

PART I

**CONCEPT OF DHĀRAṆĀ ACCORDING
TO YOGA AND SPIRITUAL LORE**

PART II

**CRITICAL FLICKER FUSION IMMEDIATE EFFECT
AFTER JYOTI TRĀṬAKA**

Dissertation Submitted by

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Towards the partial fulfillment of

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[M.Sc. (Yoga)]

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DECLARATION

I hereby declare that the work presented in this dissertation was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA), Bangalore, under the guidance of Dr. Ravi kulkarni and Dr. sarasvati Mohan. I also declare that this work entitled

Part I :

Concept of *Dhāraṇā* according to yoga and spiritual lore.

Part II:

Critical Flicker Fusion immediate effect after *Jyoti Trāṭaka*.

It has not previously formed the basis of any degree, diploma, membership or similar title.

Place: Prashanti Kutiram, Bangalore

Taruna Malik

Date: Dec 2010

CERTIFICATE

This is to certify that this dissertation containing two parts- Part I entitled **Concept of *Dhāraṇā* according to yoga and spiritual lore** and Part II entitled **Critical Flicker Fusion immediate effect after *Jyoti Trāṭaka*** submitted by **Taruna Malik** in partial fulfillment of the degree of Master of Science (Yoga) the work carried out by his under my guidance and supervision. This work has not been submitted anywhere else nor has formed the basis of the award of any other degree.

Dr. Ravi Kulkarani

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Dr. Sarasvati Mohan

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Date: Dec 2010

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Taruna Malik

INTERNATIONAL TRANSLITERATION CODES

Standard International Transliteration Code
(used to transliterate Sanskrit words in the text)

अ	=	a	ड	=	ḍa
आ	=	ā	ढ	=	ḍha
इ	=	i	ण	=	ṇa
ई	=	ī	त	=	ta
उ	=	u	थ	=	tha
ऊ	=	ū	द	=	da
ऋ	=	r	ध	=	dha
ए	=	e	न	=	na
ऐ	=	ai	प	=	pa
ओ	=	o	फ	=	pha
औ	=	au, ou	ब	=	ba
अं	=	m	भ	=	bha
अः	=	ḥ	म	=	ma
क	=	ka	य	=	ya
ख	=	kha	र	=	ra
ग	=	ga	ल	=	la
घ	=	gha	व	=	va
ङ	=	ṅa	श	=	śa
च	=	ca	ष	=	ṣa
छ	=	cha	स	=	sa
ज	=	ja	ह	=	ha
झ	=	jha	क्ष	=	kṣa
ञ	=	ña	त्र	=	tra
ट	=	ṭa	ज्ञ	=	jña
ठ	=	ṭha			

PART I
LITERARY RESEARCH
CONCEPT OF DHĀRAṆĀ ACCORDING
TO YOGA AND SPRITUAL LORE

ABSTRACT

Dhāraṇā is the sixth limb of *Patañjali's Aṣṭāṅga Yoga*. It means "concentration". It is further explained in *Patañjaliyogasūtra*:

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प० यो० सू० ॥

Deśabandhaścittasya dhāraṇā ||3\1|| P. Y. S.

Concentration (*Dhāraṇā*) is the process of holding or fixing the attention of the mind onto one object or place.

Dhāraṇā is the practice of training the mind to focus and to concentrate. The point of concentration can be anywhere outside or inside, hence it give the clarity of thought. An object selected for practising has no role to play in the meditation process. Its objective is only used to stop the mind from wandering.

Dhāraṇā helps to achieve the mental state where mind, intellect and ego are controlled, hence mind become purified by the practices. So, it becomes able to focus efficiently.

This study focusses on different aspects of *Dhāraṇā*, using mainly:

- *Patañjaliyogasūtra*, its commentaries by both eastern and western writers and other texts like *GheraṇḍaSamhitā*.

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Chapter 1

INTRODUCTION

Dhāraṇā is translated as "collection or concentration of the mind (joined with the retention of breath)", or "the act of holding, bearing, wearing, supporting, maintaining, retaining, keeping back (in remembrance), a good memory", or "firmness, steadfastness, certainty". This term is related to the verbal root *dhri* i.e. to hold, carry, maintain, resolve.

Dhāraṇā is the sixth stage, step or limb of eight elucidated by Patanjali's *Aṣṭāṅga Yoga* or *Rāja Yoga*. *Dhāraṇā* is the initial step of deep concentrative meditation, where the object being focused upon is held in the mind without consciousness wavering from it. The difference between *Dhāraṇā*, *Dhyāna*, and *Samādhi* (the three together constituting *Samyama*) is that in the former, the object of meditation, the meditator, and the act of meditation itself remain separate. That is, the meditator or the meditator's meta-awareness is conscious of meditating (that is, is conscious of the act of meditation) on an object, and of his or her own self, which is concentrating on the object. In the subsequent stage of *Dhāraṇā*, as the meditator becomes more advanced, consciousness of the act of meditation disappears, and only the consciousness of being/existing and the object of concentration exist in the mind.

Each of us feels a sense of frustration, when we are not able to focus. The inability to focus may be because our minds were racing with ideas, judgments, worries, or even memories. The main idea underlying *Dhāraṇā*, is the ability to focus on something (uninterrupted both by external or internal distraction).

Dhāraṇā is a form of meditation that can be called receptive concentration. With the help of *dhāraṇā* a set of conditions are created that helps the mind focus in one direction and object, rather than concentrating in many directions, thereby diverting the mind. The term *Dhāraṇā* is given to both the practice of deep concentration and the state in which you achieve deep concentration. Ideally, *Dhāraṇā* ' should be performed at every moment of the day to gain utmost control of both body and mind.

Chapter 2

AIMS OF THE STUDY

- To have a brief understanding of *Dhāraṇā* from ancient yogic texts available and literatures.
- To collect information regarding *Dhāraṇā* and make it available for future references.
- To identify the areas of future research.

SOURCES OF INFORMATION

Traditional Texts

Upaniṣads

Bhagavadgītā

Patañjali's yogasūtra

Gheraṇḍa Saṁhitā

CHAPTER 3

MEANING OF DHĀRAṆĀ ACCORDING TO SAṂSKṚT DICTIONARIES

3.1 *The Student's Sanskrit-English Dictionary by Vaman Shivram Apte*

1. The act of holding bearing, supporting, preserving.
2. The faculty of retaining in the mind, a good or retentive memory; धीर्धारणावती मेधा
(*dhīrdhāraṇāvātī medhā*) A.K. 3
3. Memory in general.
4. Keeping the mind collected, holding the breath suspended steady, abstraction of mind;
परिचेतुमुपांशु धारणा (*paricetumupāṁśu dhāraṇām*) R.8.18; Ms. 6. 72.

धारणा - इत्युच्यते चेयं धायते यन्मनो तथा ।

Dhāraṇā - Ityucyate Ceyam Dhāryate Yanmano Tayā

5. Fortitude, firmness, steadiness.
6. A fixed precept or injunction, a settled rule, conclusion; इति धर्मस्य धारणा (*iti dharmasya dhāraṇā*). Ms. 8. 184, 4.38, 9.124.
7. Understanding, intellect
8. Continuance in rectitude, propriety, decorum.

Conviction – comp. योगः (*yogaḥ*) deep devotion or abstraction. शक्तिः (*śaktiḥ*) f. A retentive memory.

3.2 A SANSKRIT -ENGLISH DICTIONARY BY SIR MONIER MONIER
WILLIAMS

The act of holding, bearing, wearing, supporting, maintaining, M. Bh.; R; Retaining, keeping back (also in remembrance), a good memory, kath up; Grs; M.Bh.; Bh.P. : collection and concentration of the mind. (joined with the retainment of breath), Mn; M.Bh.; Suśr.; Kāv; Pur & C.; Cf. Mw. B. 239.

(nām √ dhri, to exercise concentration, yajña.; nām gataḥ, having composed one's self, R.); understanding, intellect, yajña.III, 73; firmness, steadfastness, righteousness, L.; Fixed percept or settled rule, certainty, Mn.; M.Bh.; Pl. the 8th to the 11th day in the light of half month jyaishṭha, var – tmaka (nât) mf(ikā)n. that whose nature consists in bearing itself, sūryas, one who easily collects or composes himself, Suśr – pāraṇa. Vrata, n. N. of wk – maya, mf (i) n. consisting in abstraction of the mind, Bh. P. – yukta, mfn, connected with abstr of m, M.Bh. – yoga, m. abst of the m, deep devotion, MW – vat, mfn. Connected with memory, L.

3.3 ŚABDAKALPADRUMA

धारणा । स्त्री

Dhāraṇā | *Strī*

धारयति या सा । धृ णिच् युच् । टाप् । बुद्धिः । इति राज निघण्टः ॥ यथा याज्ञवल्क्ये ।३।७३ ।

Dhāryate yā sā | *Dhṛ ṇic yuḥ* | *ṭāp* | *Buddhiḥ* | *Iti Rāja Nighaṇṭaḥ* || *Yathā*

Yājñavalkaye | 3 | 73 |

“इन्द्रियाणि मनः प्राणो ज्ञानमायुः सुखं धृति ।

धारणा प्रेरणं दुःखमिच्छाहङ्कार एव च ॥”

न्यायपथस्थितिः । तत्पर्यायः । संस्था २ मर्यादा ३ स्थितिः ४ इत्यमरः । २ । ८ । २६ ॥ यथा मनुः ।

४ । ३८ ।

“Indriyāṇi Manaḥ Prāṇo Jñānamāyuh Sukhaṁ Dhṛtiḥ

Dhāraṇā Preraṇam Duḥkhamicchāhaṅkāra eva ca ॥”

Nyāyapathasthitiḥ | Tatparyāyāḥ | Saṁsthā 2 Maryādā 3 Sthitiḥ 4 Ityamaraḥ | 218|26||

Yathā Manuḥ | 4|38|

“न लङ्घयेत वतसतन्त्रीं न प्रधावेच्च वर्षति ।

न चोदके निरीत्तेत स्वं रूपमिति धारणा ॥ ”योगा विशेषः ॥ इति मेदिनी ॥ ५६ ॥

“Na laṅghayeta vatasatantrīṁ na pradhāvecca varṣati

na codake nirītteta svaṁ rūpamiti Dhāraṇā ॥” Yogā Viśeṣaḥ | Iti Medinī | 56 |

स तु अद्वितीयवस्तुन्यन्तरेन्द्रियधारणम् । इति वेदान्तसारः ॥

Sa tu advitīyavastunyantarendriya Dhāraṇam | Iti Vedāntasāraḥ |

ध्येये चित्तस्य स्थिरबन्धनम् । इति हेमचन्द्रः ॥

Dhyeye Cittasya Sthirabandhanam | Iti Hemacandraḥ |

“तस्मात् समस्तशक्तीनामाधारे तत्र चेतसः ।

कुर्वीत संस्थितिं सा तु विज्ञेया श्रुद्धधारणा ॥ ”इति विष्णुपुराणे ॥६ । ७ । ७४ ॥

“Tasmāt samastāśaktīnāmādhāre tatra cetasaḥ|

Kurvīta samsthitim sā tu vijñeyā śruddhadhāraṇā||” Iti Viṣṇupurāṇe||6|7|74||

ब्रह्मणि मनोधरणम् । यथा, -

“ब्रह्मात्मचिन्ता ध्यानं स्यात् धारणा मनसो धृतिः ।

अहं बृह्मेत्यवस्थानं समाधिर्ब्रह्मणः स्थितिः ॥ ” इति गारूडे ४९ अध्यायः ॥

Brahmaṇi manodhāraṇam| Yathā

*Brahmātmacintā dhyānaṁ syāt dhāraṇā manaso dhṛtiḥ| Ahaṁ bṛhmetyava sthānaṁ
samādhirbrahmaṇaḥ sthitiḥ|| Iti Gārūḍe 49 Adhyāyaḥ||*

अष्टादशप्राणायामादिरूपधारणा यथा, -

“प्राणायामा दशाष्टौ च धारणा साभिधीयते ।

द्वे धारणे स्मृतो योगो मुनिभिस्तत्त्वदर्शिभिः ॥”

प्राणाभ्यां हृदये चात्र तृतीया च तथोरसि ।

कण्ठे मुखे नासिकाये नेत्रभ्रूमध्यमूर्द्धसु ।

किञ्चित्तस्मात् परस्मिंश्च धारणाः परमाः स्मृताः ॥

दशैता धारणाः प्राप्य प्राप्नोत्यक्षरसाम्यताम् ॥

इति गारूडे ।२३० अध्याय ।

Aṣṭādaśaprāṇāyāmādirūpadhāraṇā yathā, -

*Prāṇāyāmā daśāṣṭau ca dhāraṇā sābhidhīyate |
Dve dhāraṇe smṛto yogo munibhistatvadarśibhiḥ ||
Prāṇābhyām hṛdaye cātra tṛtīyā ca tathorasi |
Kaṅthe mukhe nāsikāye netrabhrūmadhyamurddhasu |
Kiñcittasmāt parasmimśca dhāraṇāḥ paramāḥ smṛtāḥ ||
Daśaitā dhāraṇāḥ prāpya prāpnotyakṣarasāmyatām || Iti Gārūḍe | 230 Adhyāya |*

अपि च ।

api ca ||

प्राणायामैर्द्वादशऽभिर्यावत्कालो हतो भवेत् ।
यस्तावत् कालपर्यन्तं मनो ब्रह्मणि धारयेत् ।
तस्यैव ब्रह्मणा प्रोक्तं ध्यानं द्वादश धारणाः ॥
द्वादशध्यानपर्यन्तं मनो ब्रह्मणि यो नरः ।
तुष्टे तु स यतो मुक्तः समाधिः योऽभिधीयते ॥
ध्येयान्न चलते यस्या मनोऽभिध्यायतो भृशम्
प्राप्यावधिकृतं कालं यावत् सा धारणा स्मृता ॥
इति च गारुडे २४० अध्यायः ॥

*Prāṇāyāmaidārdadaśa 'bhiryāvatkālo hrato bhavet |
Yastāvāt kālaparyyantam mano brahmaṇi dhārayet |
Tasyaiva brahmaṇā proktam dhyānam dvādaśa dhāraṇāḥ ||
Dvādaśadhyānaparyyantam mano brahmaṇi yo naraḥ |*

Tuṣṭe tu sa yato muktaḥ samādhiḥ yo'bhidhīyate||
Dhyeyānna calate yasyā mano'bhidhyāyato bhṛśama
Prāṇayāvadhikṛtaṁ kālāṁ yāvāt sā dhāraṇā smṛtā||
iti ca gāruḍe 240 adhyāyaḥ||

3.4 VĀCASPATYAM

धारणा

Dhāraṇā

धारण न.

dhāraṇa na.

धारि - ल्यूट ।

dhāri - lyūṭ।

१ धरणे

1 dharāṇe

२ विचारणे भावे युच् ।

2 vicāraṇe bhāve yuḥ।

३ बुद्धिभेदे ।

3 buddhibhede।

४ राज्ञां न्यायपथस्थितौ च स्त्री अमरः ।

4 rājñāṁ nyāyapathasthitau ca strī āmaraḥ।

५ योगाङ्गभेदे स्त्री तल्लक्षणादिकं पाताञ्जलयोगसूत्र भाष्या उक्तं यथा -

5 yogāṅgabhedē strī tallakṣaṇādikaṁ pātañjalayogasūtra bhā ṣy uktānā yathā -

योगाङ्गानुष्ठानन्तु द्विधैवं कारणत्वं लभते इति योगाङ्गान्यधायर्यन्ते (भा.)

यमनियमासनप्राणायामप्रत्याहारधारणाध्यानसमाध्योऽष्टावङ्गानि (पा. सू.)

yogāṅgānuṣṭhānantu dvidhāvam kāraṇatvam labhate iti yogāṅgānyadhāryante (bhā.)

yamaniyamāsanaprāṇāyāmapratyāhārādhāraṇādhyānasamādhyo'ṣṭāvāṅgāni (Pā. Sū.)

“यथाक्रमं एतेषाम् अनुष्ठानं स्वरूपचं वक्ष्यामः” भा० इति उद्देश्य ।

yathākramam eteṣām anuṣṭhānam svarupaccam vaxayāmaḥ bhā. iti uddeśya|

तेषां मध्ये पञ्चानां लक्षणानि पातञ्जलीयोगसूत्र समाधिपादे दर्शयित्वा धारणादेर्लक्षणानि विभूतिपादे

उक्तानि तत्त्वधारणायाः लक्षणं दर्शितं यथा “उक्तानि पञ्च बहिरङ्गानि साधनानि धारणा वक्तव्या”

भा. आभासः ।

teṣām madhye pañcānām lakṣaṇāni pātañjalīyogasūtra samādhipāde darśayitvā

dhāraṇāderlakṣaṇāni vibhūtipāde uktāni tatvadhāraṇāyāḥ lakṣaṇam darśitam yathā

“uktāni pañca bahiraṅgāni sādhanāni dhāraṇā vaktavyā” bhā. ābhāsaḥ|

देशबन्धश्चित्तस्य धारणा (पा० सू०)

deśabandhaścittasya dhāraṇā (Pā. Sū.)

नाभिचक्रे हृदयपुण्डरीके मूर्ध्नि ज्योतिषि नासिकाये जिह्वाये इत्येवमादिषु देशेषु बाह्ये वा विषये

चित्तस्य वृत्तिमात्रेण बन्ध इति बन्धो धारणा (भा.)

nābhicakre hṛdayapuṇḍarīke mūrdhni jyotiṣi nāsikāye jihvāye ityevamādiṣu deśeṣu bāhye

vā viṣaye cittasya vṛttimātreṇa bandha iti bandho dhāraṇā (bhā.)

प्रथम द्वितीय पादाभ्यां समाधिः तत्साधनं चोक्तम् तृतीयपादे तत्प्रवृत्त्यनुगुणाः अङ्गोत्पादहेतवो विभूतयो वक्तव्याः ताश्च संयमसाध्याः संयमच धारणाध्यानसमाधिसमुदाय इति विभूतिसाधनतया पञ्चभ्यश्च ॥

prathama dvitīya pādābhyāṃ samādhiḥ tatsādhanam cōktam tṛtīyapāde tatapraoṛtṭyanugunāḥ aṅgotpādahetavo vibhūtayō vaktavyāḥ tāśca saṁnyamasādhyāḥ saṁnyamaca dhāraṇādhyāna samādhisamudāya iti vibhūtisādhanatayā pañcabhyaśca.

योगाङ्गेभ्यो बहिरङ्गेभ्योऽस्याङ्गत्रयस्यान्तरङ्गतया विशेषज्ञापमत मन्त्रे त्रयस्योपन्यासः तत्रापि च धारणाः ध्यानसमाधीनां कार्यकारणभावेन नियत पौर्वापर्यत्वान्तद् अनुरोधेन उपन्यासक्रम इति प्रथमं धारणा लक्षणीयेत्याह उक्तानीति देशेति अध्यात्मिकदेशमाह । नाभित्वक्र इति ।

yogāṅgebhyo bahiraṅgebhyo'syāṅgatrayasyāntaraṅgatayā viśeṣajñāpamata mantre trayasyopanyāsaḥ tatrāpi ca dhāraṇāḥ dhyānasamādhinām kāryakāraṇabhāvena niyata paurvā paryatvāntad anurodhena upranyāsakrama iti prathamam dhāraṇā lakṣaṇīyetyāha uktānīti deśeti adhyātmikadeśamāha | nābhivakra iti |

आदिशब्देन ताल्वादयो ग्राह्याः बन्धः सम्बन्धः । बाह्यदेशमाह बाह्य इति । बाह्ये च न स्वरूपणं चित्तस्य सम्बन्धः सम्भवतीत्युक्तं वृत्तिमात्रेण इति अत्रापि पुराणम् प्राणायामनं पवनं प्रत्याहारेण चेन्द्रियम् ।

ādīśabdena tālvādayo grāhyāḥ bandhaḥ sambandhaḥ | bāhyadeśamāha bāhyaiti | bāhye ca na svarūpaṇam cittasya sambandhaḥ sambhavatītyuktam vṛttimātreṇa iti atrāpi purāṇam prāṇāyāmanam pavanam pratyāhāreṇa cendriyam |

वशीकृत्य तैतः कुर्याच्चित्तस्थानं शुभात्रये शुभात्रया बाह्या हिरण्यगर्भवासवप्रजापतिप्रभृतयः हृदञ्च
तत्रोक्तम् । मूर्ते भगवतोरुप सर्वोपात्रयनिष्पृहम् । एषा वै धारणा ज्ञेया याच्चित्त तत्र धायते । तच्च
मूर्ते हरेरुपं तद्विचिन्त्य नराधिपे । तत् यतामनाधारा धारणां नोमपद्यते ।

*vaśīkṛtya taitaḥ kuryāccittasthānaṁ śubhātraye śubhātrayā bāhyā
hiraṇyagarbhavāsavaprajāpatiprabhṛtayaḥ hradañca tatroktam| mūrte bhagavatorupa
sarvopātrayanisṣṛham| eṣā vai dhāraṇā jñeyā yācitta tatra dhāryate| tacca mūrte hare
rupaṁ tadvicintya narādhipē| tat yatāmanādhārā dhāraṇāṁ nomapadyate|*

प्रसन्नवदनं चारु पद्मपत्रनिभेक्षणम् ।

सुकपोलं सुविस्तीर्णं ललाट फलकोज्वलम् ।

समकर्णान्तविन्यस्यस्त चारु कुण्डल भूषणम् ।

कम्बुग्रीवं सुविस्तीर्य श्रीपत्मङ्कितवक्षसम् ।

*prasannavadanaṁ cāru padmapatranibhekṣaṇam|
sukapolaṁ suvistīrṇaṁ lalāṭa phalakojovalam|
samakarṇāntavinyasyasta cāru kuṇḍala bhūṣaṇam|
kambuḡrīvāṁ suvistīryaṁ śrīpatmaṅkitavakṣasam|*

वलीविभङ्गिना मयनाभिना चोदरेक्ष च । प्रलम्बाष्टभुजं विष्णुमथ वापि चतुर्भुजम् ।

समस्थितोरुजङ्घञ्च स्वास्तिकाङ्घ्रि कराम्बुजम् । चिन्तयेदु ब्रह्मभूतं तं पीतनिर्मलवाससम् ।

*valīvibhaṅginā mayanābhinā codarekṣa ca| pralambāṣṭabhujam viṣṇumatha vāpi
caturbhujam| samasthitorujaṅghañca svāstikāṅghi karāmbujam| cintayedu brahmbhūtaṁ
taṁ pītanirmalavāsasam|*

किरीटहारकेयूरकटकादिविभूषितम् । शार्ङ्गचक्रगदाखड्गशाङ्खाक्षवलयान्वितम् । चिन्तयेत्तन्मयो
योगी समाधयात्ममानसम् । तावत् यावत् दृढीभूतो तत्रैव नृप धारणा । एतदातिष्ठतोऽन्यद्वा
स्वेच्छया कर्म सर्वतः । नाप्याति यदा चित्तं सिङ्गां मन्येत तां तदेति विदूतिः ।

*kirīṭahārakeyūrakṭakādivibhūṣitam | śāṅgacakraḡadākhaḡaśāṅkhākṣavalayānvitam |
cintayettanmayo yogī samādhāyātmamānasam | tāvat yāvat dṛḡḡbhūto tatraiva nṛpa
dhāraṇā | etadātiṣṭhato'nyadvā sveckayā karma sarvataḥ | nāpyāti yadā cittam siṅgām
manyeta tāṁ tadeti |*

सां सूत्रोक्ते पूरणरेचककुम्भकारख्यप्राणनिरोधरूपे चित्तवशीकरणे प्राणायामभेदे च । यथा

“ध्यानस्यापि साधनायाह” भा

“धारणासनस्वकर्मणा ततसिद्धिः” (सां. सू.)

वक्ष्यमाणेन धारणादि त्रयेण ध्यानं भवतीत्यर्थः ।

*sām sūtrokte pūraṇarecakakumbhakākhyaprāṇanīrodharupe cittavaśīkaraṇe
prāṇāyāmabhede ca | yathā dhyānasyāpi sādhnānyāha bhā dhāraṇāsanasoakarmaṇā
tatasiddhiḥ (sām. sū.) vakṣyamāṇena dhāraṇādi trayeṇa dhyānam bhavatītyarthaḥ |*

धारणादित्रयं क्रमात् सूत्रत्रयेण लक्षयति । “निरोधमूर्द्धि विधारणाभ्याम्” सू० प्राणस्तेति प्रसिद्धया

लभ्यते । प्रछर्दन विधारणाभ्यां वा प्रणस्येति योगसूत्रे भाषाकारेण प्रणायामस्य व्याख्यातत्वात् ।

छर्दिश्च वमनम् । विधारण त्याग इति यावत् । तेन पूरणरेचनयोर्लाभः । धारणश्च कुम्भकम् ।

*dhāraṇādītrayaṁ kramāt sūtratrayeṇa lakṣayati | “nīrodhamūrdhi vidhāraṇābhyām” sū0
prāṇasteti prasiddhayā labhyate | prachardana vidhāraṇābhyām vā praṇasyeti yogasūtre*

*bhāṣākāreṇa praṇāyāmasya vyākhyātavāt| chardiśca vamanam| vidhāraṇa tyāga iti
yāvata| tena pūraṇarecanayorlābhaḥ| dhāraṇaśca kumbhakam|*

तथा च प्राणस्य पूरकरेचककुम्भकैर्यो निरोधो वशीकरणं सा धारणेत्यर्थः । आसनादेः स्वशब्देन

पञ्चालक्षणीयतयासूत्रे परिशेषत एव धारणायालक्ष्यत्वलाभाङ्गारणापदं नोपात्तम् । चित्तस्य धारणा

तु समाधिवद्ध्ययानशब्दे नैव गृतेत्युक्रम । प० भा०

*tathā ca prāṇasya pūrakarecakakumbhakairyo nirodho vaśīkaraṇam sā dhāraṇetyarthaḥ|
āsanādeḥ svaśabdena pañcālakṣaṇīyatayāsūtre pariśeṣata eva
dhāraṇāyālakṣyatvalābhāṅgāraṇāpadam nopāttam| cittasya dhāraṇā tu
samādhivaddhyayānaśabde naiva gr̥tetyukram| pa. bhā.*

3.5 AMARAKOŚA

संस्था तु मर्यादा धारणा स्थितिः ॥२५॥

saṁsthā tu maryādā dhāraṇā sthitiḥ||25||

Meaning:-

Samsthā:- By this act it is stable, The universe will be healthy.

Maryādā:- Limit. मर्य =limit; दा =giver; it will not cross the limit.

Dhāraṇā:- It is held by this.

Sthitiḥ:- It is situated in this.

CHAPTER 4

MEANING OF DHĀRAṆĀ ACCORDING TO SĀMSKRĪT LORE

5.1 RAGHUVAMŚĀ

नृपतिः प्रकृतीखेक्षितुं व्यवहारासनमाददे युवा ।

परिचेतुमुपांशु धारणां कुशपूतं प्रवयास्तु विष्टरम् ॥ ८ । १८ ॥ (अष्टम वर्ग । अष्टादश श्लोकः ॥)

nṛpatiḥ prakṛtikhekṣitum vyavahārāsanamādade yuvā

paricetumupāṁśu dhāraṇām kuśapūtam pravayāstu viṣṭaram ॥

(aṣṭam varga | aṣṭādaśa ślokaḥ ॥)

संजी ॥ - नृपतिरिति । युवा नृपतिरजः प्रकृतीः प्रजाः कार्यार्थिनीरवेक्षितुम् ।

दुष्टदुष्टपरिज्ञानार्थमित्यर्थः । व्यवहारासनं धर्मासनम् । आददे स्वीचकार । प्रवयाः स्थविरो नृपती

रघुस्तु । प्रवयाः स्थविरो वृद्धः इत्यमरः । धारणां चित्तस्यैकाग्रतां परिचेतुमशयसितुम् । उपांशु

विजने । उपांशु विजने प्रोक्तम् इति हलायुधः । कुशैः पूतं विष्टरमासनमाददे ।

“ यमादिगुणसयुक्ते मनसः स्थितिरात्मनि ।

धारणा प्रोच्यते सद्भिर्योगशास्त्रविशारदैः” ॥ इति वशिष्ठः ॥१८ ॥

sañjī. - nṛpatiriti | yuvā nṛpatirajaḥ prakṛtīḥ prajāḥ kāryārthinīravekṣitum

duṣṭāduṣṭaparijñānārthamityarthaḥ | vyavahārāsanam dharmāsanam | ādade svīcakāra

pravayāḥ sthaviro nṛpatī raghustu | pravayāḥ sthaviro vṛddhaḥ ityamarah | dhāraṇām

cittasyaikāgratām paricetumaśyasitum | upāṁśu vijane | upāṁśu vijane proktam iti

*halāyudhaḥ| kuśaiḥ pūtaṁ viṣṭaramāsanamādade| yamādiguṇasayukte manasaḥ
sthitirātmani| dhāraṇā procyate sadbhiryogaśāstraviśāradaḥ||iti vaśiṣṭhaḥ||18||*

अन्वयः - युवा नृपतिः प्रकृतीः अवेक्षितुं व्यवहारासनम् आददे प्रवयाः नृपतिस्तु धारणां परिचेतुम्
उपांशु कुशपूतं विष्टरम् आददे ।

*anvayaḥ - yuvā nṛpatiḥ prakṛtīḥ avekṣituṁ vyavahārāsanam ādade pravayāḥ nṛpatistu
dhāraṇāṁ paricetuma upāṁśu kuśapūtaṁ viṣṭaram ādade|*

5.2 MANUH SMRTI

न लङ्घ्येद्वत्सतन्त्री न प्रधावेच्च वर्षति ।

न चोदके निरीक्षेत स्वं रुपमिति धारणा ॥४॥३८॥

*na laṅghyedvatsatantrī na pradhāvecca varṣati|
na codake nirīkṣeta svaṁ rupamiti dhāraṇā||4||38||*

meaning:- he must not leap over the tether of a calf, nor run while it is raining, nor looks at his image in the water this is a injunction(of the śāstra)

5.3 VISNUPURĀNA

Once upon a time there was a king called *Dharma Dhvaja Janaka*. He has two grandsons one is *Keśi Dhvaja* who is the knower of *ātma vidyā* and second is *Khāṇḍikya* who is the knower of *karma vidyā*. Ones *Khāṇḍikya* ask to *Keśi Dhvaja* what is the way to destroy all the impurities of *chitta*?

Then *Keśi Dhvaja* describes the way in the sixth part eighth chapter sutra 73 to 75:-

तद्रूपं विश्वरूपस्य तस्य योगयुजा नृप ।

चिन्त्यमात्मविशुद्ध्यर्थं सर्वकिल्बिषनाशनम् ॥६॥८॥७३

tadrūpaṁ viśvarūpasya tasya yogayujā nṛpaḥ

cintyamātmaviśuddhyartham sarvakilbiṣanāśanam ॥6॥8॥73

यथाग्निरुद्धतशिखः कक्षं दहति सानिलः ।

तथा चित्तस्थितो विष्णुर्योगिनां सर्वकिल्बिषम् ॥६॥८॥७४ ॥

yathāgniruddhataśikhaḥ kakṣam dahati sānilaḥ

tathā cittasthito viṣṇuryoginām sarvakilbiṣam ॥6॥8॥74 ॥

तस्मात्समस्तशक्तीनामाधारे तत्र चेतसः ।

कुर्वीत संस्थितिं सा तु विज्ञेया शुद्धधारणा ॥७५ ॥

tasmātsamastaśaktīnāmādhāre tatra cetasaḥ

kurvīta samsthitim sā tu vijñeyā śuddhadhāraṇā ॥75॥

Meaning:- O king, to destroy the impurities of the *citta*, yoga practicer should concentrate on the universal form of the lord, who destroyes all the sins. As the huge flame of fire with air burn *śuṣka trṇa samūha* in the same way lord *Viṣṇu*, who is staying in the *citta* of a *Yogī* destroy his all the sins. So you should keep the image of lord *Viṣṇu* in the *chitta* who is the base of all the powers, that is the pure *Dhāraṇā*.

5.4 GĀRŪDAPURĀNA

षट्त्रिंशन्मात्रिकं श्रेष्ठः प्रत्याहारश्च रोधनम् ॥

ब्रह्मात्मचिन्ता ध्यानं स्यात् धारणा मनसो धृतिः ॥३६॥

Ṣaṭṭriṁśanmātrikaṁ śreṣṭhaḥ pratyāhāraśca rodhanam ॥

Brahmātmacintā dhyānaṁ syāt dhāraṇā manaso dhṛtiḥ ॥36॥

Absolute suspension of breath is called *Kumbhaka*. Expiration by one nostril is called *recaka*. The withdrawal of the organs of senses from external objects is called *Pratyāhāraḥ*. *Dhyāna* is the meditation on self or Brahman. The steadying of the mind is called *Dhāraṇā*.

अहं बृह्मेत्यवस्थानं समाधिर्ब्रह्मणः स्थितिः ॥

अहमात्मा परं ब्रह्म सत्यं ज्ञानमनन्तकम् ॥३७॥

Ahaṁ bṛhmetyavasthānaṁ samādhirbrahmaṇaḥ sthitiḥ ॥

Aha mātma paraṁ brahma satyaṁ jñānamanantakam ॥37॥

The state of mind in which one's soul is absolutely immersed in Brahman and when he thinks 'I am Brahma' is called *Samādhi*. I am self, the Param-Brahma, ever existent, full of knowledge and without end.

इति श्री गारुडे महापुराणे पूर्वखण्डे प्रथमांशाख्ये आचारकाण्डे वर्णाश्रमधर्मनिरूपणसं

नामैकोनपञ्चाशत्तमोऽध्यायः ॥४९॥

iti śrī gāruḍe mahāpurāṇe pūrvakhaṇḍe prathamāṁśākhye ācārakaṇḍe

varṇāśramadharmanirupaṇasaṁ nāmaikonapañcāśtṭamodhyāyaḥ ॥49॥

5.5 VEDĀNTA-SĀRA

अद्वितीयवस्तुन्यन्तरिन्द्रियधारणं धारणा ॥२०६॥

advitīyavastunyantarindriyadhāraṇam dhāraṇā ||206||

Meaning:-

“Concentration (*Dhāraṇā*) means the fixing of the mind on Brahman, the one without a second.”

Dhāraṇā is to keep the mind on super consciousness (Brahman) who don't have a second identity or form. When you hold the object which is *Advitīya* (the one without second), in the *chitta* that process called *Dhāraṇā*.

Chapter 5

MEANING OF DHĀRAṆĀ ACCORDING TO YOGIC TEXTS

5.1 PĀTAÑJALİYOGASŪTRA

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प. यो. सू. ॥

Deśabandhaścittasya dhāraṇā ॥3\1॥ P. Y. S.

Concentration (*Dhāraṇā*) is the process of holding or fixing the attention of mind onto one object or place.

- *Deśa* = place, object, point, spot
- *Bandhaḥ* = binding to, holding, fixing, uniting
- *Cittasya* = of the mind, consciousness
- *Dhāraṇā* = concentration, focusing, directing attention

Dhāraṇā according to *Maharshi Patañjali* is a practice to focus the mind on a particular thing and bring back the wandering mind to the same object over and over again. *Dhāraṇā* helps one in concentrating on a single object and therefore brings in peace of mind by avoiding all thoughts, which the person wants himself to restrain from.

5.2 BHAGAVADGĪTĀ

चञ्चलं हि मनः कृष्ण प्रमाथि बलबद्धदम् ।

तस्याहं निग्रहं मन्ये वायोरिव सुदुष्करम् ॥६।३४॥ भगवद्गीता ॥

Cañcalam hi manaḥ kṛṣṇa pramāthi balabaddadaḍham |

Tasyāham nigrahaṁ manye vāyoriva suduṣkaram ||6|34|| bhagavadgītā ||

Meaning

O *Kṛṣṇa* , Verily, the mind is fickle, turbulent, powerful and unyielding. To control it, I think is as difficult as controlling the wind itself, So later *kṛṣṇā* gives the teaching to Arjuna for various kinds of practices of *Dhāraṇā*.

The goal of yoga is modification of mind. *Dhāraṇā* is the first step of *Antaraṅga Yoga*; this leads to *Samādhi*. It helps to bring back the mind to the single object.

तत्रैकाग्रं मनः कृत्वा यतचित्तेन्द्रियक्रियह् ।

उपविश्यासने युञ्ज्यात् योगमात्मविशुद्धये ॥६।१२॥

Tatraikāgraṁ manaḥ kṛtvā yatacittendriyakriyah |

Upaviśyāsane yuñjyāt yogamātmaviśuddhaye ||6|12||

Meaning

There, having made the mind one-pointed, with the actions of the mind and the senses controlled, being seated on the seat let him practice yoga for the purification of the self.

समं कायशिरोग्रीवं धारयन्नचलं स्थिरः ।

संप्रेक्ष्य नासिकाग्रं स्वं दिशश्चानवलोकयन् ॥६।१३॥

Samam kāyaśirogrīvaṁ dhārayannacalam sthiraḥ |

Samprekṣya nāsikāgraṁ svaṁ diśaścānavalokayan ||6|13||

Meaning

Let him firmly holds his body, head, and neck erect and still, gazing at the tip of his nose, without looking around.

प्रशान्तात्मा विगतभीः ब्रह्मचारिव्रते स्थितः ।

मनः संयम्य मच्चित्तो युक्त आसीत् मत्परः ॥६॥१४॥

Praśāntātmā vigatabhīḥ brahmacārivrate sthitaḥ।

Manah saṁyamya maccitto yukta āsīt matparaḥ॥6॥14॥

Meaning

Serene-minded, fearless, firm in the vow of Brahmacharya, having controlled mind, thinking of Me and balanced, let him sit, having Me as the Supreme Goal

5.3 GHERANDASAMHITĀ

Gheraṇḍasaṁhitā gives a story to explain different types of *Dhāraṇā-Mudrās*

There was a crow named *Bhuṣuṇḍa*, who is actually a human that has assumed a crow form and identity. He lived on the northern slope of Mount *Meru*. His nest is on a branch of the *Kalpa* Tree (*kalpataru*), also known as the Wish-fulfilling Tree. Once upon a time, the Wish-fulfilling Tree grew on earth. It has gold and silver leaves and jewels for flowers—and wish for whatever is wanted. Unfortunately, as people became more ambitious and acquisitive, the *kalpataru* was taken away and planted on *Meru*, where now, only the gods and their closest allies have access to it.

Bhuṣuṇḍa has achieved supreme peace and wisdom and lives in a perpetual state of *samādhi*. He is one of the *cirajīvas* and “knower of three times” (*trikāla jñānī*). At the time of *pralaya*, while everything and everyone in existence is being wiped out, he survives because he knows an esoteric *prāṇāyāma* practice called the Five Concentration Seals or “*pañca dhāraṇā mudrā*”. Each seal is dedicated to one of the traditional elements (*bhūta*)—Earth, Water, Fire, Air, Ether or Space—that make up the world. So, for example, when the dozen sons of the First Goddess, called Unbounded

(*Aditi*), scorch the earth with their burning rays, *Bhuṣuṇḍa* protects himself by bathing in the Water Concentration Seal. When hurricane winds uproot even the mountains and blow them away like dust, *Bhuṣuṇḍa* is steady as a rock in the Earth Concentration Seal. When the universal flood submerges everything, *Bhuṣuṇḍa* floats lightly on the surface of the water with the Air Concentration Seal. And when *Brahmā* finally closes his eyes and the world winks out, *Bhuṣuṇḍa* falls into dreamless sleep at the foot of the god's bed. In the morning, *Brahmā* awakes and begins fashioning the universe anew. *Bhuṣuṇḍa* used his amazing will power, re-creates his nest on the branch of the *Kalpa* Tree on Mount *Meru*. By practicing the [five] *Dhāraṇās*, everything on earth is possible. The *yogi* can come and go from the heavenly realms in his mortal body; he can move as fast as the mind and has the power of travelling through space. When the fivefold perception of *Yoga*, arising from (concentrating the mind on) earth, water, light, air and ether, appeared to the *Yogin*, then he has become possessed of a body made of the fire of *Yoga*, and he will not be touched by disease, old age or death. The five *Dhāraṇās* upon the elements respectively have the power of stopping, inundating, burning, and destabilizing. "Seals" or *mudrā* means the various bodily positions, pressings, and contractions, or a multitude of hand gestures (called *hasta mudrā*). However, in traditional *Haṭha Yoga* there are also concentration or awareness seals, five in number, which consist of fixing both consciousness and breathe, in turn, in five ascending body regions or energy centres (*cakra*).

Each energy center is marked with a particular geometric symbol and color, which together represent a corresponding traditional element, each of which is a "crystallization" of various frequencies of subtle vital energy (*prāṇa*). For example, the lowest center is marked with a yellow square, which represents the Earth element, the densest of the five. Along with symbols and colors, each center also has a particular "seed" syllable (*bīja*) or *mantra*, and a presiding (male) deity (*deva*).

So as we concentrate on and breathe into each center, we are supposed to visualize its symbol, color and deity, while (preferably) silently repeating the syllable.

Gheraṇḍasaṃhitā describes five *mudrās* in details

5.3.1. *The Five Dhāraṇā-Mudrās*

कथिता शाम्भवी मुद्रा शृणुष्व पञ्चधारणाम् ।

धारणानि समासाद्य किं न सिध्यति भूतले ॥६८ ॥३ ॥

kathitā śāmbhavī mudrā śṛṇuṣva pañcadhāraṇām |

dhāraṇāni samāsādya kiṃ na sidhyati bhūtale ||68||3||

The *śāmbhavī* has been explained: hear now the five *Dhāraṇās* . By learning these five *dhāraṇās* one can achieve everything in this world.

अनेन नरदेहेन स्वर्गेषु गमनागमा ।

मनोगतिर्भवित्तस्य खेचरत्वं न चान्यथा ॥६९ ॥३ ॥

Anena naradehena svargeṣu gamanāgamā |

Manogatirbhavittasya khecaratvaṃ na cānyathā ||69||3||

By this, with the human body one can visit and revisit Svarga-loka, He can go wherever he likes, as swiftly as mind. He acquires the faculty of walking in the sky.

The five *dhāraṇās* are:

a) *The Pārthivīdhāraṇāmudrā*

अथ पार्थिवीधारणामुद्राकथनम् ।

Atha Pārthivīdhāraṇāmudrākathanam |

यत्तत्त्वं हरितालदेशरचितं भौमं लकारान्वितं

वेदास्त्रं कमलासनेन सहितं कृत्वा हृदि स्थायिनम् ।

प्राणं तत्र विलीय पञ्चघटिकाश्चित्तान्वितं धारये

देष्टास्तम्भकरी सदा क्षितिजयं कुर्यादधोधारणा ॥७०॥३॥

*yattattvamharitāladesāracitaṁ bhaumaṁ lakārānvitaṁ
vedāstraṁ kamalāsanena sahitaṁ kṛtvā hradi sthāyinaṁ |
prāṇaṁ tatra vilīya pañcaghaṭikāścittānvitaṁ dhāraye
deṣāstambhakarī sadā kṣitijayaṁ kuryādadhohāraṇā ||70||3||*

The *prathvī-tatva* has the colour of orpiment (yellow) the letter ‘la’ is its secret symbol or seed; its form is foursided. *Brahmā* is the presiding deity. Place this *tatva* in the heart, and fix by *kumbhaka* the *Prāṇa- Vāyu* and the *chitta* there for the period of five *ghaṭikās* (*the way of counting the time for holding the breath*). This is called *Adhodhāraṇā*. By this, one conquers the earth, and no earthy-elements can injure him and it causes steadiness.

अथ पार्थिवीधारणामुद्रायाः फलकथनम् ।

Atha Pārthivīdhāraṇāmudrāyāḥ Phalakathanam |

Then is the result of *pārthivīdhāraṇāmudrā*.

पार्थिवीधारणामुद्रं यः करोति च नित्यशः ।

मृत्युञ्जयः स्वयं सोपि स सिद्धो विचरेद् भुवि ॥७१॥३॥

*Pārthivīdhāraṇāmudraṁ yaḥ karoti ca nityaśaḥ |
Mṛtyuñjayaḥ svayaṁ sopi sa siddho vicared bhuvī ||71||3||*

Meaning

He who practices this *dhāraṇā*, becomes the conqueror of death; as an Adept he walks over this earth.

Let us summarize and understand the *pārthivīdhāraṇāmudrā*:

- Earth Concentration Seal
- Color: Yellow (as orpiment, a mineral)
- Symbol: Square (earth = strength, firmness, solidity, cohesion) The square symbolizes “permanence, security, balance, the rational organization of space, correct proportion, limitation, moral rectitude and good faith (the “square deal”)”
- Seed syllable: *Lam* (a name of *Indra*) a *bīja-mantra* is the *prāṇika* force concentrated to a point.
- Presiding deities: *Brahmā* / *ḍākinī* (or *sāvitrī*)
- Body region: Heart or sacrum center (Root-Foundation Wheel)
- Benefits: Brings about “steadiness and conquers death.”

b) *The Āmbhasīdhāraṇāmudrā*

अथ आम्भसीधारणामुद्राकथनम् ।

Atha Āmbhasīdhāraṇāmudrākathanam |

शङ्खेन्दुप्रतिमञ्च कुन्दधवलं तत्त्वं किलालं शुभं

तत्पीयूषवकारबीजसहितं युक्तं सदा विष्णुना ।

प्राणं तत्र विलीय पञ्चघटिकाश्चित्तान्वितं धारयेदेषा

दुःसहतापपापहरणी स्यादाम्भसी धारणा ॥७२॥३॥

Śaṅkhendupratimaṅca kundadhavalam tattvaṁ kilālam śubham

*Tatpīyūṣavakārabījasahitam yuktam sadā viṣṇunā |
Prāṇam tatra vilīya pañcaghaṭikāścittānvitam dhārayedeṣā
Duḥsahatāpapāharaṇī syādāmbhasī dhāraṇā ||72||3||*

The water-tattva is white like the *Kuṇḍa*-flower or a conch or the moon; its form is circular like the moon, the letter ‘*varī*’ is the seed of this ambrosial element, and *Viṣṇu* is its presiding deity. By *Yoga*, produce the water-*tatva* in the heart, and fix there the *prāṇa* with the *chitta* (consciousness), for five *ghaṭikās* (*the way of counting the time for holding the breath*), practising *Kumbhaka*. This is Watery *Dhāraṇā*; it is the destroyer of all sorrows. Water cannot injure him who practises this.

अथ आम्भसीधारणामुद्रायाः फलकथनम् ।

Atha Āmbhasīdhāraṇāmudrāyāḥ Phalakathanam |

आम्भसी परमां मुद्रां यो जानाति स योगवित् ।

जले च गभीरे घोरे मरणं तस्य नो भवेत् ॥७३॥३॥

Āmbhasī paramāṁ mudrāṁ yo jānāti sa yogavit |

Jale ca gabhīre ghore maraṇam tasya no bhavet ||73||3||

इयं तु परमां मुद्रां गोपनीयां प्रयत्नतः ।

प्रकाशात् सिद्धिहानिः स्यात् सत्यं वच्मि च तत्त्वतः ॥७४॥३॥

Iyam tu paramāṁ mudrāṁ gopaniyāṁ prayatnataḥ |

Prakāśāt siddhihāniḥ syāt satyam vacmi ca tatvataḥ ||74||3||

Meaning

The *Āmbhasī Dhāraṇā Mudrā* is a great *mudrā*; the *Yogī* who knows it, never meets death even in the deepest water. This should be kept carefully concealed.

Let us summarize and understand the *Āmbhasī Dhāraṇā Mudrā*.

- Water Concentration *Āmbhasī Dhāraṇā Mudrā*
 - Color: White (as a jasmine flower, or the moon or a conch)
 - Symbol: Half-moon (water = contraction)
 - Seed syllable: *vam̐* (a name of *Varuṇa*, means “ocean, water”)
 - Presiding deities: *Viṣṇu /Rakini*
 - Body region: Throat or center between pubis and navel (Own-Base Wheel)
 - Benefits: Removes “unbearable suffering and sins.” It’s also noted that the *Yogi* who masters this seal “never meets death even in frightful deepest water.”

c) *The Āgneyīdhāraṇāmudrā*

अथ आग्नेयीधारणामुद्राकथनम् ।

Atha Āgneyīdhāraṇāmudrākathanam |

यन्नाभिस्थितमिन्द्रगोपसदृशं बीजं त्रिकोणान्वितम्

तत्त्वं तेजोमयं प्रदीप्तमरुणं रुद्रेण यत् सिद्धिदम् ।

प्राणं तत्र विलीय प्रञ्चघटिकाश्चित्तान्वितं धारये

देषा कालगभीरभीतिहरिणी वैश्वानरी धारणा ॥७५॥३॥

Yannābhisthitamindragopasadṛśam bījaṁ trikoṇānvitam

Tatvaṁ tejomayaṁ pradīptamaruṇaṁ rudreṇa yat siddhidam |

Prāṇaṁ tatra vilīya prñcaghaṭikāścittānvitam dhāraye

Deṣā kālagabhīrabhītihariṇī vaiśvānarī dhāraṇā||75||3||

The fire *tattva* is situated at the navel , its colour is red like the *indra-gopa* insect (lady bird), its form is triangular, its seed is ‘*raṁ*’, its presiding deity is *Rudra*. It is refulgent like the sun, and the giver of success. Fix the *prāṇa* along with the *chitta* in this *Tattva* for five *ghaṭikās* (the way of counting the time for holding the breath). This is called as Fire- *Dhāraṇā*.

अथ आग्नेयीधारणामुद्रायाः फलकथनम् ।

Atha Āgneyīdhāraṇāmudrāyāḥ Phalakathanam |

प्रदीप्ते ज्वलिते वह्नौ यदि पतति साधकः

एतन्मुद्राप्रसादेन स जीवति न मृत्युभाक् ॥७६॥३॥

Pradīpte jvalite vahnau yadi patati sādhaḥ

Etanmudrāprasādena sa jīvati na mṛtyubhāk||76||3||

Meaning:

If the practitioner is thrown in to burning fire, by virtue of this mudra he remains alive, without fear of death.

Let us summarize and understand the *Āgneyī-Dhāraṇā-Mudrā*.

- Fire Concentration Seal (*Āgneyī-Dhāraṇā-Mudrā*)
 - Color: Blazing red (it resembles a *indra-gopa* insect (lady bird), whose crushed and dried body is used to make red dye)
 - Symbol: (Inverted) Triangle (fire = heat, light, expansion)
 - Seed syllable: *raṁ* (“fire, heat”)
 - Presiding deities: *Rudra* (“crying, howling, roaring, dreadful, horrible”)/
laṅkinī
 - Body region: Palate or navel center (Jeweled City Wheel)

- Benefits: Removes the “deep fear of death.” It’s also noted that should the Yogi be “thrown into a blazing fire, this *mudrā* would keep him alive, without fear of death.”

d) *The Vāyavīdhāraṇāmudrā*

अथ वायवीधारणामुद्राकथनम् ।

Atha Vāyavīdhāraṇāmudrākathanam।

यद्भिन्नाञ्जसन्निभमिदं धूम्रावभासं परं

तत्त्वं सत्त्वमयं यकारसहितं यत्रेश्वरो देवता ।

प्राणं तत्र विलीय पञ्चघटिकाश्चित्तान्वितं धारये-

देषा खे गमनं करोति यमिनां स्याद्वायवी धारणा ॥७७॥३॥

Yadbhinnāñjasannibhamidaṁ dhūmrāvabhāsaṁ paraṁ

Tattvaṁ sattvamayaṁ yakārasahitaṁ yatreśvaro devatā।

Prāṇaṁ tatra vilīya pañcaghaṭikāścittānvitāṁ dhāraye-

Deṣā khe gamanaṁ karoti yamināṁ syādvāyavī dhāraṇā।।77।।3।।

The Air-*Tattva* is black as unguent for the eyes (collirium), the letter ‘*yam*’ is its seed, and *Īsvara* its presiding deity. This *tattva* is full of *Satva* quality. This is *Vāyavī Dhāraṇā*.

अथ वायवीधारणामुद्रायाः फलकथनम् ।

Atha Vāyavīdhāraṇāmudrāyāḥ Phalakathanam।

इयं तु परमा मुद्रा जरामृत्युविनाशिनी

वायुना म्रियते नापि खे गतेश्च प्रदायिनी ॥७८ ॥३ ॥

शठाय भक्तिहीनाय न देया यस्य कस्यचित् ।

दत्ते च सिद्धिहानिः स्यात् सत्यं वच्मि च चण्ड ते ॥७९ ॥३ ॥

Iyaṁ tu paramā mudrā jarāmṛtyuvināśinī

Vāyunā mriyate nāpi khe gateśca pradāyinī ॥78॥3॥

Śaṭhāya bhaktihīnāya na deyā yasya kasyacitt

Datte ca siddhīhāniḥ syāt satyaṁ vacmi ca caṇḍa te ॥79॥3॥

Meaning:

This great *mudrā* destroys decay and death. Its practitioner is never killed by any aerial disturbances; by its virtue one walks in the air. This should not be taught to the wicked or to those devoid of faith.

Let us summarize and understand the *Vāyavī Dhāraṇā Mudrā*.

- Air Concentration Seal (*Vāyavī Dhāraṇā Mudrā*)
 - Color: Black (it resembles a mass of lampblack, which is used as unguent for the eyes), sometimes grey-blue or smokey because surrounded by vapor
 - Symbol: Circle (1), or a hexagon made of six dots (2) or a pair of locked triangles (3) (air = movement) the interlocking triangles symbolize “union in duality”.
 - Seed syllable: *Yam*
 - Presiding deities: *Īsvara /Kākinī*
 - Body region: Between the eyebrows or heart center (Unstruck [Sound] Wheel)
 - Benefits: Brings about the “ability to move through space.” It’s also noted that this seal “conquers old age and death,” and that the *Yogī* who masters it “need not fear death from any aerial accidents.”

e) *The Ākāśīdhāraṇāmudrā*

अथ आकाशीधारणामुद्राकथनम् ।

Atha Ākāśīdhāraṇāmudrākathanam।

यत् सिन्धौ वरशुद्धवारिसदृशं व्योमं परं भासितं

तत्त्वं देवसदाशिवेन सहितं बीजं हकारान्वितम् ।८० ॥३ ॥

प्राणं तत्र विलीय पञ्चघटिकाश्चित्तान्वितं धारये-

देषा मोक्षकवाटभेदनकरी कुर्यान्नभोधारणाम् ॥८१ ॥३ ॥

Yat sindhau varaśuddhavārisadr̥śam vyomam param bhāsitam

Tattovam devasadāśivena sahitam bījam hakārānvitam।80।।3।।

Prāṇam tatra vilīya pañcaghaṭikāścittānvitam dhāraye-

Deṣā mokṣakavāṭabhedanakarī kuryānnabhodhāraṇām।।81।।3।।

अथ आकाशीधारणामुद्राकथनम् ।

Atha Ākāśīdhāraṇāmudrākathanam।

आकाशीधारणां मुद्रां यो वेत्ति सैव योगवित् ।

न मृत्युर्जायते तस्य प्रलये नावसीदति ॥८२ ॥३ ॥

Ākāśīdhāraṇām mudrām yo vetti saiva yogavit।

Na mṛtyurjāyate tasya pralaye nāvasīdati।।82।।3।।

Meaning:

He who knows this *Dhāraṇā* is a real *Yogī*, death does not approach him, nor he perish all the *Pralayas*.

This Ether-*Tattva* has the colour of pure sea-water, ‘*Haṁ*’ is its seed, its presiding deity is *sadāśiva*. This is Ether-*Dhāraṇā*.

Let us summarize and understand the *Ākāśī Dhāraṇā Mudrā*.

- Space (or Ether) Concentration Seal (*Ākāśī Dhāraṇā Mudrā*)
 - Color: Colorless or clear like water (1); also said to be smoky violet in color (2)
 - Symbol: None or a circle (1 and 2) (ether = space)
 - Seed syllable: *Haṁ* (ha) name of a form of *Śiva*, also: “meditation, auspiciousness, sky, heaven; blood, dying, fear; knowledge; moon; war; pride; cause, motive”) Presiding deities: *sadāśiva* (or *Ardha Nārīśvara*), who’s androgynous: its right half is male, its left half is female, the goddess *Umā* (also called *Pārvatī* and *Durgā*)/ *śaṅkinī* The goddess was born with the name *Aparṇā*. She and her two sisters performed great austerities. Her mother Mena was worried about her daughter, and begged her “*U mā*”, which means “Oh [child], don’t [practice austerities].”
 - Body region: Crown (*brahma randhra*, “*brahma* aperture”) or throat center (Pure Wheel)
 - Benefits: Breaks down the “doorway to liberation.” It’s also noted that the *Yogī* who practices this seal is untouched by “old age and death.”

5.4 KATHOPANISAD

Kaṭhōpaniṣad describes *Dhāraṇā* in the context of utilizing the body as a vehicle to move towards god.

विज्ञानसारथिर्यस्तु मनः प्रग्रहवान्नरः ।

सोऽध्वनः पारमाप्नोति तद्विष्णोः परमं पदम् ॥९॥

Vijñānasārathiryastu manaḥ pragrahavānnaraḥ |

So'dhvanah pāramāpnoti tadviṣṇoḥ paramam padam ||9||

The man, he reins of however, who has as his charioteer a discriminating intellect, and who has under control the reins of the mind, attains the end of the road; and that is the highers place of vishnu.

Chapter 6

MEANING OF *DHĀRAṆĀ* ACCORDING TO *PATAÑJALİYOGASŪTRA*

Now we explain different commentaries for *Patañjaliyogasūtra* on *dhāraṇā* by different writers i.e both eastern and western.

6.1 *DHĀRAṆĀ ACCORDING TO EASTERN WRITERS*

6.1.1 I. K. Taimni

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प. यो. सू ॥

deśabandhaścittasya dhāraṇā

Meaning: **Concentration is the confining of the mind within a limited mental area.**

Explanations:

The first five *aṅgas* of *Yoga* (*yama*, *niyama*, *āsana*, *prāṇāyāma*, *pratyāhāra*) eliminate, step by step, the internal causes of mental distraction. *Yama* and *niyama* eliminate the disturbances which are caused by uncontrolled emotions and desires. *Āsana* and *Prāṇāyāma* eliminate the disturbances arising from the physical body. *Pratyāhāra*, by detaching the sense-organs from the mind, cuts off the external world and the impressions which it produces on the mind. The mind is thus completely isolated from the external world and the *Sādhaka* is thus in a position to grapple with it without any interference from outside. It is only under these conditions that the successful practice of *Dhāraṇā*, *Dhyāna* and *Samādhi* is possible.

The main reason why the vast majority of aspirants for the *yogic* life keep struggling with the mind year after year and then generally give up the effort as a hopeless task lies in the lack of systematic preparation, without which even elementary practice of *Dhāraṇā* is very difficult.

Theoretically, it is possible for the student to start right away with the mind and he may succeed in practising meditation to a certain extent but he cannot go very far in this manner and his progress is bound to come to a stop sooner or later. It is only when he has prepared himself in the manner indicated above that he can go on steadily right up to the end. In the rare cases where people have practiced meditation successfully without any other kind of preparation it will be found that they had already developed the necessary qualifications, even though they did not go through all the practices in this life.

Dhāraṇā There is a great deal of difference between what an ordinary man means by concentration of mind and what this phrase means in Yogic psychology. It may be stated that the main difference, and a very fundamental difference, is that according to modern psychology the mind cannot be made to remain fixed on any object for any considerable time. It remains moving even when concentration of the highest degree has been attained. Concentration according to this view is the controlled movement of the mind within a limited sphere and by keeping the mind confined in this manner all the remarkable results of concentrated mental effort can be obtained. But according to Eastern psychology upon which the science of yoga is based, though concentration begins with the controlled movement. In the ultimate stage the mind becomes one with the essential nature of the object concentrated upon and can thus move no further.

Eastern psychology recognizes the uses of the ordinary type of concentration but it holds that there are two limitations in this kind of concentration. One is that the mind can never fully realize the essential nature of the object concentrated upon. However deep it may penetrate, it still touches only the fringe or superficial aspects of its nature and can never reach the core. The second limitation is that with this kind of concentration consciousness always remains confined within the prison-house of the intellect. It cannot be released from the limitations of the intellect to be able to function at the deeper levels through the subtler vehicles. For, to be able to jump from one plane to another the mind must be brought first to that condition in which it is without movement though 'shining' with the object which holds the field of consciousness.

In *Dhāraṇā* as this first stage is called, the mind is confined within a limited sphere defined by the object which is being concentrated upon. The phrase *deśa-Bandha* means confinement within the territory which allows a limited freedom of movement. The mind is interned, as it

were, within the limited mental territory and has to be brought back immediately if it strays out. The reason why a limited freedom of movement is possible when the mind is being concentrated upon a particular object will be seen if we remember that every object has innumerable aspects and the mind can consider these aspects only one by one. So that, while it takes up one aspects after another it is moving and yet really fixed on the object of concentration. Or it may be that the object may involve a process of reasoning consisting of many steps connected logically with each other and forming an integrated whole. Here also there can be movement without really leaving the object of concentration. It is only when the mind gets out of touch with the object and an unconnected and irrelevant objects enters it that *Dhāraṇā* may be considered to be broken. The main work in *Dhāraṇā* therefore consists in keeping the mind continuously engaged in the consideration of the object and to bring it back immediately as soon as the connection is broken. The *Sādhaka* should place before himself is to reduce progressively the frequency of such interruptions and to eliminate them completely ultimately. But it is not only the elimination of interruptions which has to be aimed at but complete focussing of the mind on the objects. Vague and blurred impressions should be replaced by sharply defined mental images by increasing the degree of alertness and power of attention. So, the conditions of the mind during the period when it is engaged with the object is as important as the frequency of the interruptions which break the connection.

6.1.2 M. N. Dvivedi

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प. यो. सू. ॥

deśabandhaścittasya dhāraṇā

Meaning:

Contemplation is the fixing of the mind on something.

Explanation:

Dhāraṇā or contemplation is the fixing of the mind on something, external or internal. If internal, it may be one of the plexuses, or the tip of the tongue, or the nose, or any convenient spot, if external,

it may be any suitable image of the deity, or a picture, or any similar objects. Any such thing contemplated upon externally or internally should be strictly associated with nothing but holiness and purity. The mind should be able to picture to itself the objects even in its absence, and at an instant's notice.

6.1.3 *Rāma Prasāda*

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प. यो. सू. ॥

deśabandhaścittasya dhāraṇā

Concentration (*dhāraṇā*). “concentration is the steadfastness of the mind.”

Concentration means the mind becoming fast in such places as the sphere of the navel, the lotus of the heart, the light in the brain, the fore-part of the nose, the fore-part of the tongue, and such like parts of the body; or by means of the modifications only in any other external objects only.

6.1.4 *Śaṅkara*

***Dhāraṇā* (concentration) is binding the mind to one place. Binding to one place means binding it there, and it is the mind that is to be bound.**

Śaṅkara gives detail that binding to the navel circle all the vital currents meet there in the form of a circle, so it is called the circle of the navel. On the form of the heart lotus, the light in the head. The door of the *nāḍī* nerve-channel of the head is radiant, and so it is called a light. To the tip of the nose, the tip of the tongue, and other such locations, and to external objects, such as the moon, to these the mind is bound.

The mental process (*vṛtti*) of that mind, held in those places without being dispersed, is called *dhāraṇā*, as a purely mental process: it functions simply as the idea of that place without any disturbance (*vikṣepa*).

6.1.5 Swami Prabhavananda And Christopher Isherwood

Concentration (*dhāraṇā*) is holding the mind within a centre of spiritual consciousness in the body, or fixing it on some divine form, either within the body or outside it.

The centres of Spiritual Consciousness here referred to are the seven lotuses. In order to Concentrate, you must first fix your mind upon the inner light within one of these lotuses, as your teacher directs. Or you may concentrate upon the form of your chosen Ideal, trying to visualize that from either within a lotus or outside your own body altogether.

6.1.6 T.K.V DesiKochar

देशबन्धश्चित्तस्य धारणा ॥ ३।१॥ प. यो. सू. ॥

deśabandhaścittasya dhāraṇā

The mind has reached the ability to be directed (*dhāraṇā*) when direction towards a chosen object is possible inspite of many other potential object within the reach of the individual.

The object is chosen by the individual regardless of the attraction of alternatives. The chosen object may be sensual or conceptual, simple or complex, tangible or beyond touch, infavourable conditional or against all odds. The ability to maintain directions in this way is not possible if our minds are immersed in distraction or strongly affected by obstacles such as misapprehensions.

6.2 DHĀRAṆĀ ACCORDING TO WESTERN WRITERS

6.2.1 *George Feuerstein*

Desa= place, here: spot

Bandha= binding(from vbandh “to bind”)

Citta= Consciousness

Dhāraṇā= concentration

Meaning :

Concentration is the binding of consciousness to a (single)spot.

Explanation:

Like sense withdrawal and the other angas, concentration constitutes a particular technique of yoga and must not be reduced to mean attention in general. An coinciding (samāpatti) is the underlying process of the technique of ecstasy so one pointedness(ekāgratā) is the underlying process of the technique of concentration. This focussing of the mind is what is meant by the binding of consciousness. Place, as we learn from the commentaries, signifies either an internal or an external object.

6.2.2 *JAMES HAUGHTON WOODS*

Binding the mind- stuff to a place is fixed-attention

Explanation:

Binding the mind- stuff, only in so far as it is a fluctuation, to the navel or to the heart-lotus or to the light within the head or to the tip of the nose or to the tip of the tongue or to other places of the same kind or to an external objects,- this is fixed-attention

Meaning :

Dhāraṇā is binding the mind to a place

Dhāraṇā is binding the mind to a place. It is binding the mind, as a purely mental process, to the navel circle, the heart lotus, the light in the head, the tip of the nose, the tip of the tongue, and other such locations; and to external objects.

However, *Vācaspati Mīśra* is mistaken when he identifies concentration on an external objects with the practice *traṭāka* or gazing which is widely employed in *haṭhayoga*. In *traṭāka* the eyes are kept open and the sight is fixed on an object actually extraneous to consciousness, thus involving an act of perception. Yet, it is clear from the *yoga-sūtra* that concentration follows upon sense withdrawal or is Coterminous with it. External objects (*bāhya- viśaya*), on the other hand, denotes the various places within the body (eg. Navel, heart, etc) which are the favorite anchorages for consciousness mentioned in yoga texts

6.2.3 ROY EUGENE DAVIS

An undisturbed flow of attention is concentration.

When solely influenced by consciousness and subconsciousness drives, mental forces are dispersed and powers of concentration are impaired. By directing mental forces by an act of conscious will, the forces of the mind come under the volitional control of the devotee, contributing to success in planned ventures and realization of desired states of consciousness during meditation. Concentration requires mental training and skilful use of will power (intentions). It occurs easily when attention is fascinated by an object which elicits curiosity, and is effortless when attention is absorbed in contemplation.

The mind is a material organ of perception. Do not say that you cannot control your mental process; control your states of consciousness and mental attitudes, and orderly mental process will naturally occur.

During, meditating, sit in a prescribed posture and enter into the process with conscious intention. Assume an attitude of responsible command, knowing that you are but regulating body processes and mental forces to prepare for meditative contemplation and surrender in god. Flow attention to the highest ideal possible when you meditate. Acknowledge God and saints. Remind yourself that you are a ray of pure consciousness. Know that god's grace is

expressive in and through you. The purpose of meditation is to experience superconscious states.

If the mind is restless during the early stage of meditation, pray for increased awareness of the presence as god, use meditation techniques- *prāṇāyāma*, listening to Om, and contemplation of the boundless field of pure consciousness. Ignore all outer circumstances. You are meditating to experience Self knowledge and to surrender to God. Forsake passions, needs, problems, and psychological conflicts. Everything will be harmoniously adjusted as a result of successful meditation practice. After meditation, you will be in a superior position to examine and relate to any personal challenges and environmental circumstances. Let God alone be your focus when you meditate.

CHAPTER 7

BENEFITS OF *DHĀRAṆĀ*

Dhāraṇā is the sixth limb of *Aṣṭāṅga Yoga*. The word '*Dhāraṇā*' simply means 'unbending concentration of mind'. Working with complete focus and concentration is something that satisfies every individual at the maximum. Each of us, feel a sense of frustration, when we are not able to focus. The inability to focus may be because our minds were racing with ideas, judgments, worries, songs, or even memories. The main idea underlying *Dhāraṇā*, is the ability to focus on something (uninterrupted both by external or internal distractions).

Dhāraṇā is a form of meditation that can be called receptive concentration. With the help of *Dhāraṇā* a set of conditions are created that helps the mind focus in one direction and object, rather than concentrating in many directions, thereby diverting the mind. The term '*Dhāraṇā*' is given to both the practice of deep concentration and the state in which you achieve deep concentration. Ideally, '*Dhāraṇā*' should be performed at every moment of the day to gain utmost control of both body and mind.

Dhāraṇā aims at setting up the mind, by focusing it upon some stable entity. One good method to start it is by rolling the eyes upward and downward, in one direction to get the concentration. Any object selected for practicing has no role to play in the meditation process. The object is only used to stop the mind from wandering - through memories, dreams, or reflective thought - by intentionally holding it obsessively upon some static object. This ability is a movement toward perception of its true nature and not an escape from reality. *Dhāraṇā* helps in channeling one's thoughts on a certain thing. It makes sure that you reach a level of awareness in anything you do, by focusing on every step you take. In this way *Dhāraṇā* can bring richness to one's life. With the help of deep contemplation and reflection, one can create the right conditions. *Dhāraṇā* works with the objective to achieve the mental state, where the mind, intellect, and ego are controlled. The mind becomes purified by the practices. It becomes able to focus efficiently on one subject or point of experience. *Dhāraṇā* also helps in the cessation of fluctuations in the mind.

The practice of Dhāraṇā, at the time, when one is struggling with anger, restlessness or expectation it would help in balancing those struggles. Dhāraṇā is the practice of training the mind to concentrate and focus in such a way, that we can possibly avoid frustrations. Concentrating our attention on one point allows the mind to be stable and calms the disturbance of activity, to which we are used to. The point of concentration can be anywhere within our body or outside. Therefore, maintaining a fixed and focussed concentration, throughout the practices, gives consistency and clarity to the thoughts.

CHAPTER 8

Summary and Conclusion

Dhāraṇā is the sixth limb of *aṣṭāṅga yoga*. It means trying to hold the mind through the thoughts in an object again and again. The conscious practice of *Dhāraṇā* is to hold the mind in one, object where even though mind moves several time in different places, it puts the mind back again in the same object. This process of holding when remain same for a long time and the effort is not needed becomes *Dhyāna*. Practice of *Dhāraṇā* is to trained the mind in such a way so that one does not get disturbed by the speed of thoughts. The mastery over the mind comes through the practice of *Dhāraṇā*, when mind gets the power to think and as well as not to think.

The way of practicing *Dhāraṇā* into each energy center will open up the *chakras*, where we are supposed to visualize its symbol, color and deity, while (preferably) silently repeating the syllable (the five *dhāraṇā-mudrās*).

The term *Dhāraṇā* is given to both the practice of deep concentration and the state in which we achieve deep concentration.

Dhāraṇā or contemplation is the fixing of the mind on something, external or internal. If internal, it may be one of the plexuses, or the tip of the tongue, or the nose, or any convenient spot. If external, it may be any suitable image of a diety ,or a picture, or any similar objects. With the help of *Dhāraṇā* a set of conditions are created that helps the mind focus in one direction and on one object, rather than concentrating in many directions, thereby diverting the mind.

Dhāraṇā works with the objective to achieve the mental state, where the mind, intellect and ego are controlled. The mind becomes purified by the practice. It becomes able to focus efficiently on one subject or point of experience. *Dhāraṇā* also helps in the cessation of fluctuations in the mind.

Therefore, maintaining a fixed and focused concentration, throughout the practices, gives consistency and clarity to the thoughts.

CHAPTER 9

Abbreviations

- AK → *Amarakośa*
- B → *Bombay edition*
- Bhā → *Bhāṣya*
- Bh.P → *Bhāgavata Purāna*
- C → *Calcutta edition*
- Grs → *Gheraṇḍasaṃhitā*
- Kath up → *Kāthopaniṣad*
- Kāv → *Kāvya*
- L → *Lexicographers, especially such as Amarasinha, Hemacandra.*

- M. bh → *Mahābhārata*
- Mfn → *Masculine, feminine and neuter.*
- Mn → *Medinī*
- Ms → *Manusmṛti*
- Mw → *Monier Williams Dictionary*
- Pā. sū → *Patañjaliyogasūtra*
- Pa. bhā. → *PatañjalYogaBhāṣya*
- Pur → *Purānas*
- R → *Raghuvamśa*
- sāṅ. sū. → *Sāṅkhya sūtra*
- Suśr → *Suśrutasamhitā*

CHAPTER 10

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PART II

EXPERIMENTAL RESEARCH

Critical Flicker Fusion Immediate Effect After

JYOTI TRĀṬAKA

ABSTRACT

In ancient Indian studies of yoga, there is emphasis on shatkarma (i.e. internal cleansing of body). The yogic texts: *Haṭha Yoga Pradīpikā and Gheraṇḍa Saṁhitā* gives a detail about shatkarma. *Jyoti trāṭaka* is one of the shat karma which means gazing of the eyes.

The purpose of this study was to investigate the changes in the Critical Flicker Frequency immediately after *Jyoti Trāṭaka*.

The design was self as control study. Total 30 subjects (15 males) and (15 females) randomly selected with a group average of 31.33 ± 4.67 years. In Experimental sessions subjects practiced *Jyoti Trāṭaka* and eye exercises for 30 minutes. Before the practice the Critical Flicker Frequency was measured and after practice also Critical Flicker Frequency is measured and for control group the practice the Critical Flicker Frequency was measured and they practiced eye exercises and blindfold for 10 minutes and after the practice the Critical Flicker Frequency was measured.

The data indicates that the *Trāṭaka* group showed a statistically significant increase in the CFF from 37.35 to 38.66 ($p < 0.001$, paired samples t-test). The control group showed a statistically non-significant decrease in the CFF from 37.33 to 36.88 ($p = 0.06$, paired samples t-test). The two sessions showed no significant difference in the mean CFF before intervention ($p = 0.953$, paired samples t-test) while the difference in the CFF after intervention is significantly different ($p < 0.001$, paired samples t-test).

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Chapter 1

INTRODUCTION

The ancient Indian science, yoga is believed to help in gaining mastery over the mind and body. It is the greatest contribution of our ancient seers being more than 5000 years old. The practice of yoga aims at overcoming this to take the inner journey to the soul. Yoga offers both the goal and the means to reach it.

Yoga is one of the orthodox systems of Indian philosophy. It was coordinated and systemized by *Patañjali* in his *Yogasūtra's*, which contains 196 aphorisms. According to *Patañjali*, yoga is a conscious process of gaining mastery over the mind. The term Yoga has its verbal root 'Yuj' in *Samskrta* which means 'joining'. '*Yujyate anena iti Yogaḥ*' Yoga is that which joins. In traditional terminology it is the joining of the '*Jivātmā*' with the '*Paramātmā*' i.e the individual self with the universal self (Nagendra, Swamy, & Mohan, 2003).

According to *Yogavāsishtha*, 'yoga is called a skillful trick to calm down the mind'. It is skillful subtle process and not a brutal, mechanical, gross effort to stop the thoughts in the mind. In *Bhagavadgītā* it is defined as '*Yogaḥ karmasu kauśalam*'. Yoga is special skill which makes the mind reach its subtler state. It is dexterity in action. The dexterity is in maintaining relaxation and awareness in action. It is also defines yoga as 'Equanimity of mind' i.e "*Samatvam Yoga Ucyate*". (Rāmasukhadāsa, 1999).

The scope of yoga as portrayed in *Bhagavadgītā* and *Upaniṣads* is far more comprehensive. As Swami Vivekananda puts it, "It is a mean of compressing one's bodily existence" Yoga is that systematic conscious process which can compress the process of man's growth greatly.

Sri Aurobindo emphasizes an all-round personality development; at the physical, mental, intellectual, emotional, and spiritual levels (*Nityānanda*, 1983).

1.1. SATAKARMA

Yoga has considered internal purification of the human body in depth. The Cleansing Process have been planned with a view to have total purification of the body. [2]

There are three humours in the body: *Kapha 'mucus', Pitta 'bile' and Vāta 'wind'*. In yoga and ayurveda they are called *Tridoṣa*. A balanced proportion of these three facilitates body functions, but if there is an excess of one and a shortage of another, ailments develop due to overheating or not enough heat in the body. Before commencing *Prāṇāyāma*, any imbalance in the *doṣa's* should be removed, gas in the stomach and intestines eliminated, etc. in *Hat̥ha Yoga* there are six particular practices which were specifically designed for this purpose. They are called *Ṣaṭakarma*. These techniques regulate the production of the *doṣa*.

Ṣaṭakarma is a compound word consisting of two components: *Ṣaṭa* meaning 'six' and *karma* meaning 'art' or 'process'. The word *kriya* or *karma* is used in *Hat̥ha Yoga* regarding the techniques of cleaning. *Ṣaṭakarma* is a *Saṃskṛta* word that refers to the Yogic practices involving purification of the body. These practices, outlined by *Yogī Svātmārāma* in the *Hat̥ha Yoga Pradīpikā*, include *Neti Dhauti Nauli Basti Trāṭaka Kapālabhāti*.

SATAKARMA ACCORDING TO HAT̥HA YOGA PRADĪPIKĀ:

मेदश्लेष्माधिकः पूर्वं षट्कर्माणि समाचरेत् ।

अन्यस्तु नाचरेत्तानि दोषाणां समभावतः ॥२१॥

Medaśleṣmādhikāḥ pūrvam ṣaṭkarmāṇi samācaret |

Anyastu nācārettāni doṣāṇām samabhāvataḥ ||21||

Meaning:

When fat or mucus is excessive, *Ṣaṭakarma*: the six cleansing techniques should be practised before (*Prāṇāyāma*). Others, in whom the *doṣas*, i.e. phlegm, wind and bile, are balanced, should not do them.

धौतिर्बस्तिस्तथा नेतिस्त्राटकं नौलिकं तथा ।

कपालभातिश्चैतानि षट् कर्माणि प्रचक्षते ॥२२॥

Dhautirbastistathā netistrāṭakam naulikam tathā

Kapālabhātīścaitāni ṣaṭ karmāṇi pracakṣate ॥22॥

Meaning:

Neti, Dhauti, Nauli, Basti, Trāṭaka, and Kapālabhāti; these are known as *Ṣaṭakarma* or the six cleansing processes.

कर्मषट्कमिदं गोप्यं घटशोधनकारकम् ।

विचित्रगुणसंधायि पूज्यते योगिपुंगवैः ॥२३॥

Karmaṣaṭkamidam gopyam ghaṭaśodhanakārakam

Vicitraguṇasandhāyi pūjyate yogipuṅgavaiḥ ॥23॥

Meaning:

These *Ṣaṭakarma* which effect purification of the body are secret. They have manifold, wondrous results and are held in high esteem by eminent yogis.

SATAKARMA ACCORDING TO GHERANDA SAMHITĀ:

धौतिर्वस्तिस्तथा नेतिर्लौलकी त्राटकम् तथा ।

कपालभातिश्चैतानि षट्कर्माणि समाचरेत् ॥ १२ ॥ घे० स० ॥

Dhautiroastistathā netirlaulakī trāṭakam tathā.

Kapālabhātīścaitāni ṣaṭkarmāṇi samācaret.

Meaning:

The six purificatory processes are: *Neti, Dhauti, Nauli, Basti, Trāṭaka, and Kapālabhāti.*

1.2. JYOTI TRĀTAKA

Trāṭaka means to gaze steadily. There are two forms of the practice, one is *Bahiraṅga* or external *Trāṭaka* and the other is *Antaraṅga* or internal *trataka*. *Bahiraṅga* is simpler to practise because you just have to gaze at an object or symbol. However, *Antaraṅga Trāṭaka* involves clear and stable inner visualization of an object. *Svātmārāma* has not indicated whether he is referring to external or internal practice.^[3]

Jyoti Trāṭaka is the most advanced version of *Trāṭaka* as it involves gazing at the flame of a candle, which appears to us like an object, but in reality, is an event. The continuous burning of the fuel creates an impression that the flame is something constant, but every moment a new flame is being created. You start looking at the flame and observe the creation of light in the process of burning. Your focus is supposed to take in the whole process and not just the flame.^[4]

TRĀṬAKA ACCORDING TO GHERANDA SAMHITĀ:

निमेषोन्मेषकम् त्यक्त्वा सूक्ष्मलक्ष्यम् निरीक्षयेत् ।

यावदश्रुन पतति त्राटकम् प्रोच्यते बुधैः ॥ ५३ ॥ घे० स० ॥

एवमभ्यासयोगेन शाम्भवी जायते ध्रुवम् ।

नेत्ररोगा विनश्यन्ति दिव्यद्रष्टिः प्रजायते ॥५४ ॥घे० स० ॥

*nimeṣonmeṣakam tyaktvā sūkṣmalakṣyam nirīkṣayet |
yāvadaśruna patati trāṭakam procyate budhaiḥ || 53 ||
evamabhyāsayogena sāmभवी jāyate dhruvam |
netrarogā vinaśyanti divyadraṣṭiḥ prajāyate ||54||*

Meaning:

Gaze steadily without winking at any small objects, until tears begin to flow.

By practicing this, sambhavi siddhis are obtained; and certainly all diseases of eye are destroyed and clairvoyance is obtained.

TRĀṬAKA ACCORDING TO HATHA YOGA PRADĪPIKĀ:

निरीक्षेन्निश्चलदृशा सूक्ष्मलक्ष्यम् समाहितः ।

अश्रुसम्पातपर्यन्तमाचार्यैस्त्रटकम् स्मृतम् ॥३१ ॥ ह० यो० प्र० ॥

*Nirīkṣenniścaladṛśā sūkṣmalakṣyam samāhitaḥ |
Aśrusampātaparyantamācāryaiṣṭraṭakam smṛatama ||31|| ha0 yo0 pra0||*

Meaning:

Looking intently with an unwavering gage at a small point until tears are shed is known as *Trāṭaka* by the *Ācāryās*.

मोचनम् नेत्ररोगाणाम् तन्द्रादीनाम् कपाटकम् ।

यत्नतस्त्राटकम् गोप्यम् यथा हाटकपेटकम् ॥ ३२ ॥ ह० यो० प्र० ॥

Mocanam netrarogāṇām tandrādīnām kapāṭakam

Yatnatastrāṭakam gopyam yathā hāṭakapeṭakam || 32 || *Ha. Yo. Pra.* ||

Meaning:

Tratakā eradicates all eye diseases, fatigue and sloth and closes the doorway creating these problems. It should be carefully kept secret like a golden casket.

Other meaning:

Being calm, one should gaze steadily at a small mark, till eyes are filled with tears. This is called *Trāṭaka* by *Ācāryā*. *Trāṭaka* destroys the eye diseases and removes sloth, etc. It should be kept secret very carefully, like a box of jewellery.

1.3. TECHNIQUE

JYOTI TRĀTAKA:

1. Preparation

- a. All the healthy volunteers practice in a group, sit around the candle stand, and make circle at sufficient distance from the candle stand (1.5 to 2. meters).
- b. The maximum no. of participants in a group around could be about ten.
- c. The candle kept in a same level as the eyes.

2. Instruction
3. Preparatory eye exercises
 - a. Up and down or Vertical movement
 - b. Right and left or horizontal movement
 - c. Diagonal movements of eye balls
 - d. Rotational movements of eye balls.
4. Effortless gazing or focusing at flame
5. Palming (simple)
6. Intensive focusing at the tip of the wick of the flame.
7. Palming (press and release)
8. Defocusing
9. Palming (simple)
10. Silence

1.4. **BENEFITS**

PHYSICAL:

It keeps away the eyestrain by improving the stamina of eye muscles and by giving deep relaxation to them. It makes the eyes clear, bright, and radiant. It cleanses the tear glands and purifies the optical system.

THERAPEUTIC:

Errors of refraction get corrected. It strengthens the ability of the lens to adjust better to distances. It balances the nervous system, relieving nervous tension, anxiety, depression and insomnia.

SPIRITUAL:

It helps to develop intense concentration and improves memory, strong will power and excellent preparation for meditation.

1.5. **CONTRAINDICATIONS**

Epileptics should avoid gazing of flickering candles flames. Insomnia person should practice one hour before going to bed.

1.6. CRITICAL FLICKER FUSION (CFF)

The flicker fusion (or flicker fusion rate) is a concept in the psychophysics of vision. It is defined as the frequency at which an intermittent light stimulus appears to be completely steady to the observer

Critical flicker fusion frequency (CFF) is measured with a standard electronic apparatus (ANAND AGENCIES, PUNE, INDIA). This apparatus has a red light stimulus, 6 mm in diameter, with a luminous intensity of 50 mcd and flicker frequency which can be adjusted from 12 to 95 Hz. The stimulus was surrounded by a white background with illumination of 150 lux.

1.7. WHY CRITICAL FLICKER FUSION

Every day, billions of people worldwide operate under flickering artificial lighting conditions, or observe flickering computer/TV displays and/or cinematic pictures. Although the flickering stimuli in these conditions are visible for only a fraction of the viewing time, they appear as continuous and stable because we perceptually integrate successive flashes in a process called flicker fusion. Flicker fusion is critical to stable perception under flickering light conditions, and is the basis for cinematic and computerized movies.

1.8. HOW TO TEST THE EFFECT

CFF machine has a flicker frequency which was adjusted from 10 to 60 Hz. The subject is asked to report when the flickering stimulus is seen as a continuous light. This is done when the flicker rate is increased as well as decreased (when the stimulus changes from continuous to a flicker). This was done four times and the average of the four was used.

Chapter 2

REVIEW OF LITERATURE

Boucart, M., Naili, F., & Defoort, S. (2009). Scene perception in low vision: A study on people with macular degeneration, *Journal of Vision*, Volume 9(8):961.

Research on scene recognition in normally-sighted people have shown the extent to which human observers use diagnostic image information such as colour, orientations or texture to quickly categorize natural images. Even under degraded visual conditions such as low contrast, blurring or large visual eccentricity normally-sighted observers are able to categorize scenes quickly on the basis of their spatial properties.

DM Coleston, C Kennard, (1995), Responses to temporal visual stimuli in migraine: the critical flicker fusion test, Academic Unit of Neuroscience and Princess Margaret Migraine Clinic, Charing Cross and Westminster Medical School, London, UK.

Reports of sensitivity to striped patterns and to flickering lights are not uncommon in migraineurs. Only recently, however, have objective methods been used to assess the visual sensitivity of these patients, with emphasis on their responses to spatial stimuli; responses to temporal information have been largely neglected on an experimental level. The "critical flicker fusion" (CFF) test was performed by 25 migraineurs with aura, 25 migraineurs without aura, and 25 control subjects. The CFF test is a quick, simple technique which provides information concerning the temporal responsiveness of the visual system; a sensitivity threshold is measured. A significant group difference between the migraineurs without aura and the control subjects emerged ($p = 0.01$). Control subjects had the highest CFF threshold, migraineurs with aura the next highest, and migraineurs without aura the lowest threshold.

Hema Shankar, BMBS, MA, Konrad Pesudovs, PhD, (2007), Critical flicker fusion test of potential vision, Elsevier Inc.

The CFF phenomenon effectively discriminated between subjects with and without retinal/neural disease and accurately predicted visual outcome after cataract surgery. The use of a brighter stimulus enhanced performance in cases of dense media opacity.

James M. Smith¹ and Henryk Misiak², (1976), Critical flicker frequency (CFF) and psychotropic drugs in normal human subjects—A review, Springer Berlin / Heidelberg, *Psychopharmacology*, 175-182.

This literature review presents summary methodological and statistical data on 33 studies in which critical flicker frequency (CFF) thresholds were used to evaluate the effects of acute oral doses of single psychotropic drugs in normal human subjects. In all, 96 drug-dose-study combinations are represented. CFF was found to be altered to a statistically significant degree ($P < 0.05$) in 51 (65%) of the 79 instances in which inferential statistical methods were used to evaluate the results. As expected, stimulants increased CFF while hypnotics decreased it. There is also a discussion of important methodological considerations in the design of psychopharmacological studies employing CFF. While many studies have shown CFF to be sensitive to the effects of psychotropic drugs, there have not always been adequate controls for extraneous factors (especially, set and suggestion, changes in pupillary diameter, and the presence of other commonly used drugs). Finally, consideration is given to the attempts to increase the sensitivity of the CFF test to drug effects.

Jojo K G, (2007), The Immediate effect of Trataka on Visual Perception.

The study was conducted to assess the immediate effect of trātaka on adults and children. There were two groups of subjects for the present self as control study. One group comprising of children who were attending a ten days personality development camp and another group was of adults who were attending a one month residential yoga instructor's

course. The immediate effect of trātaka on the degree optical illusion was measured by using Muller-Lyer lines. The data was taken before and immediately after trātaka. Pre values were compared with post values by using a Wilcoxon signed rank test. There was a significant improvement in ‘out’ trials (ICR-Increment) ($p < 0.001$) and ‘in’ trials (DCR-Decrement) ($p < 0.001$, Wilcoxon signed ranks test) of both yoga and control group of children. There was no significance difference in the adults. Since the yoga practices helps in improving different aspects of perception, and reduce the degree of illusion. The present study was conducted to compare the immediate effect of trātaka on children and adults. In this study the subjects were studied using ‘self as control’ design in 2 different session’s i.e trātaka (eye exercises) and sitting quietly. The impact of this self as control study showed that there was a significant difference in the degree of illusion perceived by children after the practice of trātaka. But there was no difference in the adults.

P. Ramana Vani, R. Nagarathna, H. R. Nagendra and and Shirley Telles, (1996), Progressive Increase in Critical Flicker Fusion Frequency Following Yoga Training, Vivekananda Kendra Yoga Research Foundation, Chamarajpet, Bangalore.

The critical flicker fusion frequency (CFF) is the frequency at which a flickering stimulus is perceived to be steady, with higher values suggesting greater perceptual accuracy. The CFF was measured in two age matched groups of healthy male volunteers whose ages ranged from 25 to 39 years, with 18 subjects in each group. After baseline assessments one group (yoga group) received yoga training, while the other group (control group) carried on with their routine activities. Yoga practices included asanas, pranayamas, kriyas, meditation, devotional sessions and lectures on the theory of yoga. After 10 days neither group showed a change in CFF.

However, at 20 and at 30 days the yoga group showed significant increases in CFF by 11.1% and 14.9%, respectively (two factor ANOVA, Tukey multiple comparison test). The control group showed no change at the day 20 and day 30 follow up.

Rubin GR, Kraft TW., (2007), Flicker assessment of rod and cone function in a model of retinal degeneration.

Critical flicker frequency (CFF) is the lowest frequency for which a flickering light is indistinguishable from a non-flickering light of the same mean luminance. CFF is related to light intensity, with cone photoreceptors capable of achieving higher CFF than rods. A contemporaneous measure of rod and cone function can facilitate characterization of a retinal degeneration. We used sinusoidal flicker ERG to obtain CFF values, over a wide range of light intensities, in RCS dystrophic (RCS-p(+)) and wild type rats. Recordings were made at PN23, PN44, and PN64. The CFF curve in control animals increased in proportion to the log of stimulus intensity, with a gentle slope over the lowest 4 log-unit intensity range. The slope of the CFF curve dramatically increased for higher intensities, indicating a rod-cone break. In the RCS rats the rod driven CFF was significantly lower in amplitude compared to normal rats at the earliest age tested (PN23). By PN64 the rod driven CFF was immeasurable in the RCS rats. The amplitude of the cone driven CFF approached normal values at PN23, but was greatly reduced by PN44. By PN64 the entire CFF function was greatly depressed and there was no longer a discernable rod-cone break. These CFF/ERG data show that RCS rats exhibit significant early degeneration of the rods, followed soon after by degeneration of the cones. Using this approach, rod and cone function can be independently accessed using flicker ERG by testing at a few select intensities.

Roufs, J. A., Sep 1974, Dynamic Properties of vision: V. Perception lag and reaction time in relation to flicker and flash thresholds, *Vision Research*. Volume 14(9):853-869.

In order to relate perception lag to flicker thresholds, both were measured by the same 2 Ss under the same conditions. Perception lag obtained by 3 methods-double flash, eye and ear, and reaction time-were compared for fovea flashes at a dark background. The course of perceptive delay was measured as a function of the intensity of long flashes over a large intensity range. At medium intensities the results of the 3 methods agree. At low intensities, decreasing the intensity towards the threshold increased reaction time progressively faster than double-flash settings in the

1st decade above the threshold. In a 2nd series of experiments with 2 Ss, reaction times and double-flash settings at a low and a high background level were compared. The flicker fusion characteristics of the same stimuli were determined by modulating them harmonically. The change of perception lag at the low background level was considerably greater than that at the high level on varying the flash intensity over a comparable range. Visual latency and flicker thresholds were related on the basis of 3 hypothetical general system properties. The course of perception lag obtained by double-flash settings is in agreement with that calculated from the flicker fusion curve. Latency curves at different background levels can be found from a generalized function and 2 parameters which are characteristic for sensitivity and inertia and which can be found either from flicker or flash thresholds.

Rovamo J, Raninen A., (1988), Critical flicker frequency as a function of stimulus area and luminance at various eccentricities in human cone vision: a revision of Granit-Harper and Ferry-Porter laws, PMID: 3227655, <http://www.ncbi.nlm.nih.gov/pubmed/3227655>

When the photopic luminous flux collected by ganglion cells was kept constant at all retinal locations by reducing average stimulus luminance in inverse proportion to photopic Ricco's area (F-scaling), critical flicker frequency to stimuli of 1.2-88 deg² in area, presented at various eccentricities along the temporal meridian of the visual field, increased as a single logarithmic function of the number of retinal ganglion cells stimulated. Their number was calculated by multiplying stimulus area by the ganglion cell receptive field density of the human retina. When the number of ganglion cells stimulated was kept constant by enlarging the stimulus area in inverse proportion to the ganglion cell density (M-scaling), the logarithm of CFF to green, yellow, orange and red cone-targets increased as parallel linear functions of logarithmic flux, calculated by multiplying retinal illuminance by photopic Ricco's area.

Wolfgang Skrandies, (1985), Critical Flicker Fusion and Double Flash Discrimination in Different Parts of the Visual Field, *International Journal of Neuroscience*, Volume 25(3-4):225-231.

The temporal sensitivity of the visual system was investigated in fifteen healthy subjects by determining the critical flicker fusion frequency (CFF) and the performance in a double flash discrimination (DFD) task. Measurements were obtained using a small test light of 2.5° diameter in the fovea and at eight different perifoveal retinal locations along the horizontal and vertical meridians. Statistically significant differences were found for both the CFF and the DFD task showing a higher temporal sensitivity of the nasal and upper than the temporal and lower retinal areas. The functional significance of the findings is discussed and related to electrophysiological and behavioral data which describe a functional superiority of the upper over the lower hemi retinal system.

R. Nagarathna, H. R. Nagendra and Shirley Telles, 1995, Improvement In Visual Perception Following Yoga Training, *Journal of Indian Psychology*, volume: 13, No. 1, Vivekananda Kendra Yoga Research Foundation

Visual discrimination was tested in two groups of 18 college students each, with ages ranging from 17-22 years. One group (the yoga group) had 10 days training in yoga. Including āsanās (physical postures), Prāṇāyāma (voluntary regulation of breathing), Trataka (visual focusing exercises), meditation, and lectures on the theory of yoga. The control group carried on with their routine activities. The ability to detect intermittent light of fixed luminance, at varying frequencies was tested in both groups at the beginning and end of 10 days. While initial values were similar for both group. At the end of 10 day the frequency at which the yoga group was able to detect the flickering of the stimulus, was significantly more than the initial values (Wilcoxon's paired signed ranks test), whereas the control group showed no significant change. The final value of the yoga group was also significantly more than that of the control group (t test for unpaired data).

P. Raghuraj and Shirley Telles, (1997) Muscle Power Dexterity skill and Visual Perception in Community home girls trained in yoga or sports and in regular school girls, volume 41(4):409-415.

The present study was conducted to compare critical flicker fusion frequency (CFF), degree of optical illusion ("di"), dexterity scores, and grip strength in three groups of subjects, viz community home girls who had learned yoga for 6 months (CHY), age-matched community home girls who had physical activity training for 6 months (CHP), and girls who were attending a regular school (SCH). There were equal numbers in each group for each of the 4 assessment (range 11 to 30 subjects) and age range was 12 to 16 years. The CHP group had significantly lower CFF and "di" was significantly higher (one factor ANOVA, t test for unpaired data) in the CHP group, both compared to CHY and SCH groups. Right hand grip strength was also significantly less in the CHP group compared to SCH. The results were explained by previous reports of high levels of anxiety and aggression in community-home groups, which is known to influence the four parameters described here. The better performance of the CHY group compared to CHP, suggested that yoga practice has a beneficial effect in these subjects.

Chapter 3

METHODOLOGY

3.1. **AIM**

- To study the immediate effect of Jyoti Trataka in CFF test.
- To compare the changes that happens in CFF before and after Trataka.

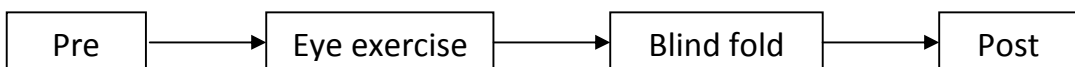
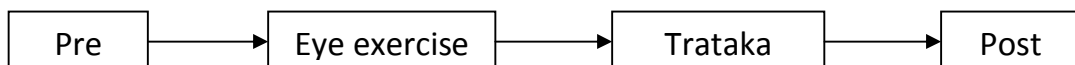
3.2. **HYPOTHESIS**

- Jyoti Trataka can produce an increase the critical flicker fusion rate immediately after the practice.

3.3. **RESEARCH DESIGN**

Design: 30 subjects who were attending a five days general *jyoti trataka* class were the subjects. The subjects were given training in the eye exercises and *jyoti trataka* for 30 minutes for five sessions before assessment. The test was conducted on a group of subjects attending general yoga class in Bangalore. All the subjects were assessed in two sessions: one session where critical flicker fusion (CFF) was measured before *trataka* and eye exercises practice for 30 min and immediately after *trataka* . In another session the CFF measured before blindfold and eye exercise for 20 minutes and after blindfold. The two sessions were conducted on different days using crossover design.

Design of research study: The design of this research study was self as control.



Subjects:

The 30 subjects were in the age range 25 to 40 years with a mean age of 31.33 ± 4.67 all the subjects were Indian national and they were from varied educational background. A record was also made of the first language learned by the subjects.

Assessment:

Critical flicker fusion frequency was measured with a standard electronic apparatus (Anand Agencies, Pune, India). This apparatus has a red light stimulus, 6 mm in diameter, with a luminous intensity of 50 mcd and flicker frequency which can be adjusted from 12 to 95 Hz. The stimulus was surrounded by a white background with illumination of 150 lux. The subject was seated in front of the apparatus. During the experiment all overhead lights were switched off. The binocular response of all subjects was assessed in two types of trials: ascending: the frequency of flicker was gradually increased, 0.5 Hz per step, from the minimum (10 Hz) till the subjects reported that it was "fused" or steady, this was the fusion threshold, and descending the frequency of the response was gradually reduced (0.5 Hz per step) from maximum (60 Hz) till the subjects reported that it was flickering, this was the flicker threshold. Each subject was assessed in 4 trials each, i.e. 2 ascending and 2 descending, given alternately.

3.4. **THE SAMPLE**

There were 30 subjects for yoga group and 30 subjects for control group.

3.4.1. **Age:** 25 to 40 year

3.4.2. **Inclusion:**

- 15 male and 15 female participants
- Persons in the age group of 25 to 40 years.
- Knowledge of English to follow instruction.
- Persons using spectacles/contact lenses can also participate.

3.4.3. **Exclusion:**

- Participants above 40 years and below 25 years of age.
- Participants suffering from colour blindness.

3.4.4. Source of the study: One group of subjects attending a general yoga class in Bangalore.

3.4.5. Demographic details of sample:

All the subjects were Indians attending a general yoga class in Bangalore. Age 25 to 40 Years. Mean age: 31.33 ± 4.67 .

3.5. TOOLS USED

We used Critical flicker fusion frequency (CFF) apparatus to check the critical frequency: Critical flicker fusion frequency (CFF) measured with a standard electronic apparatus (ANAND AGENCIES, PUNE, INDIA). This apparatus has a red light stimulus, 6 mm in diameter, with a luminous intensity of 50 mcd and flicker frequency which can be adjusted from 12 to 95 Hz. The stimulus was surrounded by a white background with illumination of 150 lux.

CHAPTER 4

RESULTS

Table 1 shows the mean and standard deviations of the CFF immediately before and after the *trataka* and control sessions.

Table 1. Values of the Critical Flicker Fusion

	<i>Trataka</i>	<i>Control</i>
<i>Pre</i>	37.35±2.84	37.33±2.67
<i>Post</i>	38.66±2.91	36.88±2.84

All data were normally distributed. The *trataka* group showed a statistically significant increase in the CFF from 37.35 to 38.66 ($p < 0.001$, paired samples t-test). The control group showed a statistically non-significant decrease in the CFF from 37.33 to 36.88 ($p = 0.06$, paired samples t-test). The two sessions showed no significant difference in the mean CFF before intervention ($p = 0.953$, paired samples t-test) while the difference in the CFF after intervention is significantly different ($p < 0.001$, paired samples t-test).

CHAPTER 5

DISCUSSION AND CONCLUSION

It has long been known that our eyes are never still even during fixation. Jurin, in 1738, referred to the “trembling of the eye”. Helmholtz, in 1860, also admitted the difficulty of maintaining perfect fixation, and proposed that this “wandering of the gaze” served to prevent retinal fatigue. Starting in the late 1800s, a variety of techniques for recording these eye movements were developed. Scientists today agree on the occurrence of three main types of eye movement during visual fixation in humans: tremor, drifts and microsaccades.

Tremor. Sometimes called physiological NYSTAGMUS, tremor is an aperiodic, wave-like motion of the eyes⁷, with a frequency of ~90 Hz²⁵. Being the smallest of all eye movements (tremor amplitudes are about the diameter of a cone in the FOVEA, visual tremor is difficult to record accurately — tremor amplitudes and frequencies are usually in the range of the recording system’s noise. The contribution of tremor to the maintenance of vision is unclear. It has been argued that tremor frequencies are much greater than the FLICKER FUSION FREQUENCIES in humans, so the tremor of the visual image might be ineffective as a stimulus but recent studies indicate that tremor frequencies can be quite low, below the flicker fusion limit. Greschner have shown that low frequencies (5 Hz) of tremor-like motion generate strong synchronous firing in the turtle’s retina. Furthermore, early visual neurons can follow high-frequency flickering that is over the perceptual threshold for flicker fusion. So, it is possible that even high-frequency tremor is adequate to maintain activity in the early visual system, which might then lead to visual perception. Tremor is generally thought to be independent in the two eyes. This imposes a physical limit on the ability of the visual system to match corresponding points in the retinas during stereovision.

Drifts. Drifts occur simultaneously with tremor and are slow motions of the eye that occur during the epochs between microsaccades. During drifts, the image of the object being fixated can move across a dozen photoreceptors. Initially, drifts seemed to be random motions of the eye, generated by the instability of the oculomotor system. However, drifts were later found to have a compensatory role in maintaining accurate visual fixation in the absence of microsaccades, or at times when compensation by microsaccades was relatively poor. Drifts have been reported to be both CONJUGATE and non-conjugate as with tremor,

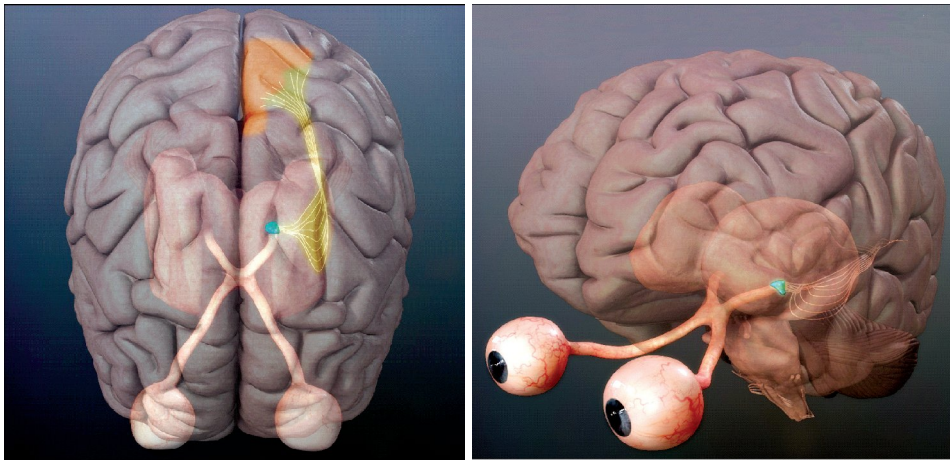
drifts might result from the noise and variability of neuronal firing to the ocular muscles. If drifts and tremor are indeed conjugate, this might indicate that they have a central origin (at least in part). This idea supports observations of reduced or absent tremor in patients with brainstem lesions.

Microsaccades. Fixational microsaccades, also called ‘flicks’ in early studies, are small, fast, jerk-like eye movements that occur during voluntary fixation. They carry the retinal image across a range of several dozen to several hundred photoreceptor widths, and are about 25 ms in duration. Microsaccades cannot be defined on the basis of amplitude alone, as the amplitude of voluntary saccades can be as small as that of fixational microsaccades. In this review, we use the term microsaccade to refer to the small involuntary saccades that occur during fixation, sometimes called fixational saccades. Microsaccades have been described in several species other than humans. However, they seem to be most important in species with foveal vision (such as monkeys and humans). Microsaccades in the macaque monkey are quite similar to those in humans. One of the possible roles of microsaccades is to correct displacements in eye position produced by drifts. The probabilities of occurrence, direction and amplitude of microsaccades are related to previous displacements of the image over the retina. For example, if drifts carry the fixation target away from the fovea, microsaccades will tend to bring the target back. No comparable correlation has been found for drifts. The accuracy of potentially correctional microsaccades is nevertheless limited, and non-corrective microsaccades also occur. Recent studies indicate that microsaccades might help to counteract receptor adaptation on a short timescale and to correct fixation errors on a longer timescale. The relationship between microsaccade velocity and amplitude (length) follows the ‘MAIN SEQUENCE’, similar to large saccades. It has therefore been proposed that microsaccades and large saccades might be generated by the same mechanisms (that is, by circuits leading to saccade-related burst neurons in the superior colliculus). No correlation has been shown between visual acuity and changes in microsaccade amplitude.

Microsaccades in the two eyes have generally been found to be conjugate. As microsaccades are performed involuntarily, this might indicate a subcortical control mechanism for microsaccade production. The problem of the binocular coordination of microsaccades has just begun to be investigated, and recent studies have distinguished between monocular and binocular microsaccades, with potentially different functional roles.

Saccades of the type called microsaccades, are believed to play an important role in visual perception. Microsaccades typically carry the retinal image across several dozen to several hundred photoreceptor widths and are about 25 ms in duration. Recent research indicates that microsaccades lead to neural activity in the visual pathway. Moreover, the induced neural activity occurs at all levels of the visual system, from the ganglion cells in the retina to the cortex. Flicker rates above the perceptual threshold are known to generate cortical and sub-cortical responses [M-C 2002], indicating that the fusion does not occur in the retinal cells, but later in the visual pathway. The practice of fixating the vision in the *trataka* practice would therefore seem to indicate changes at a cortical level that mediate the process of fusion. Subjects also uniformly report a feeling of calm alertness after the practice of *trataka* which is consistent with the fact that the CFF increases, since it has been observed that the CFF decreases under stress and fatigue.

A study on visual experience [Seitz] indicates that the CFF threshold can be increased by prolonged exposure to stimuli. It would be interesting to see whether the practice of *Trataka* can lead to an elevated CFF threshold.



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