

# Mapping Ajna Chakra: A Review of Its Probable Neuroanatomical and Endocrine Connections

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**Abstract**—Ajna Chakra, traditionally described in yogic literature as the “command center” of consciousness, is considered one of the most significant psychic centers within the subtle body system. Located between the eyebrows and associated with intuition, perception, cognition, and mental clarity, Ajna Chakra occupies a central role in meditation and higher mental functioning. Ancient yogic and Ayurvedic texts describe it as the seat of wisdom, mental discipline, and internal awareness. In modern scientific interpretation, researchers have attempted to correlate Ajna Chakra with neuroanatomical and endocrine structures such as the pineal gland, pituitary gland, hypothalamus, limbic system, optic chiasma, and frontal cortical networks.

The present review explores the probable anatomical, neurological, and endocrine correlates of Ajna Chakra through an integrative analysis of classical yogic descriptions and modern biomedical sciences. The review further examines the physiological significance of meditation, pranayama, and yogic practices in modulating stress, neuroendocrine function, circadian rhythm, emotional regulation, and cognitive processes. Special emphasis is placed on the pineal gland due to its central role in melatonin secretion and consciousness regulation, which parallels many symbolic descriptions of Ajna Chakra. The article also discusses the role of Ajna Chakra imbalance in stress-related disorders, psychosomatic illnesses, anxiety, sleep disturbances, and impaired cognitive functioning. Existing experimental and clinical evidence regarding meditation-induced neuroplasticity and hormonal modulation are reviewed to establish possible scientific explanations for yogic concepts. The integration of Ayurveda, yoga, neuroscience, endocrinology, and psychophysiology provides a broader understanding of Ajna Chakra and its potential relevance in holistic health sciences.

**Index Terms**—Ajna Chakra, Pineal gland, Pituitary gland, Neuroanatomy, Endocrinology, Yoga, Meditation, Ayurveda, Stress, Neurophysiology

## I. INTRODUCTION

The ancient sciences of Ayurveda and Yoga describe the human body not only in terms of gross anatomical structures but also through subtle physiological and energetic systems. Yogic philosophy proposes the existence of Nadis, Chakras, and Pranic pathways that regulate physical, mental, emotional, and spiritual functions. Among these subtle centers, Ajna Chakra occupies a unique position because it is considered the center of command, intuition, mental perception, and higher consciousness.

The word “Ajna” is derived from the Sanskrit root meaning “to command,” “to perceive,” or “to know.” Ajna Chakra is traditionally situated between the eyebrows in the region commonly referred to as the “third eye.” Yogic literature describes it as a two-petaled lotus associated with mental clarity, awareness, concentration, and spiritual awakening. It is also believed to control lower chakras and regulate mental and sensory functions.

Classical yogic texts such as Hatha Yoga Pradipika, Shiva Samhita, Gheranda Samhita, and Sat Chakra Nirupana describe Ajna Chakra as a psychic center connected with the Ida, Pingala, and Sushumna Nadis. These nadis symbolize the flow of vital energy and are considered essential for maintaining harmony between body and mind.

Modern researchers have attempted to identify probable anatomical correlates of Ajna Chakra based on its location and functional descriptions. Structures such as the pineal gland, pituitary gland, hypothalamus, optic chiasma, limbic system, and prefrontal cortex have been proposed as possible correlates. These structures are involved in endocrine regulation, emotional processing, cognition, circadian rhythm, autonomic regulation, and consciousness.

In recent decades, neuroimaging studies and psychophysiological investigations have demonstrated that meditation and yogic practices can influence brain activity, hormonal balance, stress responses, and cognitive performance. These findings have encouraged interdisciplinary attempts to understand traditional yogic concepts through modern scientific frameworks.

The present review aims to critically analyze the possible neuroanatomical and endocrine associations of Ajna Chakra and explore their relevance in health, stress regulation, and consciousness studies.

## II. AIM OF THE REVIEW

To explore and critically analyze the probable neuroanatomical and endocrine correlations of Ajna Chakra through an integrative review of yogic literature, Ayurvedic concepts, neuroanatomy, endocrinology, and modern scientific research.

### 2.1 Objectives

1. To review classical yogic and Ayurvedic descriptions of Ajna Chakra.
2. To identify probable neuroanatomical structures associated with Ajna Chakra.
3. To analyze endocrine associations of Ajna Chakra, especially the pineal and pituitary glands.
4. To evaluate the effect of meditation and pranayama on neuroendocrine regulation.
5. To explore the relationship between Ajna Chakra and stress-related disorders.
6. To discuss scientific evidence supporting the psychophysiological effects of yogic practices.

### 2.2 Concept of Chakra in Yogic Science

The chakra system forms an essential component of yogic physiology. Chakras are considered subtle energy centers situated along the spinal axis and are

associated with physical organs, endocrine glands, emotional states, and spiritual functions.

The six primary chakras described in yogic texts are:

1. Muladhara Chakra
2. Swadhisthana Chakra
3. Manipura Chakra
4. Anahata Chakra
5. Vishuddha Chakra
6. Ajna Chakra

Above these lies Sahasrara Chakra, which represents ultimate consciousness and spiritual integration.

Each chakra is symbolically represented by petals, colors, bija mantras, deities, and specific psychological attributes. The chakras are believed to influence physical health, emotional balance, and mental functioning through the flow of prana.

Ajna Chakra is particularly important because it is regarded as the center of intuition, discrimination, intellect, memory, and inner awareness.

## III. CLASSICAL DESCRIPTION OF AJNA CHAKRA

### A. Location

Ajna Chakra is traditionally located between the eyebrows in the midline of the forehead. Internally, it is believed to correspond to deeper intracranial structures.

### B. Symbolism

Ajna Chakra is represented as a lotus with two petals, symbolizing duality, balance, and integration of opposite energies.

### C. Associated Elements

- Color: Indigo or deep blue
- Bija Mantra: Om
- Presiding deity: Ardhanarishwara or Shiva
- Element: Mind or Mahat Tattva

### D. Functional Attributes

Classical yogic texts attribute the following functions to Ajna Chakra:

- Concentration
- Intuition
- Wisdom
- Decision making
- Memory

- Imagination
  - Internal perception
  - Mental discipline
  - Regulation of consciousness
- Ajna Chakra is also considered the gateway between the physical and spiritual dimensions of awareness.

#### IV. NEUROANATOMICAL CORRELATIONS OF AJNA CHAKRA

The exact anatomical representation of chakras remains uncertain because chakras belong primarily to the subtle body concept. However, several neuroanatomical structures exhibit functional similarities with Ajna Chakra.

##### A. Pineal Gland

The pineal gland is one of the most commonly proposed anatomical correlates of Ajna Chakra.

##### B. Anatomy

The pineal gland is a small endocrine structure located near the center of the brain between the two cerebral hemispheres. It forms part of the epithalamus.

##### C. Physiology

The gland secretes melatonin, which regulates circadian rhythm, sleep-wake cycles, seasonal biological rhythms, and neuroendocrine balance.

##### D. Relevance to Ajna Chakra

The pineal gland has been linked with:

- Light perception
- Biological rhythms
- Consciousness regulation
- Meditation-related neurophysiology
- Spiritual symbolism of the “third eye”

Ancient mystical traditions often regarded the pineal gland as a seat of higher consciousness due to its central location and photosensitive properties.

##### E. Pituitary Gland

The pituitary gland is another major structure associated with Ajna Chakra.

##### F. Anatomy

Located within the sella turcica beneath the hypothalamus, the pituitary gland is considered the master endocrine gland.

##### G. Physiology

It regulates:

- Growth hormone secretion
- Thyroid function
- Adrenal function
- Reproductive hormones
- Lactation
- Stress response

##### H. Relation to Ajna Chakra

The command function attributed to Ajna Chakra parallels the regulatory role of the pituitary gland over multiple endocrine systems.

#### V. HYPOTHALAMUS

The hypothalamus integrates autonomic, endocrine, emotional, and behavioral responses.

##### A. Functions

- Temperature regulation
- Hunger and thirst regulation
- Emotional integration
- Circadian rhythm control
- Stress response coordination

The hypothalamus acts as a bridge between the nervous and endocrine systems, closely resembling the integrative nature of Ajna Chakra.

##### B. Limbic System

The limbic system includes structures such as:

- Amygdala
- Hippocampus
- Cingulate gyrus
- Hypothalamus

These regions regulate:

- Emotions
- Memory
- Motivation
- Learning
- Behavioral responses

Meditative practices associated with Ajna Chakra activation may influence limbic activity and emotional processing.

##### C. Prefrontal Cortex

The prefrontal cortex is involved in:

- Attention
- Planning

- Judgment
- Self-awareness
- Executive functioning
- Emotional control

Functional MRI studies indicate increased activation and cortical thickness in prefrontal regions among experienced meditators.

#### D. Optic Chiasma

Due to the location of Ajna Chakra between the eyebrows and behind the forehead, some authors correlate it with the optic chiasma and optic pathways. Visual imagery, imagination, and internal visualization practices in meditation may indirectly involve these structures.

#### E. Endocrine Associations of Ajna Chakra

The endocrine system plays a central role in maintaining physiological balance through hormonal regulation. Ajna Chakra is believed to influence endocrine harmony, particularly through pineal-pituitary-hypothalamic interactions.

#### F. Pineal-Pituitary Axis

The pineal gland influences melatonin secretion, which indirectly affects pituitary function through hypothalamic regulation.

Meditation practices have been associated with:

- Increased melatonin levels
- Reduced cortisol secretion
- Improved sleep quality
- Enhanced emotional stability

These effects support the hypothesis that yogic practices targeting Ajna Chakra may modulate neuroendocrine balance.

#### G. Stress Hormones and Ajna Chakra

Chronic stress activates the hypothalamic-pituitary-adrenal axis, leading to increased cortisol secretion.

Long-term elevation of cortisol may cause:

- Anxiety
- Depression
- Sleep disturbances
- Cognitive impairment
- Immune dysfunction

Meditation and pranayama practices focusing on Ajna Chakra may reduce sympathetic overactivity and normalize stress hormone levels.

#### H. Ajna Chakra and Stress Regulation

Stress is one of the major contributors to psychosomatic disorders in modern society. Yogic science considers imbalance of mental energy centers as a factor in emotional and psychological disturbances. Ajna Chakra is associated with mental clarity, emotional regulation, and internal equilibrium.

#### I. Neurophysiology of Stress

Stress activates:

- Sympathetic nervous system
- Hypothalamic-pituitary-adrenal axis
- Cortisol secretion
- Catecholamine release

Prolonged stress adversely affects brain structures such as the hippocampus and prefrontal cortex.

#### J. Yogic Modulation of Stress

Practices associated with Ajna Chakra include:

- Meditation
- Bhramari Pranayama
- Anulom Vilom
- Om chanting
- Trataka
- Mindfulness practices

These techniques may produce:

- Reduced cortisol levels
- Increased parasympathetic activity
- Improved concentration
- Better emotional control
- Enhanced sleep quality
- Reduced anxiety

## VI. MEDITATION AND BRAIN FUNCTION

Meditation produces measurable neurophysiological changes.

#### A. Electroencephalographic Changes

Meditation has been associated with:

- Increased alpha wave activity
- Enhanced theta synchronization
- Improved neural coherence

These changes correlate with relaxation, attention, and altered states of consciousness.

#### B. Neuroplasticity

Long-term meditation may increase gray matter density in:

- Prefrontal cortex
- Hippocampus
- Insula
- Anterior cingulate cortex

These areas are involved in attention, memory, emotional regulation, and self-awareness.

#### C. Functional Connectivity

Meditation enhances communication between cortical and subcortical regions, potentially improving emotional stability and cognitive flexibility.

- Scientific Studies Related to Ajna Chakra
- Several studies indirectly support concepts associated with Ajna Chakra.
- Melatonin and Meditation

Research has shown elevated melatonin levels in meditators, suggesting pineal gland activation during deep meditative states.

#### D. Cortisol Reduction

Meditation and pranayama reduce serum cortisol levels and improve stress adaptation.

#### E. Functional MRI Findings

Neuroimaging studies reveal altered activity in:

- Prefrontal cortex
- Default mode network
- Limbic system
- Thalamic circuits

These findings support the relationship between meditation and higher-order brain functions.

#### F. Autonomic Regulation

Yoga practices improve autonomic balance by increasing vagal tone and reducing sympathetic dominance.

### VII. AJNA CHAKRA AND PSYCHOSOMATIC DISORDERS

A. Disturbances in mental balance may contribute to psychosomatic disorders.

Conditions potentially associated with Ajna Chakra imbalance include:

- Anxiety disorders
- Depression
- Insomnia
- Chronic stress

- Migraine
- Attention disturbances
- Emotional instability

Yogic interventions targeting Ajna Chakra may help improve psychological well-being and quality of life.

#### B. Ayurvedic Perspective

Ayurveda emphasizes the relationship between mind, body, consciousness, and health.

Ajna Chakra may be correlated with:

- Manovaha Srotas
- Satva balance
- Higher mental faculties
- Buddhi and Dhi
- Prana Vayu
- Sadhaka Pitta

According to Ayurveda, mental imbalance and stress can disturb doshic equilibrium and contribute to disease manifestation.

Meditation, pranayama, sattvic diet, and behavioral discipline are recommended for maintaining mental harmony.

#### C. Probable Integrated Model of Ajna Chakra

Based on classical descriptions and scientific evidence, Ajna Chakra may represent a functional integration of:

- Pineal gland
- Pituitary gland
- Hypothalamus
- Limbic system
- Prefrontal cortical networks
- Autonomic nervous system

Rather than representing a single anatomical structure, Ajna Chakra may symbolize a multidimensional psycho-neuroendocrine regulatory network.

#### D. Limitations in Scientific Correlation

Despite growing interest, several limitations remain:

1. Chakras are subtle metaphysical concepts not directly identifiable through conventional anatomy.
2. Most correlations remain theoretical.
3. Standardized research methodologies are lacking.
4. Many studies have small sample sizes.
5. Objective biomarkers for chakra activity are not established.
6. Cultural and philosophical interpretations vary.

Further interdisciplinary research is required to establish stronger scientific understanding.

#### VIII. FUTURE RESEARCH DIRECTIONS

Future studies may focus on:

- Neuroimaging during chakra meditation
- Hormonal changes associated with meditation
- EEG-based mapping of meditative states
- Autonomic nervous system modulation
- Longitudinal studies on stress reduction
- Integrative psych neuroendocrine models
- Clinical trials on yoga-based interventions

Advanced neuroscientific tools may provide deeper insights into traditional yogic concepts.

#### IX. DISCUSSION

Ajna Chakra represents one of the most intriguing intersections between ancient spirituality and modern neuroscience. Yogic literature describes it as a center of command, awareness, intuition, and higher consciousness. Modern science identifies several intracranial structures with similar functional properties, including the pineal gland, hypothalamus, pituitary gland, limbic system, and prefrontal cortex.

The pineal gland is especially relevant due to its central location and role in melatonin secretion, biological rhythm regulation, and neuroendocrine integration. Similarly, the pituitary gland functions as a master regulator of endocrine activity, reflecting the controlling aspect attributed to Ajna Chakra.

Meditation and pranayama practices associated with Ajna Chakra activation have demonstrated measurable effects on stress physiology, emotional regulation, cognitive function, and autonomic balance. Neuroimaging studies support the idea that meditation influences higher cortical networks and limbic structures involved in self-awareness and emotional stability.

Although direct anatomical identification of Ajna Chakra remains speculative, available evidence suggests that the concept may represent a functional psych neuroendocrine integration rather than a discrete physical structure. The integration of yogic science with modern neuroscience may contribute significantly to holistic medicine, stress management, preventive healthcare, and consciousness research.

#### X. CONCLUSION

Ajna Chakra occupies a central position in yogic physiology and spiritual psychology. Classical texts describe it as the command center governing intuition, concentration, perception, and higher awareness. Modern scientific interpretation suggests possible correlations with the pineal gland, pituitary gland, hypothalamus, limbic system, and prefrontal cortical regions.

The neuroendocrine and psychophysiological effects of meditation and pranayama support the hypothesis that yogic practices influence brain function, hormonal balance, emotional regulation, and stress adaptation. Although definitive anatomical identification remains uncertain, Ajna Chakra may be understood as a symbolic representation of integrated psych neuroendocrine functioning.

The convergence of Ayurveda, Yoga, neuroscience, endocrinology, and psychology provides a promising framework for understanding the relationship between consciousness and human physiology. Further scientific research is required to validate these correlations and explore their therapeutic applications in modern healthcare.

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