occupies supramarginalgyrus and is concerned with auditory word image. Posterior area is close to both acoustic cortical area & visual area and is therefore concerned with integration of auditory and visual data required for understanding of spoken and written words.

**Area 22** – Wernicke’s area is sensory speech center. It is concerned with comprehension of spoken language. It is connected to Broca’s area by arcuate fasciculus.

**c. Stereognostic area (Area 5, 7)** – Location in the superior parietal lobule in the superolateral surface.
**Function** – Stereognosis i.e appreciation of shape, size and texture of an object without aid of vision.

**Lesion** – Astereognosis.

d. **Gustatory area** (Area 43) – Located in the bottom of post central gyrus – responsible for conscious sensation of smell.

**Taste area**
Lies in the post-central gyrus and taste area-
I. Lies buried in the insular cortex.

**Functions:** Conscious perception of taste.

E. **Ghrana Buddhi (smell perception) or olfactory areas**

Primitive areas like pre-pyrriform cortex, amygdala, entorhinal cortex and medial dorsal nucleus of the thalamus.

**Functions:** Detection of smell as a part of protective measures. Other parts concerned with sensory integration.

Olfactory area is small in man it is situated over anterior end of uncus and parahippocampal gyrus.

- Pre frontal cortex (frontal association cortex) – it is related to intellectual activity, emotional behaviour and to control autonomic activity.
- The dominant hemisphere is concerned with consciousness, speech, arithmetical analysis and calculation.

Non dominant hemisphere is concerned with 3-D geometry, musical sense, artistry and synthesis of coherent thoughts.

**Importance of Pre-frontal area**

1. The Pre-frontal area of cerebrum is the site of working memory. Working memory is vital for comprehensive, understanding, planning, reasoning, fearing and decision-making. Working with emotional intelligence – Daruel.

2. The pre-frontal area discriminates the sensory impulses, correlates them with stored impressions and helps in the final response through the ideo-motor area (Sarva vyavahara hethu).
3. The pre-frontal areas associate themselves with other lobes of brain like parietal, occipital, temporal lobes and with other parts like thalamus, diencephalon, hypothalamus, tegmentum, visual and auditory areas and act as planning organs (Vyavasayita).

4. Pre-frontal lobes help in complex intellectual activities like giving judgment and taking decision (Niscayamika Buddhi).

5. Pre-frontal areas, the executive centers, implement the actions after analysis through their connections with hypothalamus and brainstem and by influencing the autonomic nervous system and endocrinal system.

6. The various functions of prefrontal cortex are.
   a) This forms the center for the higher functions like emotion, learning, memory and social behavior. Short term memories are registered here.
   b) It is the seat of intelligence. So, it is also called the organ of mind.
   c) It is responsible for the personality of the individuals.
   d) The prefrontal cortex is responsible for the various autonomic changes during emotional conditions, because of its connections with hypothalamus and brainstem.

**Bilateral removal of pre-frontal lobes causes**

1. Lack of self control - Opposite quality of Dhriti
2. Distractibility - Opposite quality of Samadhita
3. Flight of irregular, link less ideas - Opposite quality of Tatva Gyan
4. Lack of memory - Opposite quality of Dharana
5. Lack of initiation – Vyavasayitha Bhanga
6. Disturbed orientation of time and space – Dhi Vibhramsa

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 dendritic growth or a new formation of the axonic connection.

**Summary and Conclusion:** In every individual production of knowledge starts with the perception and grasping by Indriya and then it goes through the internal process of Manas, the subject is then analyzed by means of Chintan and Grahana (grasping) and Dharana (retaining) Vichara and categorized into Nitya (eternal), Hitya (useful), Ahitya (harmful).
And then the quick action is performed if needed, otherwise it is stored as Smriti. Buddh is Guna of Atma. It manifests with the combination of Atma and Manas. The concept of Buddh can be conveniently correlated with the concept of intelligence. Intelligence depends upon the ability to observe, to comprehend, to retain and to recall.

Therefore Buddh Sthana may be considered mainly as prefrontal lobe, Wernicke’s area, anterior part of temporal lobe, thalamus, hypothalamus, hippocampus and other regions of cerebral cortex etc. The aggregated and coordinated activities of all these structures like self-control, undistractibility, concentration, memory, initiation and orientation etc are monitored by Buddhi.

Sushrut has separately discussed the development of Chetana, Manas and Buddh in 4th, 5th and 6th months respectively. But Charak included all these under Chetana and described its development in 3rd month.

REFERENCES