EPISTEMOLOGY ACCORDING TO DIFFERENT SCHOOLS OF INDIAN PHILOSOPHY

EFFECT OF YOGIC RELAXATION TECHNIQUES ON MEMORY,SUSTAINED ATTENTION AND STRESS IN CORONARY ARTERY BYPASS SURGERY (CABG) PATIENTS -A PROSPECTIVE RANDOMIZED CONTROL STUDY.

A
LITERATURE
RESEARCH

SUBMITTED BY
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UNDER THE GUIDENCE OF
DR.R.NAGARATHNA
DR. H.R. NAGENDRA

TOWARDS THE PARTIAL FULFILLMENT OF
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CERTIFICATE

This is to certify that **Ketki A. Gokhale** is submitting this literature research **Epistemology according to different schools of Indian Philosophy** in partial fulfillment of the requirements for the Master of Science (Yogic Science) registered with effect from January 12th 2005 to January 12th 2006 by **Swami Vivekananda Yoga Anusandhana Samsthana (sVYASA)** and this is a record of work carried out by him in this institute.

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DECLARATION

I Hereby Declare That The Work Presented In This Dissertation Is Done By Me Under The Guidance Of Dr.R Nagarathna and Dr. HR Nagendra. I Also Declare That This Work Entitled

Part – 1

EPISTEMOLOGY ACCORDING TO DIFFERENT SCHOOLS OF INDIAN PHILOSOPHY.

Part – 2

EFFECT OF ADD ON YOGIC RELAXATION TECHNIQUES ON MEMORY, SUSTAINED ATTENTION AND STRESS IN CORONARY ARTERY BYPASS SURGERY (CABG) PATIENTS –A PROSPECTIVE RANDOMIZED CONTROL STUDY.

Has not previously formed the basis of any degree, diploma, membership or similar titles.

Place: Prashanti Kutiram Ketki A. Gokhale.

Date:

PART I- LITERARY RESEARCH

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PART I
LITERARY RESEARCH

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ABSTRACT

Like all other living beings man struggles for existence. He wishes to lead his life in the light of his knowledge. Desire for knowledge springs from the rational nature of man. Philosophy is an attempt to satisfy this very reasonable desire. Philosophy in its widest sense means 'love of knowledge' and aims at knowledge of truth. The science that deals with theory of knowledge is called as Epistemology, which enquires into the nature of human knowledge, as to how it develops and how far it is able to grasp reality.

As regards the means of knowledge there is great divergence among the different systems of philosophy. The Charvakas who are out and out materialists believe only in perception; the Buddhists and the Vaisheshikas in perception and inference; the Sankhya and Yoga schools in perception, inference and verbal testimony (shabda); the Nyayayika adds to these comparison as well; the Prabhakara school of Mimamsaka includes presumption; while the Vedantists, along with the Bhatt school of Mimamsaka believe in six means of knowledge, viz., perception, inference and verbal testimony (shabda), presumption and non apprehension.

The place of Vedas in Indian philosophy is very important. The Vedas are the earliest available records of Indian literature. Mimamsa and Vedanta may be regarded as the direct continuation of the Vedic culture. Though the Sankhya, Yoga, Nyaya and Vaisheshika based their theories on ordinary human experience and reasoning, they did not challenge the authority of the Vedas, but tried to show that the testimony of the Vedas was quite in harmony with their rationally established theories. The Charavaka, Bauddha and Jaina schools arose mainly by opposition to the Vedic culture and therefore they rejected the authority of the Vedas.

Thus, Authority or the testimony of the reliable person and scriptures forms the basis of philosophy.

CHAPTER 1
INTRODUCTION

The term Philosophy literally means “love of wisdom” or “pursuit of knowledge”. It consists of three parts, Epistemology; theory of knowledge. Ontology; theory of being or reality. Axiology; theory of values. Indian philosophy is divided into two broad classes. The heterodox or nastika system namely Charvaka, Buddhism and Jainism. They are called heterodox not because they are atheists, but because they reject the authority of Vedas. The orthodox or astika systems, which believe in the authority of the Vedas, namely the Nyaya of Gotama, the Vaisheshika of Kanada, the Sankhya of Kapila, the Yoga of Patanjali, the Purva-mimamsa of Jaimini and the Uttara-mimamsa or Vedanta of Badarayana. Every system of philosophy is based on epistemology or theory of knowledge. The question of the validity and means of knowledge forms an important chapter of each system. Each philosophical system has its own theory of knowledge, which is an integral part of its metaphysics.

Among heterodox schools of philosophy the first is Charvaka system. The word Charavaka is derived from charuvaka or sweet tongued or charva means to eat. Their motto was: Eat, drink and be merry. Bruhaspati is said to the founder of Charvaka philosophy. They are free thinkers. They reject the authority of Vedas and supremacy of Brahmanas.The School admits the reality of gross matter. The Charvakas recognize perception as the only means of valid knowledge. They reject inference and testimony as means of valid knowledge.

The next is the Jaina system. The word Jainism is derived from ‘jina’ which means ‘conqueror’ one who has conquered his passions and desires. The Jainas believe in 24 Tirthankaras or ‘ Founders of the faith’ through whom their faith has come down from fabulous antiquity. Vardhamana Mahavira was the last prophet who gave a new orientation to this faith and thus modern Jainism is regarded as a result of his teachings.

The Jainas admits three kinds of means of knowledge i.e. pramanas perception, inference and testimony.

The founder of Buddhist school was Gautama Buddha who at the age of twenty-nine discarded his kingdom and material life and set himself in search of real knowledge. He got enlightenment at the age of thirty-nine and started preaching the truth of life. It became a world religion and a great cultural force. The teachings of Buddha were oral. The Buddhist school of philosophy accepts perception and inference as the means of knowledge.

The Sage Gotama is the founder of Nyaya School. He is also known as Gautama and as Akshapada.The term Nyaya means literally that by means of which the mind is lead to the conclusion. Nyaya means argumentation and suggest that the system is predominantly Intellectual, Analytical, Logical, and Epistemological. Nyaya becomes equivalent to an argument and the system that treats of arguments more thoroughly than others, come to be knows as the Nyaya system. Arguments are either valid or invalid. The term Nyaya means in popular usage "right" and so Nyaya becomes the science of right reasoning or Tarkashastra. Nyaya in the narrow sense stands for syllogistic reasoning while in the wider sense it signifies the examination of objects by evidences. It thus becomes the science of demonstration or of correct knowledge or Pramanashastra i.e. the science of logic and epistemology. It is also called as Hetuvidya or the science of causes, Vadavidya or the science of debate, Anvikshiki or the science of critical study. Summing up all the above things becomes the 'Nyayashastra'. Vatsyayana in his Nyaya-bhashya commented upon Gotama's Nyaya-sutra. Nyaya recognizes perception, inference, comparison and testimony as the means of knowledge.

The term Vaisheshika is derived from the term 'vishesha'. The Vaisheshika system lays stress on particularity (vishesha) of the eternal substances. Kanada is the author of the Vaisheshika sutras. The Nyaya and Vaisheshika are the allied systems. Vaisheshika recognizes perception and inference only as means of valid knowledge.

The word ‘Yoga’ in Sanskrit has a very large number of meanings. It is derived from the root *Yuj* that means ‘to join’. According to the highest conceptions of Hindu philosophy of which the Science of Yoga is an integral part, the human soul or the Jivatma is a facet or partial expression of the Paramatma, the Divine Reality that is the source or substratum of the manifested universe. Although in essence the two are the same and are indivisible, still, the Jivatma has become subjectively separated from Paramatma and is destined, after going through an evolutionary cycle in the manifested universe, to become united with him again in consciousness. This state of unification of the two in consciousness as well as the mental process and discipline through which this union is attained are both called Yoga.

Yoga, according to Patanjali, is a methodical effort to attain perfection, through the control of the different elements of human nature, physical and psychical. The physical body, the active will and the understanding mind are to be brought under control. Patanjali insists on certain practices, which are intended to cure the body of its restlessness and free it from its impurities. When we secure through these practices increased vitality, prolonged youth and longevity, these are to be employed in the interest of spiritual freedom. The other methods are employed to purify and tranquillize chitta. The main interest of Patanjali is not metaphysical theorizing, but the practical motive of indicating how salvation can be attained by disciplined activity.

The word ‘Mimamasa’ literally means ‘revered thought’ and was originally applied to the interpretation of the Vedic rituals, which commanded highest reverence. Jaimini (400 B.C.) was the author of the Mimamsa sutra, and the founder of the Mimamsa system. The earliest work of this system is the Mimamsa sutra of Jaimini, which begins with an inquiry into the nature of Dharma.Shabarswamin, has written the great commentary on this work and his commentary has been explained by Prabhakara and Kumarila. The word Mimamsa is used in the sense of any critical investigation. The school Mimamsa justifies the meanings by giving rules according to which the commandments of the Veda are to be interpreted and by giving a philosophical justification for the Vedic ritualism.Mimamsa deals with the earlier portion of the Vedas

and is therefore called Purva Mimamsa or also called as Karma Mimamasa.It deals with Dharma hence, also called as Dharma Mimamsa.

Karma (action) and Upasana (meditation) are absolutely essential to hasten the dawn of true knowledge and therefore the study of Purva Mimamasa though not essential for the study of Vedanta, which is continuation of Mimamsa, is a good means for the purification of the soul. The aim of Mimamsa is to supply the principles according to which the Vedic texts are to be interpreted and to provide philosophical justification for the views contained therein. It undertakes a through investigation into the nature and validity of knowledge and into the various means, which provide valid knowledge.

The Upanishads, the Brahma-sutra and the Gita are called 'Prasthana-traya' or the basic works of Vedanta. The later portion of the Vedas i.e. the Upanishads is called as Jnanakanda as it deals with the knowledge of Reality. The Upanishads deals with the later portion of the Vedas and is therefore called as Uttar-mimamsa or Jnana-mimamsa.It deals with Brahma hence called as Brahma-mimamsa.
The Upanishads are regarded as the Shruti by the Vedantins and their teachings were summarized by Badarayana in his Brahma-sutra and were developed into the school of Advaita Vedanta by the first systematic expounder, Gaudapada. He is reputed to be the teacher of Shankara's teacher, Govinda.

Among all these systems the Nyaya emphasizes epistemology and logic and discusses the nature, conditions and validity of perception, inference, comparison and testimony.

CHAPTER 2
AIMS AND OBJECTIVES

1. Understanding the concept of Pramanas according to the various schools of philosophy.
2. Understanding the relation of Pramanas with Pramata, Prameya and Prama.
3. To study the Pramanas as the means of highest knowledge.

CHAPTER 3
EPISTEMOLOGY

3.1 MEANING OF EPISTEMOLOGY

Epistemology is the study of the valid forms of knowledge. It comes from the Greek word “episteme” which means knowledge. It is sometimes called “theory of knowledge”. It must be noted that epistemology as a distinct branch of philosophy. Episteme-Knowledge; Logos-Science.

Epistemology inquires into the nature, origin, validity and extent of knowledge. Is experience or reason the source of knowledge? Does knowledge represent the reality? What is the nature of valid knowledge? What are the tests of truth? What are the conditions of valid knowledge? What are the limits to the human knowledge? Can man know the world, soul and God? Can the finite mind know the infinite? Epistemology seeks to answer these questions. It has a dominant place in philosophy.

The relation of epistemology with ontology or metaphysics is like this; Epistemology is the theory of knowing and ontology is the theory of being or Reality. A particular theory of knowing leads to a particular theory of Being; a particular theory of Being presupposes a particular theory of knowing. In order to ascertain whether knowledge reveals to us any reality we must know what knowledge itself is, and the nature of reality can not be understood unless we know how it is related to knowledge.

3.1.1 PRAMANAS

The word Pramana comes from the root “ma” means to measure and signifies that by which we measure or the means of measurement. That by which something is known is called as Pramana.In other words there is an instrument of cognizing an object rightly. This instrument is called as Pramana.The object will be judged or grasped by this, hence called as Pramana. The aim of the pramana is to measure and test the correctness of

knowledge. The scope of the pramanas is when a thing is known but its knowledge is still uncertain. For anything to be completely established, description and investigation are both necessary.

The general term pramana has three different but closely connected meanings; they signify first, a source of knowledge, without reference to it's being either true or false; secondly a source of valid knowledge; and lastly a means of scrutiny. Pramanas in the second sense are thought of as simply revealing Truth. In the third sense also their aim is taken to be the revelation of Truth; but they are regarded as always presupposing doubts and reaching Truth after the discovery of the logical grounds for believing in one and not believing in the other of the two alternatives involved in doubt.

Pramanas are so called because they give us Prama i.e. knowledge. Cognition of the real nature of things is Prama, and the means of such knowledge is Pramana.What is the real nature of things? It is nothing else but being or existence in the case of that which is and non-being or non-existence in the case of that which is not.

The special source of a particular prama or knowledge is called pramana. Pramana is defined as the karana of a prama. A karana is conceived as the unique or the special cause through the action of which a particular effect is produced. E.g. In the case of perpetual knowledge or pratyaksha prama, a sense organ (in the case of an external perception) or the mind (in the case of an internal perception) is said to be the karana or instrumental cause.

3.1.2 ROLE OF PRAMANAS

Pramanas play an important role in revealing objects and hence it occupies a prominent place in philosophy. Pramana has got some capacity of revealing an object, which is taken to be really existent through its unfailing correspondence to the fact. Without pramana an object cannot be known. If an object is not known at all, how can its unfailing correspondence to the fact be known? Hence pramana has been admitted as a category. If pramana is substantiated as category, other objects like, prameya (knowable

entity), pramata (knower), and pramiti (right cognition) are substantiated or become meaningful. It is main objective of philosophy in general to discuss mainly either on pramana, which is called pramanashatra (epistemology) or prameyashatra (metaphysics)Vatsyayana feels that prameya apart from pramiti and pramata is always connected with the first category called pramana.

Even the proper day-to-day behaviour is possible if there is a proper application of pramana. If the object is rightly revealed through pramana, the action like inclination (pravritti), refraining from (nivritti), and an indifferent attitude (upeksha) are possible.

The right cognition of the categories leads us to the attainment of mundane and transcendental well being. The right cognition of the categories like pramana leads us to the mundane well being, because these are beneficial for defeating others and defending our own standpoint. The right cognition of the self, which is accepted as one of the prameyas can conjoin us with the transcendental well being like the attainment of liberation. It can remove ignorance or wrong notion, which again removes aversion and attachment caused by wrong notion. If there is non attachment there cannot be inclination (pravritti) towards an object or work due to it. Due to absence of inclination the merit or demerit cannot be generated. Owing to the lack of vasanas there is no possibility of rebirth, which is meant for the enjoyment of the result of the karma done by an individual being. The absence of birth leads to the absence of suffering, which is the state of liberation according to Nyaya.In this way right cognition of the prameya can conjoin us with the liberation which is described as unseen highest good.

3.1.3 PRAMEYA

Prameya is the object of knowledge. Nyaya School explains various objects of knowledge, which are as follows:

आत्मशरीरेन्द्रियार्थबुध्दिमनःप्रवृत्तिदोषप्रेत्यभावफलदुःखापवर्गास्तु प्रमेयम् ॥९ ॥

Ātmaśarīrendriyārthabudhdimanaḥpravṛttidoṣapretyabhāvaphaladuaḥkhāpavargāstu prameyam||9||

(Nyaya Sutra, Chapter 1)

Soul, body, senses, objects of sense, intellect, mind, activity, fault, transmigration, fruit, pain and release are the objects of right knowledge.

In the Nyaya sutra twelve prameyas have been described because knowledge of the truth about them leads to release while false knowledge about them leads to the stream of births and deaths.

इच्छा द्वेष प्रयत्न सुख दुःख ज्ञानानि आत्मनो लिङ्गम् इति ॥१० ॥

Icchā dveṣa prayatna sukha duḥkha jñānāni ātmano liṅgam iti||10||

(Nyaya Sutra, Chapter 1)

Desire, aversion, volition, pleasure, pain, and intelligence are the marks of the soul.The soul is the seer of all, the experiencer of all. In the individual body there is only one soul, for one can recollect only what one has seen, and not what has been seen by others. The soul cannot be apprehended through the contact of the senses. It is known from testimony and from inference by the marks of desire, aversion, activity, pleasure, pain and cognition. Desire, aversion and activity imply recollection of past experience of pleasure and pain, the power of selection of one particular object out of many as the cause of pleasure or of pain and the adaptation of activity towards its acquisition or avoidance. They therefore prove the existence of a single entity, which witness a multitude of objects. Pleasure and pain also persist in memory; the sight of their causes revives their memory. There must be therefore an entity in which pleasure and pain sink into oblivion. Cognition involves doubt and determination. The performer of the two functions must be one and the same.

चेष्टेन्द्रियार्थाश्रयः शरीरम् ॥११ ॥

Ceṣṭeaondriyārthāśrayaḥ śarīram||11|

(Nyaya Sutra, Chapter 1)

Body is the site of gesture, senses and sentiments. The body is the field or vehicle of the souls' experience, because the movement towards the acquisition or avoidance of an object takes place in the body, because the efficiency to the senses varies according to the health or diseases of the body, and because the resonance of pleasure and pain in the body.

घ्राण रसन चक्षु स्त्वक्श्रोत्राणि इन्द्रियाणि भूतेभ्यः ॥१२॥

Ghrāṇa rasana cakṣu stvakśrotrāṇi indriyāṇi bhūtebhyaḥ||12||

(Nyaya Sutra, Chapter 1)

Nose, tongue, eye, skin and ear are the sense produced from elements. The instruments of experience, that is the senses, are the powers of smell, taste, sight, touch and hearing. The elements of the earth, water, fire, ether and space are their respective causes.

गन्धरसरुपस्पर्शशब्दाः पृथिव्यादिगुणाः तदर्थाः ॥१४॥

Gandharasarupasparśaśabdāḥ pṛthivyādiguṇāḥ tadarthāḥ||14||

(Nyaya Sutra, Chapter 1)

Smell, taste, colour, touch and sound are objects of the senses and the qualities of the earth, etc. Smell, taste, sight, touch and sound are respectively the attributes of the objects of senses.

बुध्दिः उपलब्धिर्ज्ञानमित्यनर्थान्तरम् ॥१५॥

Budhdiḥ upalabdhirjñānamityanarthāntaram||15||

(Nyaya Sutra, Chapter 1)

Intellect, apprehension and knowledge, these are not different from one another. Cognition is the modification of an insentient instrument or organ called buddhi. Buddhi, intellect or reason is not the medium of cognition, but cognition itself.

युगपज्ज्ञानानुत्पत्तिः मनसो लिङ्गम् ॥१६ ॥

Yugapajjñānānutpattiḥ manaso liṅgam||16||

(Nyaya Sutra, Chapter 1)

The mark of the mind is that there do not arise (in the soul) more acts of knowledge than one at a time. Memory, inference, testimony, doubt, dream, cognition, feelings of pleasure and desire etc. are marks of the mind. The senses are not their cause. They must have their other cause. That is the mind. Simultaneous non-production of cognitions even while are the senses are in contact with their objects is also the mark of the mind. It is impossible to perceive two things simultaneously. Perception does not arise merely from the contact of a sense organ with its object, but it requires also a conjunction of the mind. The mind cannot conjoin with more than one sense organ at a time; hence there cannot occur more acts of perception than one at a time.

प्रवृतिः वाग्बुध्दिशरीरारम्भ इति ॥१७ ॥

Pravṛtiḥ vāgbudhdiśarīrārambha iti||17||

(Nyaya Sutra, Chapter 1)

Activity is that which makes the voice, mind and body begin their action. There are three kinds of actions, viz., vocal, mental and bodily, each of which may be sub divided as good or bad.

Bodily actions, which are bad, are: - (1) killing, (2) stealing, (3) committing adultery.

Bodily actions, which are good, are: - (1) giving, (2) protecting, (3) serving.

Vocal actions, which are bad, are: - (1) telling a lie, (2) using harsh language (3) slandering and (4) indulging in frivolous talk.

Vocal actions which are good are: - (1) speaking the truth, (2) speaking what is useful, (3) speaking what is pleasant, and reading sacred books.

Mental actions, which are bad: - (1) malice, (2) covetousness, and (3) skepticism.

Mental actions which are good: - (1) compassion, (2) refraining from covetousness, and (3) devotion.

प्रवर्त्तनालक्षणा दोषाः ॥१८ ॥

Pravarttanālakṣaṇā doṣāḥ||18||

(Nyaya Sutra, Chapter 1)

Faults have the characteristic of causing activity. Faults move the knower to activity. They are attraction, aversion and stupidity. Where there is false knowledge there are attraction and aversion. Their existence in others is known from their acts.

पुनरुत्पत्तिः प्रत्येभावः ॥१९ ॥

Punarutpattiḥ pratyebhāvaḥ||19||

(Nyaya Sutra, Chapter 1)

Transmigration means rebirth. Transmigration is the series of births and deaths. Birth is the connection of the soul with body; sense organs mind intellect and sentiments while death is the soul's separation from them. The condition of recurrent births and deaths has no beginning and ceases on the attainment of release.

प्रवृत्तिदोषजनितोऽर्थः फलम् ॥२० ॥

pravṛttidoṣajanito'rthaḥ phalam||20||

(Nyaya Sutra, Chapter 1)

Fruit is the thing produced by activity and fault. Fault consists in the enjoyment of the pleasure or suffering of pain. All activity and faults end in producing pleasure, which is acceptable, and pain, which is fit only to be avoided. But it is inevitable so long there is connection with the body, the senses, objects and cognition.

बाधनालक्षणं दुःखम् इति ॥२१ ॥

Bādhanālakṣaṇaṁ duḥkham iti||21||

(Nyaya Sutra, Chapter 1)

Pain has the characteristic of causing uneasiness. The mark of the pain is badhana, i.e. obstruction or hindrance, suffering to the soul. The element of pain is present in all things the body, the senses, the objects, etc.

तदत्यन्तविमोक्षः अपवर्गः ॥२२ ॥

Tadatyantavimokṣaḥ apavargaḥ||22||

(Nyaya Sutra, Chapter 1)

Release is the absolute deliverance from pain. Release is everlasting deliverance from birth, which is the source of pain. This is the state, which arises when the present birth ends, and another birth does not take place. This state continuing unlimited is called apavarga, i.e. release.

3.1.4 PRAMATA

The knower or the cogniser is called as Pramata.

3.1.5 PRAMA

Knowledge (jnana) or cognition (buddhi) is defined as apprehension or consciousness (anubhava). All knowledge is the revelation or manifestation of objects. Just as lamp manifests physical things placed before it, so knowledge reveals all objects, which come before it. Knowledge can be valid or invalid. Valid knowledge is defined as right apprehension of an object. It is the manifestation of an object as it is. Knowledge in order to be valid must correspond to reality and leads to the successful activity. Valid knowledge is produced by four valid means of knowledge- perception, inference, comparison and testimony. Invalid knowledge does not correspond to its object and leads to the failure and disappointment. It includes memory, doubt, error and hypothetical reasoning. Memory is not valid because it is not presentative cognition but a representative one. The object remembered is not directly presented to the soul, but only indirectly recalled. Doubt is uncertainty in cognition. Error is misapprehension, as it does not correspond to the real object. Hypothetical reasoning is no real knowledge. It is arguing like this: ‘if there were no fire, there can not be smoke’. When you see a rope as a rope you have right knowledge. If you are uncertain whether it is rope or a snake, you

have doubt. If you recall the rope you have seen, you have memory. If you mistake the rope for a snake, you have error.

Thus Prama, which is generally defined as cognition, has the two fold characteristics; Truth and Novelty. The knowledge should be true in the sense that it is not absolutely free from error but that it is not contradicted. It is not sufficient that knowledge should be true, but it is also necessary that the content of knowledge should be new or previously unacquired.

CHAPTER 4
EPISTEMOLOGY IN HETERODOX SCHOOLS OF PHILOSOPHY

4.1 MEANS OF KNOWLEDGE (PRAMANAS)

4.1.1. ACCORDING TO CHARVAKA

A. PERCEPTION

Perception is either internal or external. External perception is due to the intercourse of the five sense organs with their objects. Internal perception depends upon external perception. The manas can work upon the material supplied by external perception. It is not independent of the external sense organs. The perceptible world is the only reality. The things perceived by the five sense organs only are real. The other things beyond the reach of perception are not real. Heaven and hell are not real because they are not perceived. The tactual organ perceives softness, hardness, heat, cold, roughness, smoothness etc. The gustatory organ perceives sweet, sour, pungent, astringent and other tastes. The olfactory organ perceives agreeable and disagreeable odours. The visual organ perceives walls, jars, pots, men, beasts, earth, and mountains etc. The auditory organ perceives various kinds of sounds. The perceptible world is real. It is an aggregate of things and qualities. Therefore, they regard perception as the only means of valid knowledge.

B. INFERENCE

The Charvaka reject inference as a means of valid knowledge. Inference is said to be a leap in the dark. We proceed in inference from known to unknown and there is no certainty in this, though some inferences may turn out to be accidentally true. A general proposition may be true in perceived cases, but there is no guarantee that it will hold true even in unperceived cases. Charvaka challenges the vyapti i.e. universal and invariable relationship of concomitance and regards it as a mere guesswork. Perception does not prove this vyapti. Nor can it be proved by inference, for inference itself is said to be presupposed its validity.

C.VERBAL TESTIMONY

The Charvaka reject the validity of Vedas because they are vitiated by falsehood and contradiction. They are incapable of being the means of valid knowledge. They are

false because they make statements, which are false. They are contradictory because they make statements, which are incompatible with one another.

E.g. A Vedic text declares 'one who desires a son should perform the putrakameshti sacrifice.' Yet we find that a son is not born after the sacrifice has been performed. Therefore, the text is false. Another Vedic text declares 'one who desires to go to heaven should perform the Agnihotra oblation.' If a text is false with regard to perceptible results, one with regard to imperceptible results must be false. There is incompatibility among others. There is contradiction among others. So the Vedas have no validity as a source of knowledge.

4.1.2 ***ACCORDING TO JAINISM***

The Jainas classify knowledge into immediate (aparoksha) and mediate (paroksha). Immediate knowledge is further divided into Avadhi, Manahparyaya and Kevala; and mediate knowledge into Mati and Shruta.

Perceptual knowledge, which is ordinarily called immediate, is admitted to be relatively so by Jainas and therefore included in mediate and not immediate knowledge. It is included under Mati.Pure perception in the sense of mere sensation cannot rank the title of knowledge. It must be given meaning and arranged into order by conception or thought. Perceptual knowledge is regarded as mediate since it presupposes the activity of thought. Mati includes both perceptual and inferential knowledge.Shruta means knowledge derived from authority. Thus Mati and Shruta, which are the two kinds of mediate knowledge, have as their instruments perception, inference and authority.

Avadhi jnana (clairvoyance), Manahparyaya jnana (telepathy) and Kevala jnana (omniscience) are the three kinds of immediate knowledge, which may be called extra ordinary and extra sensory perception. Avadhi is direct knowledge of things even at distance of space and time. It is called Avadhi or 'limited' because it functions within a particular area and up to a particular time. Manahparyaya jnana is direct knowledge of the thought of others. This too is limited by space and time. In both Avadhi jnana and

Manahparyaya jnana, the soul has direct knowledge unaided by the senses or the mind. Hence they are called immediate, though limited. Kevala jnana is unlimited and absolute knowledge. It can be acquired only by the liberated souls. It is not limited by space, time or object.

4.1.3 ***ACCORDING TO BUDDHISM***

Buddhism describes right knowledge as an invariable antecedent to the accomplishment of all that a man desires to have. Right knowledge is the knowledge by which one can particularly acquire the thing he wants to acquire. Buddhism accepts perception and inference as the means of valid knowledge.

A.PERCEPTION

According to the Buddhist school of philosophy perception means the correct presentation through the senses of an object in its own uniqueness as containing only those features which are its and its alone. Perception has been defined as a presentation, which is generated by the object alone, unassociated by any names or relations and which is not erroneous. A name is given to a thing only when it is associated in the mind through memory as being as the same perceived before. The senses present the objects by coming in contact with them and the objects also must allow themselves to be presented, as they are when they are in contact with the proper senses. But the work of recognition or giving names is not what the objects themselves directly produce, for this involves the unification of previous experience, and this is certainly not what is presented to the sense.

B.INFERENCE

According to the Buddhist logic inference is divided into two classes; Svarthanumana, which means inferential knowledge, attained by a person arguing in his own mind or judgments.

The second one is Pararthanumana, which means inference through the help of articulated propositions for convincing others in a debate. The reason by which an

inference is made should be such that it may be present only in those cases where the thing to be inferred exits and absent in every case where it does not exist. This law is essential for establishing the unfailing condition necessary for inference.

CHAPTER 5

EPISTEMOLOGY IN ORTHODOX SCHOOLS OF PHILOSOPHY

5.1 MEANS OF KNOWLEDGE (PRAMANAS)

5.1.1 ACCORDING TO NYAYA

Nyaya is allied to the Vaisheshika system, which is regarded as 'Samanatantra' or similar philosophy. Vaisheshika develops Metaphysics and Ontology; Nyaya develops Logic and Epistemology.Nyaya agrees in viewing the earthly life as full of suffering, as bondage of the soul and in regarding liberation which is absolute cessation of suffering as the supreme end of life. It agrees that bondage is due to ignorance of reality and that liberation is due to right knowledge of reality. Therefore Nyaya takes up the exposion of right knowledge of reality.

Nyaya recognizes sixteen categories or Nyaya system groups existent things under sixteen classes. They constitute its subject matter. Its purpose is to teach how to know them in their true character. Among these sixteen classes it is the knowledge of the reality of the soul and other knowable, which is the cause of the attainment of the supreme good.

Among the sixteen categories the first category is the Pramana or the valid means of knowledge. All knowledge implies four conditions;

- The Subject or the Pramata, the cogniser or the knower.
- The Object or the Prameya to which the process of the cognition is directed.
- The resulting state of cognition or the Pramiti or Prama.
- The means of knowledge or the Pramana.

The fact, from which a theory of knowledge starts, is not that we have knowledge, but that we claim to have it. The task of the epistemologist is to investigate how far the claim can be sustained. In the theory of Prama or the Truth the Nyayayika sets out to inquire how far the claim that we implicitly grant is justified. Nyayayika tries to show that the content of knowledge we acquire by means of the four Pramanas has validity.

Before we investigate the nature of objects we must know the instruments of knowledge. Pramanashastra not only helps us to a right apprehension of objects, but also enables us to test the validity of knowledge. The Nyaya starts with the assumption that the account of the world, which our minds afford us, is the main trustworthy account. All knowledge is revelatory of reality. We are so constituted as to perceive objects, notice

their resemblances and draw inferences. All thinking men, with different degrees of care and exactness, perform these operations. Whenever we have mental activity, controlled by the purpose of acquiring the knowledge of reality, we have a topic of logical inquiry. Truth seeking is already present in human action. Logical theory does not create it.

The Nyaya not only inquires into the ways and means by which the human mind assimilates and develops knowledge, it also interprets the logical facts and expresses them in logical formulae which assumes the form of standards or norms in all cases of the divergence of thought from its normal course of truth seeking. Pramanas thus become the measures of canons of knowledge by means of which we can check and evaluate the knowledge already existing in us. Logic is thus the science of proof or the estimate of evidence. It discusses the validity of knowledge by showing its dependence on given grounds or compatibility of reality. The problem of truth has important bearings on metaphysical theory. The Nyaya is the metaphysics of reality i.e. Tattvashstra as well as a theory of knowledge. Thus it is not merely logic but a full epistemology combining with psychology, logic, metaphysics and theology.

प्रत्यक्षा नुमानोपमानशब्दाः प्रमाणानि ॥३॥

Pratyakṣā numānopamānaśabdāaḥ pramāṇāni||3||

(Nyaya Sutra, Chapter 1)

Nyaya recognizes four kinds of Pramanas viz; Perception, Inference, Comparison and Verbal testimony.

A.PERCEPTION

इन्द्रियार्थसन्निकर्षोत्पन्नं ज्ञानमव्यपदेश्यमव्यभिचारि व्यवसायात्मकं प्रत्यक्षम्॥४॥

Indriyārthasannikarśotpannam dyānamavyapadeśayamavyabhicāri vyavasāyātmakam pratyakṣam||4||

(Nyaya Sutra, Chapter 1)

Of the different sources of knowledge, Pratyaksha is the most important. Vatsyayana says, "when a man seeks the knowledge of the certain thing, if he is told of it by a trustworthy person and has the verbal cognition of the thing, there is still a desire in his mind to ratify his information by means of inference through particular indicative features; and even after he has been able to get at the inferential knowledge of the thing, he is still desirous of actually seeing the thing with his eyes; but when he has once perceived the thing directly, his desires are at rest and he does seek for any other kind of knowledge". The word "pratyaksha" is an ambiguous, as it is used for both the result, the apprehension of the truth and the process or the operation which leads to that result.

Gotama defines perception as the knowledge, which is produced by the intercourse of an object with a sense organ, undefinable, determinate and in harmony with its object.

There are different factors involved in the act of perception:

1. The senses (indriyas).
2. Their objects (artha).
3. The contact of the senses with their objects (sannikarsha).
4. Cognition produced by this contact (jnanam).

When the sense organs come in contact with the objects present to them in usual way, it is called as laukika or Ordinary perception.

Ordinary perception is of two kinds viz; Internal (manas) and external (bahya).

- Internal perception

In internal perception the mind (manas), which is the internal organ, comes into contact with the psychic states and processes like cognition, affection, desire, pain, pleasure, aversion etc.and cognition is produced by the manas in conjunction with the Self.

- External perception

It takes place when the five external sense organs come into contact with the external objects. It is of five kinds; visual, auditory, tactile, gustatory and olfactory perception brought about by the sense organs of sight, sound, touch, taste and smell respectively when they come in contact with the external objects.

The external sense organs are composed of material elements of earth, water, fire, air and ether and therefore each senses the particular quality of its element.

E.g. visual perception of a jar is produced by its conjunction with the visual organ, which is in the nature of light. Auditory perception of sound is produced by its inherence in the auditory organ or ether enclosed in the ear hole. The sense organ of smell is composed of the earth and perceives smell, which is the specific quality of earth.

If the contact of the sense organs with the objects is in an unusual way, i.e. if the objects are not ordinarily present to the senses but are conveyed to them through an extraordinary medium, it is called as Alaukika or Extraordinary perception.

The Extraordinary perception is of three kinds;

- Samanyalakshana

Samanyalakshana perception is the perception of the universals. According to Nyaya, the universals are a distinct class of reals. They inhere in the particulars, which belong to different classes on account of the different universals inhering in them. An individual belongs to a particular class because the universal of that class inheres in it. Thus a cow becomes a cow because it has the universal cowness inhering in it. Ordinarily we perceive only the particulars and not the universals. We perceive particular cows but we do not perceive a 'universal cow'. Hence, the Nyaya maintains that the universals are perceived extraordinarily.

- Jnanalakshana

It is the complicated perception through association. Sometimes different sensations become associated and form one integrated perception. Here, an object is not directly presented to a sense organ, but is revived in memory through the past cognition of it and is perceived through representation.

E.g. visual perception of a fragrant sandal is due to the intercourse of the visual organ with the sandal and the recollection of its fragrance perceived in the past through the olfactory organ owing to association. The idea of fragrance revived in memory brings about the acquired visual perception of fragrant sandal.

The theory of illusion accepted by Nyaya 'Anyathakhyati' is based upon this kind of perception. The word 'Anyatha' means 'elsewise' and 'elsewhere'.

E.g. when we mistake a rope for a snake, the idea of snake perceived in the past is imported in memory through this extraordinary Jnanalakshana perception and is confused with the object (i.e. rope), which is directly presented to the sense organs.

When shell is mistaken for silver, the idea of silver perceived in the past may be somewhere else is revived in memory through Jnanalakshana perception and is confused with the object (i.e. shell), which is directly presented to the sense organ.

The past impression represents the object to our mind. Error is due to a wrong synthesis of the presented and represented objects. The represented object is confused with the presented one. The presented object is perceived elsewise and the represented object exists elsewhere. In the case of rope and snake are both separately real; only their synthesis is unreal. The snake exists elsewhere and is revived in memory through Jnanalakshana perception.

- Yogaja

Yogic perception is produced by an extraordinary intercourse brought about by meditation (Yogaja sannikarsha). Intense meditation produces a peculiar merit in the self, by virtue of which it can perceive past, future, remote, hidden and subtle objects. This is intuition born out of meditation.

There are two kinds of yogic perception, Yukta and Yunjana

- Yukta yogic perception is the intuition of a yogin whose self has attained union with God, which is constant and effortless.
- Yunjana yogic perception is the intuition of a yogin, who is endeavouring to attain union with god, and puts forth effort of will to perceive all objects.

Thus, the perception of a generic character (samanya), cognition (jnana), and a supernatural power born of meditation (yoga) are the media of extraordinary intercourse.

The Nyayayika maintains two stages in perception.

- Indeterminate or Nirvikalpa
- Determinate or Savikalpa

These are not two different kinds of perception, but only the earlier and later stages in the same complex process of perception. Perception is ‘unassociated with a name’ which means ‘indeterminate’, and it is ‘well-defined’ which means determinate.

A thing is not necessarily perceived as bearing a name. The name has value for social intercourse, but is not necessarily operative at the time when the object is perceived.
E.g. if a man sees a fruit and experiences its nature, it is a perception; but if he hears from somebody its name as jackfruit, then it is not perception but verbal cognition. In the former case it is indeterminate perception and in the latter it is determinate perception.

Nyaya regards the indeterminate perception as the starting point of all knowledge, though it is not itself knowledge. It is immediate, simple, non-relational apprehension of an object and is free from the work of assimilation, discrimination, analysis and synthesis. Determinate perception is regarded as mediate, relational, synthetic apprehension of an object. It involves analysis and synthesis, assimilation, discrimination and association.

E. g. when we go from broad day light into a dark cinema hall, we first do not see the seats or the audience clearly, but have only a dim sensation of the objects present there, gradually reveal themselves to us; the dim sense experience of the objects in the hall is indeterminate perception while the clear perception of them is determinate perception. Indeterminate perception presents the bare objects without any characterization. In determinate perception we relate the substance with its attributes.

The ancient Nyaya regards indeterminate perception and determinate perception both are valid, when they are in harmony with the real nature of their objects. Determinate perception is valid, because it apprehends an object as it really is with its qualifications, which are real. Indeterminate perception is valid, because it is a means of valid determinate perception. But, the modern Nyaya regards it as neither valid nor invalid, since it does not apprehend the relation between its objects and its qualifications.

B. INFERENCE

अथ तत्पूर्व्वकं त्रिविधमनुमानं पूर्ववच्छेषवत्सामान्यतो दृष्टं च ॥५॥

Atha tatpūrvvakaṁ trividhamanumānaṁ pūrvavaccheṣavatsāamānyato dṛṣṭaṁ ca||5||

(Nyaya Sutra, Chapter 1)

Anumana means literally the measuring after something. It is knowledge, which follows other knowledge. From the knowledge of the sign we get knowledge of the object possessing it. It is the knowledge (mana), which arises after (anu) some other knowledge or perception.

Inference is mediate knowledge of an object (e.g., a fire) derived through the medium of the knowledge of a mark (e.g., a smoke) by virtue of the universal relation or what is called as invariable concomitance between them. It depends upon the perception of a mark and the recollection of invariable concomitance or vyapti.

Inference is of two kinds;

1. Inference for oneself or Svartha-anumana:

It is a psychological process, which does not require the formal statement. A person knows the invariable concomitance or universal relation of smoke with fire by repeated observation. He perceives smoke in a hill, and doubts that a fire may exist there. Then he remembers the invariable concomitance of smoke with fire: whatever is smoky is fiery. From this he infers that the hill has fire. This is the psychological analysis of inference for oneself.

2. Inference for others or Parartha-anumana:

It is intended for convincing others. It is a demonstrative inference, which consists of the following five members (avayava);

- Pratijna or the proposition:
- Hetu or the reason
- Udaharana or the explanatory example
- Upanaya or the application
- Nigamana or the statement of the conclusion

Pratijna or the proposition:

साध्यनिर्देशः प्रतिज्ञा ॥३३॥

Sādhyanirdeśaḥ pratijñā||33||

(Nyaya Sutra, Chapter 1)

It is the thesis to be established, which makes a statement. It fixes the problem and sets the inquiry. The proposition is only a suggestion or mere probability. The proposition is different from conclusion. Thus, a proposition is the declaration of what is to be proved.

E.g. Sound is non-eternal. This is a proposition.

Hetu or the reason:

उदाहरणसाधर्म्यात्साध्यसाधनं हेतुः ॥३४॥

Udāharaṇasādharmyātsādhyasādhanaṁ hetuḥ||34||

(Nyaya Sutra, Chapter 1)

It is the statement of the reason, which is favorable to the inference of the object. It can be positive or negative. Gotama states the three characteristics of valid reason: (1) It must exist in the subject. (2) It must exist in similar instances. (3) It must not exist in dissimilar instances. The reason is the means for establishing what is to be established through the homogenous or affirmative or positive character of the example. Thus, it states the reason for the establishment of the proposition.

E.g. because it (sound) is produced.

Udaharana or the explanatory example:

साध्यसाधमर्यात्तध्दर्म्मभावी दृष्टान्त उदाहरणम् ॥३६ ॥

Sādhyasādhamaryāttadhdarmmabhāvī dṛṣṭānta udāharaṇam||36||

(Nyaya Sutra, Chapter 1)

A homogenous or affirmative example is a familiar instance, which is known to posses the property to be established and which implies that this property is invariably contained in the reason given.

E.g Sound is non-eternal is the proposition.

Because it is produced is the reason.

Whatever is produced is non-eternal as a pot. This is a homogenous example.

Here, pot is a familiar instance which possesses the property of non-eternality and implies that whatever is 'produced' is attended by the same property i.e. non-eternality.

Upanaya or the application:

उदाहरणापेक्षस्तथेत्युपसंहारो न तथेति वा साध्यस्य उपनयः ॥३८ ॥

Udāharaṇāpekṣastathetyupasaṁhāro na tatheti vā sādhyasya upanayaḥ||38||

(Nyaya Sutra, Chapter 1)

Application is the winding up, with reference to the example, of what is to be established as being so or not so.

Application is of two kinds:

- Affirmative
- Negative

The affirmative application, which is expressed by the word "so" occurs when the example is of an affirmative character.

E.g. Sound is non-eternal is the proposition.

Because it is produced is the reason.

Whatever is produced is non-eternal as a pot. This is a homogenous example.

So is sound (produced) as a pot. This is an affirmative application.

The negative application, which is expressed by the phrase "not so" occurs when the example is of a negative character.

E.g. Sound is non-eternal is the proposition.

Because it is produced is the reason.

Whatever is eternal is not produced, as the soul. This is an example.

Sound is not so (i.e. sound is produced). This is a negative application.

Nigamana or the statement of the conclusion:

हेत्वपदेशात्प्रतिज्ञायाः पुनर्वचिनं निगमनम् ॥३९॥

Hetvapadeśātpratijñāyāḥ punarvacanaṁ nigamanam||39||

(Nyaya Sutra, Chapter 1)

Conclusion is the restating of the proposition, after the reason has been mentioned. It is the conformation of the proposition after the reason and example have been mentioned. The proposition states what is to be proved, but the conclusion states what is proved.

E.g. Sound is non-eternal is the proposition.

Because it is produced is the reason.

Whatever is produced is non-eternal as a pot. This is an example.

So is sound (produced). This is an application.

Therefore sound is not eternal. This is the conclusion.

According to Gotama inference is of three kinds:

- Purvavat inference:

  A purvavat inference is the inference of an unperceived effect from a perceived cause.

E.g. a future rainfall is inferred from dense clouds, which are perceived.

- Sheshavat inference:

A sheshavat inference is the inference of an unperceived cause from a perceived effect.

E.g. a past rainfall in the source of a river is inferred from its fullness, muddiness of water, and swiftness of current, which are perceived.

These two kinds of inference are based on the causal relation. In the first, an effect is inferred from a cause. In the second, a cause is inferred from an effect.

- Samanyatodrashta inference:

A Samanyatodrashta inference is the inference of an imperceptible object from a perceived mark, which is to be uniformly related to it.

E.g. the movement of the sun is inferred from its different positions in the sky, which are perceived. There is no causal relation between them.

C.COMPARISON

प्रसिद्धासाधर्म्यात्साध्यसाधनम् उपमानम् ॥६ ॥

Prasidhdāsādharmyātsādhyasādhanam upamānam||6||

(Nyaya Sutra, Chapter 1)

Comparison is the means of knowing an unknown object through its resemblance with another well-known object.

E.g. a person familiar with a cow in a town learns from a reliable forester that a wild cow (gavaya) resembles a cow. He goes to a forest, perceives a strange animal resembling a cow, remembers that a wild cow resembles a cow, and knows the animal to be a wild cow through the knowledge of its resemblance with a well-known cow. His knowledge that the strange animal bears the name 'gavaya' is comparison.

Comparison contains the following factors:

1. The perception of an unfamiliar object, which was not perceived before.
2. The indirect knowledge of its resemblance with a familiar object, which is acquired from testimony of a reliable person who perceived them both and knew their similarity.
3. The perception of resemblance of the unfamiliar object with the well-known object.
4. The recollection of the verbal statement of the reliable person and
5. The knowledge of the relation between a name and the unfamiliar object, which is perceived.

The knowledge of resemblance involves testimony and perception. The knowledge acquired from the verbal statement ‘ a wild cow is like a cow’ is testimony. The knowledge ‘ this animal has similarity with a cow’ is perception. The perception of similarity of the strange animal with a well-known cow aided by the recollection of the verbal statement of the forester is the cause of the knowledge of the relation between it and the ‘gavaya’. A person, who does not perceive the similarity of a wild cow with a cow, does not know on the strength of the mere verbal statement of a forester that the wild cow is called ‘gavaya’. Nor does he know it through the perception of similarity without the verbal statement of the forester. So, comparison is different from testimony and perception.

It is due to the knowledge of similarity aided by the recollection of the verbal statement. Recollection is due to the revival of the impression of the knowledge of the verbal statement. The perception of similarity aided by the recollection of the forester’s statement produces the knowledge of the relation between a name and an unknown object. The knowledge of similarity is Upamana Pramana.

The knowledge of the relation of a name to an object is Upamiti.When an animal resembling a cow is perceived, the forester’s statement ‘an animal resembling a cow is called gavaya’ is remembered. Then the knowledge that an individual endued with the generic character of wild cows (gavayatva) is called gavaya produced, which is Upamati

.

Comparison is neither perception, nor inference, nor testimony. A wild cow and its similarity with a cow are perceived. But that it bears the name ‘gavaya’ is not perceived. Nor is comparison inference, since there is no knowledge of invariable concomitance (vyapati) between a name and an object in it. Nor is it testimony, since the knowledge of the verbal statement of the forester is testimony, which cannot yield the knowledge ‘ this animal bears the name gavaya’ before it is perceived.

The perception of similarity with or without the knowledge of the verbal statement is not comparison. Nor is testimony without the perception of similarity comparison. Thus, it is an independent means of valid knowledge.

D.VERBAL TETIMONY

आप्तोपदेशः शब्दः ॥७ ॥

Āptopadeśaḥ śabdaḥ||7||

(Nyaya Sutra, Chapter 1)

Gotama defines testimony as the instruction of a trustworthy person, who has immediate knowledge of the Moral law (Dharma), and who is competent to guide others in the performance of their duties and the abstention from sins for the attainment of good and the avoidance of evil. Word (verbal testimony) is the instructive assertion of a reliable person.

A reliable person is one may be a Sage (Rushi) are the seers of truths, Arya or Melccha who as an expert in a certain matter is willing to communicate his experiences of it. Trustworty persons (Apta) are those who perceive objects as they exist in their real nature, and communicate their right knowledge to others for their benefit out of compassion for them. They are free from attachment and aversion, and have immediate knowledge of eternal verities that exist in all times.

The assertions of those who know truths but speak falsehoods are not valid. The assertions of those who are ignorant of truths, but speak what they know are not valid. The assertions of trustworthy persons, which are not fit for guiding persons in the performance of right actions, are not testimony. Untrustworthy persons are tainted with delusion, mendacity and fraudulence.

E.g. A man coming to the side of a river can not ascertain whether the river is fordable or not and immediately an old experienced man of the locality, who has no

enmity against him, comes and tells him that the river is easily fordable; the word of the old man is to be accepted as a means of right knowledge, called verbal testimony.

This kind of valid knowledge is called as Shabda or Agama or Authoritative verbal testimony. Its means is also called as Shabda.It is defined as the statement of a trustworthy person (Aptavakya) and consists in understanding its meaning. A sentence is defined as a collection of words and a word is defined as that which is potent to convey its meaning. The power in a word to convey it's meaning comes, according to ancient Nyaya, from God, and according to later Nyaya, from long established conviction. Testimony is always personal. It is based on the words of a trustworthy person or Divine.

The modern Nyayayikas divide testimony into two kinds;

- Vaidika or Scriptural-

The vaidika testimony is perfect and infallible because the Vedas are spoken by God. The Vedas are not impersonal but personal (paurusheya) compositions of God, the omniscient person, and are therefore valid.

- Laukika or Secular-

Secular testimony, being the words of human beings who are liable to error is no infallible. Only the words of trustworthy person who always speak the truth are valid; others are not.

Testimony is an instruction, which is expressed in a sentence or proposition. The knowledge of proposition is testimony (pramana) and the knowledge of it's meaning is the result (pramiti). Testimony is due to the knowledge of a sentence or words.

A word is a potent symbol, which signifies an object, and a sentence in order to be intelligible must conform to certain conditions. These conditions are four and as follows;

- Akanksha-

It is mutual implication or expectancy. Word cannot by itself convey a full meaning. It must be related to other words in order to convey a complete meaning. The words of a sentence are interrelated and stand in need of one another in order to express a complete sentence.

E.g. The word ‘bring’ does not make full sense. It produces expectancy in the mind for some other word or words. The sentence ‘bring a horse’ makes full sense. The words imply one another, and convey a complete meaning. A mere aggregate have unrelated words will not make a logical sentence. It will be sheer nonsense, e.g. cow horse man elephant.

- Yogyata-

A sentence consists of words, which have fitness (yogyata) for one another. Mutual fitness of words is another condition of the intelligibility of a sentence. The condition is that the words should possess fitness to convey the sense and should not contradict the meaning.

E.g. The sentence ‘quench your thirst with water’ conveys a meaning, because its competent words have mutual fitness or compatibility. But the sentence ‘quench your thirst with fire’ is contradictory, unintelligible, since its constituent words are incompatible with one another.

- Sannidhi-

A sentence consists of words, which are in close proximity (sannidhi) to one another. The words constituting a sentence should be uttered in close succession without a long interval between one word and another.

E.g. If the words ‘bring’, ‘a’ and ‘horse’ are uttered at long intervals, they do not convey any meaning. Proximity of words is a condition of the comprehension of a sentence.

- Tayparya-

The comprehension of the meaning of a sentence depends upon the knowledge of the intension (tatparya) of the speaker.

E.g. the sentence ‘saindhavam anaya’ means ‘ bring a horse’ when the speaker gets ready for starting on a journey. It means ‘bring salt’ when the speaker is taking his meal. It has different meanings in different contexts according to the intentions of the speakers.

Thus, the sentences devoid of expectancy, compatibility and proximity are not means of valid knowledge. Hence a sentence in order to be intelligible must consist of

words, which are interdependent on, compatible with and juxtaposed to, one another, and convey a meaning in conformity with the speaker's intention.

GENERAL MECHANISM OF PRAMOTPATTI

In the process of knowledge, there is not only the contact of the sense organs with the objects but, also the contact of the sense organs with Manas and contact of Manas with the Self. Thus, there is four-fold contact between the sense organs and the Manas and the Manas and the Self.

Manas or mind is a condition of perception. An essential characteristic of knowledge is that more than one act of knowing cannot take place at a time. This characteristic is due to mind, which is conjoined with the sense, when knowledge is produced. When we are deeply absorbed in some study we do not hear the sound of the wind, though the sound affects the organ of hearing and the self in conjunction with it, being all pervading. Again even when the contact of more than one sense organ with their respective objects is present, there is no simultaneous perception of all these objects-which is due to the fact that while there is proximity or contact of manas (with one object) there is no such contact of it (with the other objects), which shows that the operation of the manas is necessary in act of knowledge. Manas mediates between the self and the senses. It accounts for the non-simultaneity of the act of knowledge.

From the contact of a sense with its objects no knowledge arises unless; there is also conjunction of soul with mind. A sense coming in contact with its object produces knowledge in our soul, only if the sense is conjoined with the mind. Hence, the conjunction of soul with the mind should be necessary element in the process of knowledge.

Gautma defines perception as the non-erroneous cognition produced by the intercourse of the sense organs with the objects, non associated with any name and well defined. Perception is that cognition which is produced by the intercourse of sense organs with the objects.Though both the contact of the mind with the self and the contact of the

sense organs with the objects are necessary of all acts of knowledge, the latter must be regarded as the principle cause in case of perception.

E.g. For sometimes a person goes to sleep with the determination that he will wake up at a certain time, and by force of his determination wakes up at that time. But, sometimes when a person is awakened from deep sleep either by a very loud sound or by shaking, his waking perceptions of sound or the touch are primarily due to the contact of the sense organs with the objects. So predominance must be given not to the mind soul contact but to the sense object contact; because in such cases the soul has no desire to know and does not put forth an effort to direct the mind towards the object.

Thus the production of knowledge is not transcendental occurrence but the self, the mind, the sense organs and the objects are the main factors, which bring about the knowledge by their mutual contact with one another. This process takes place not only in case of perception but also in all means of knowledge like inference, comparison and verbal testimony.

5.1.2 ACCORDING TO VAISHESHIKA

A.PERCEPTION

The Vaisheshikas have commented on perception and inference similar to the Nyayayika.According to Vaisheshika, valid knowledge is also due to recollection (smriti) and intuition due to austerities (Aashrajnana).

Recollection is produced by a particular conjunction of the self with manas, a subconscious impression, and suggestive forces. It apprehends the past objects, seen, heard, or felt in the past owing to a particular conjunction of the self with manas and revival of its subconscious impression produced by intensity, frequency, or emotional appeal of the past experience. According to Vaisheshika, recollection is a kind of valid knowledge as it apprehends the real nature of an object perceived in the past.

Aashrajnana is the intuition of the sages who are the authors of the scriptures. It is immediate apprehension of the real nature of the past present and future objects and other supersensible objects owing to a particular conjunction of the self with manas and a peculiar merit born of austerities. It is akin to yogic perception but Yogic perception is due to intense meditation. It also talks about siddhadarshana, which is an occult perception. It is perception of subtle, hidden and remote sensible objects through the sense organs refined and strengthened by the application of certain occult medicines. It is not perception of supersensible objects. It is not produced by the internal organ (manas) owing to a special kind of merit born of meditation or austerities. But it is occult sensuous perception. It is kind of valid knowledge.

B. INFERENCE

Kanad defines inference as the knowledge derived from the mark (linga), from which the existence of the sadhya is inferred as its effect, or cause, or conjunct, or opponent, or inherent.

E.g. From a rainfall in the source of a river (cause) a flood in the river (effect) is inferred. From smoke (effect) the existence of a fire (cause) is inferred. From a body (conjunct) the existence of the tactual organ (conjunct) conjoined with it is inferred. From an infuriated serpent the existence of the mongoose (opponent) hidden behind a bush is inferred. From the heat of water the existence of a fire (inherent) is inferred. Heat inheres in fire but not in water. The mark is the means of inference, which is based upon the relations of causality, conjunction, opposition and inherence.According to Vaisheshika comparison and verbal testimony are not pramanas. They say that both are not different from inference.

C. VERBAL TESTIMONY

According to Vaisheshika verbal testimony is also inference. The meanings of words and sentences must be understood before they give us knowledge. The understanding of meanings depends on the recognition of universal concomitance; verbal knowledge is a case inference. Since it depends upon the knowledge of invariable

concomitance or universal relation between a word and its meaning. Just as the perception of smoke and the recollection of its invariable concomitance with fire lead to the inference of an unperceived fire, so the perception of the word and recollection of its invariable concomitance with a meaning or object prove the existence of an object. Thus, testimony is inference.

D. COMPARISON

According to Vaisheshika comparison is also inference.E.g. A forester who has perceived a wild cow (gavaya) tells an inhabitant of a town, who has never perceived it, that a wild cow is like a cow. He goes to a forest, perceives an animal similar to a cow, and knows that it is a wild cow. The Nyaya calls this knowledge comparison (upamana), and treats it as an independent pramana. But, the Vaisheshika regards it as inference. The knowledge of a wild cow depends upon testimony. It depends upon the validity of the statement of a reliable person or testimony. Testimony is inference. So comparison is non different from inference.

*5.1.3*ACCORDING TO SAMKHYA SYSTEM

The Samkhya accepts the three pramanas of perception, inference and scriptural testimony.

A. PERCEPTION

Knowledge produced through sense-activity is perception.E.g. When a thing like a jar comes within the range of vision, buddhi, or the intellect, is so modified as to assume the form of the jar; and the soul becomes aware of the existence of the jar. The two kinds of perception are admitted. Buddhi comes into contact with external objects through the senses. At the first moment of the contact there is an indeterminate consciousness in which the particular features of the object are not noticed, and we have only indeterminate perception. At the second moment, through the exercise of mental analysis the object is perceived as possessing a definite nature and we have determinate perception.

Yogic perception is admitted by Samkhya, which is produced by the powers of mind unlike ordinary sense perception. In the case of internal perception the co-operation of the sense organs is lacking. Buddhi perceives the states of pleasure, pain etc.

Negation (abhava) is mentioned under perception. The Samkhya does not admit negation as such, but interprets it in terms of the positive. Mere non-perception cannot prove non-existence, since it may be duo to other causes, such as long distance, excessive nearness, extreme subtlety, or disturbance of sense organs, inattention, concealment of the object, and mixture with other things. Internal perception, self-consciousness, recognition and knowledge of non-existence are treated as falling under perception.

The inference and testimony is similar to the Nyaya School of philosophy.The modification of budhhi is the pramanas, and the validity or the invalidity of these modifications can be tested by the later modifications, and not by any reference to external objects. Validity and invalidity belongs to the cognition itself. Sometimes it is said that only the shruti is of self-evident validity while perception and inference are liable to error and require conformation. The test of reality is workability.

Our apprehension is relative to our ahankara or individual purpose. It is difficult to have a disinterested knowledge of the world independent of us. The jiva is imprisoned in its own isolated consciousness, and cannot attain to the knowledge of reality beyond it. Every cognition implicating the purusha confuses it with the internal organ. It is when the shadow of buddhi falls on purusha that the later appears as though possessed of cognition.

The mechanism of knowledge:

In all knowledge, three factors are involved: the object known, the subject knowing, and the process of knowledge. In the Samkhya philosophy “the pure consciousness is the knower (pramata), the modification (vritti) is the pramana, prama is the reflection in the consciousness of the modifications in the form of the objects. Experience belongs to purusha. Budhhi (intellect), ahankara (self-sense), manas (mind), and the senses constitute the apparatus by means of which the subject apprehends the

external object. When an object excites the senses, the manas arrange the sense impressions into a percept, the self-sense refers it to the self, and the buddhi forms the concept. By means of the contact with objects through the channels of the senses, or by means of the knowledge is produced a modification in buddhi in the form of the object to be cognized. This modification, tinged with the object, enters on the field of the purusha, who is not liable to transformation, cannot possibly be modified into the form of the object. So buddhi is said to be modified. For the modification to be manifested, there must be the reflection of buddhi in consciousness. This reflection is determined by the modification of the buddhi. When through the sense organs, buddhi comes into contact with the external object and is affected by it; it assumes the form of that object. The force of consciousness i.e. is chetanashakti, reflected in buddhi thus modified, imitates the modification of buddhi; and it is the imitation that is known as apprehension. The reflection of the purusha is not an actual intercourse, but is only apparent, being due to the failure to perceive the distinction between the purusha buddhi. The connection of the purusha, as reflected in buddhi, with the object is called knowledge and the connection of the purusha with this knowledge is seen in the resulting determination that "I act," whereas in reality the "I" or purusha, cannot act and what acts is buddhi.

*5.1.4*ACCORDING TO YOGA

Pramana, which means right knowledge or knowledge related to facts, comprise all those experiences in which the mind is in direct or indirect contact with the object of senses at the time and the mental perception corresponds with the objets. The three sources of right knowledge are mentioned in Yoga.

प्रत्यक्षानुमानागमाः प्रमाणानि ॥७ ॥

Pratyakṣānumānāgamāḥ pramāṇāni||7||

(Patanjali Yoga Sutra, Samadhi Pada)

Perception, inference and scripture are accepted as the three means of knowledge.

A. PERCEPTION

When the chitta is affected by some exsternal object, through the sense organs, we have a case of perception. The mental modification is directly related to the object. The reality in external objects is accepted by Yoga. Like the universe, all sensible objects have their eternal archetype, which undergo phenomenal changes, but are never absolutely destroyed. When an object changes into another, only its form is modified, and when all forms are destroyed, the object ultimately reverts to its primary state. Sensations occur whenever there are sensible objects exciting the senses. It is, however, true that though the presented object is the same, the resulting sensations may be different. For the chitta receives the impressions of the presented objects under the influence of one or other of the three gunas.

According to Yoga, there are two views of perception. It may be held that objects are known directly or that we can know them only indirectly, through psychic media, which in some way resemble or symbolize the objects.

Knowledge according Yoga is a state or modification of the empirical Self. But as Purusha, in itself, knows no change whatsoever, this modification must be solely of the internal organ. The cognitive situations, involve not only Purusha and some modifications of the internal organ but also an appropriate object. Of these three factors the internal organ mediates or serves as a connecting link between Purusha and the object and it is supposed to do so by taking on a "form" through which alone an object can be known, is called its mode (vritti) and knowledge means that mode as informed or illuminated by the light of Purusha. It is thus neither the mode (vritti) by itself nor the illuminating principle by itself that perceives, but a blend of both. The illumination is a constant feature of all knowledge but the modes vary in accordance with the objects presented.

Process of Prama through the modifications of mind:

According to Yoga, the Vrittis that is the modifications of mind are five fold and have two types; painful and not painful.

वृत्तयः पन्चतय्यः क्लिष्टाऽक्लिष्टाः ॥५॥

Vṛittayaḥ pancatayyaḥ kliṣṭā'kliṣṭāḥ||5||

(Patanjali Yoga Sutra, Samadhi Pada)

Even though the mind has many modifications, those modifications which are to be restricted are of the nature of being afflicted and not being afflicted are of five types, Only by the restriction of the five modifications which is of the nature of correct knowledge (pramana) the restriction of other modifications which are their effects is accomplished.

प्रमाणविपर्ययविकल्पनिद्रास्मृतयः ॥६॥

Pramāṇaviparyayavikalpanidrāsmṛtayaḥ||6||

(Patanjali Yoga Sutra, Samadhi Pada)

The modifications which are painful and not painful are of five types. Those activites characterised by Pramana through which the mind functions are known as its modificatons.They are correct knowledge, misapprehension, fancy or mental constrction, sleep and memory.The sources of true knowledge are perception, inference and testimony.

That modifications of mind which by being connected with an outside object through the channel of sense organs and making that object its own, mainly comprehends the special nature of the object which has genaral and special characteristics is the source of correct knowledge called perception.

Concentration is the quality of the Chitta in all its five stages.The Chitta is called kshipta or restless, when it has an excess of Rajas and is tosssed about by objects. We might fix our attention on objects due to our passions and interests but this kind of concentration does not help us to our real freedom.It is Mudha or blinded, when it has an excess of Tamas and is possessed by the modification of sleep.It is Vikshipta or distracted when, as more often , it is unstable on account of natural defects or accidental troubles. The ordinary mind is in this condition pursuing the pleasant and avoiding the unpleasant. These three are said to be imperfect, since they are associated with the three gunas. The mind is said to be Ekagra or singal pointed when it is devoted to one object of meditation and is entirely filled with Sattva. This prepares the mind for its greatest efforts. It is Nirudhha or restricted when its developments are checked.Though their latent impressions remain, the flow of mental modifications is arrested. Concentration is a general characteristic of all states of mind, though it is found in its intensed form in the state of Samadhi. Every mental modification leaves behind a samskara or latent tendency which may manifest itself as a conscious state when the occasion arises. Similar vrittis strengthen similar dispositions. The yogi should not only arrest the modifications but also destroy the dispositions, otherwise they may shoot forth again.When the mind is rid off its modifications, it is said to be in a balanced state that is samapatti and to assume the form

of whatever object is presented to it, the knower, the known or the act of knowledge. It assumes the nature of the object as it is in itself.

B. INFERENCE

Inference is the mental modification through which we cognize the generic nature of objects. The cognition of invariable concomitance is the basis of inference. Of two things invariably connected with each other, the perception of the one serves to establish the existence of the other.

C. TESTIMONY

The knowledge of an object seen or inferred by a trustworthy person may be communicated to others by means of words.

Valid cognition is distinguished from four other kinds of mental modifications.

- Misconception (viparyaya) is an erroneous idea, which is not true to the nature of the object.
- Imagination (vikalpa) is a form of words, which has no positive fact corresponding to it.
- Sleep (nidra) is that mental modification which is supported by the negation of the waking and dreaming modifications. It is said to be mental modification since we have an awakening memory of the kind of sleep we had.
- Memory (smriti) is the recollection of the object through the impressions left behind by the previous experience of it.

The Yoga holds that the knowledge gained through perception, inference and scriptural testimony is not absolutely valid, since it assumes, with the Samkhya, that empirical knowledge is the product of the erroneous confusion between purusha and buddhi. Truth of things as they are can be gained only through the practice of Yoga. Vyasa quotes a verse “By the scriptures, by inference and by the eager desire for practice in contemplation, in three ways he furthers his sight and gains the highest Yoga.

Shrimad Bhagavad-Gita is the text of Yoga. In the 16th chapter, daivasurasampadvibhagayoga, Krishna tells Arjuna the importance of scriptures as the guideline on the path of spiritual life.
According to Bhagavad-Gita,

यः शास्त्रविधिमुत्सृज्य वर्तते कामकारतः ।

न स सिध्दिमवाप्नोति न सुखं न परां गतिम् ॥२३ ॥

Yaḥ śāstravidhimutsṛjya vartate kāmakārataḥ।

na sa sidhdimavāpnoti na sukhaṁ na parāṁ gatim।।23।।

(Bhagavad-Gita, 16th chapter)

He who abandons the commandments of the scriptures and lives as his desires prompt him, he attains neither spiritual perfection, nor worldly happiness, nor liberation.

तस्माच्छास्त्रं प्रमाणं ते कार्याकार्यव्यवस्थितौ ।

ज्ञात्वा शास्त्रविधानोक्तं कर्म कर्तुमिहार्हसि ॥२४ ॥

Tasmācchāstraṁ pramāṇaṁ te kāryākāryavyavasthitau।

jñātvā śāstravidhānoktaṁ karma kartumihārhasi।।24।।

(Bhagavad-Gita, 16th chapter)

Therefore let the scriptures be your norm in determining what should be done and what not. Understand the injunction of the scriptures first and then set yourself to work.

Krishna tells Arjuna that those who want to rise spiritually should follow the Shastra, a scriptures as the guideline. Left to his own unguided intelligence, his tendency

will be only to yield to the evil in him and not to master it. So man requires an external authority, prescribing what to do and what not to do. That authority is called as a scripture, a text believed to have the sanction of God. Unless guided by an objective authority to which sanctity is attached, man in his natural state will degenerate into a slave of passions.

5.1.5 ACCORDING TO PURVA MIMAMSA

According to Mimamsa, the nature of valid knowledge is as follows:

Valid knowledge is defined as an apprehension of an object, which is produced by, causes free from defects and which is not contradicted by subsequent knowledge.

A valid cognition must fulfill following four conditions;

- It must not arise from defective causes.
- It must be free from contradiction. It must be self-consistent and should not be set aside by subsequent knowledge.
- It must apprehend an object, which has not already been apprehended. Novelty is an essential feature of knowledge. Thus memory is excluded from valid knowledge.
- It must truly represent the object.

Both Prabhakara and Kumarila regard knowledge itself as pramana or mean of knowledge. Jaimini admits three pramanas- Perception, Inference and Testimony.Prabhakara adds two more- Comparison and Implication. Kumarila further adds Non-apprehension.

A. PERCEPTION

It is direct apprehension. It proceeds directly from sense contact. Perception relates to objects that exist i.e. are perceptible by senses.It cannot apprehend super sensuous objects. The Mimamsaka do not support the theory of yogic intuition, by which the Yogis are said to apprehend objects, which are past and future, imperceptible and distant. This intuition is either sensuous or non sensuous. If it is sensuous then, since the senses cannot come in contact with past, future and distant objects, there cannot be

cognition of them. Even the internal sense manas can produce only cognitions of the mental states of pleasures and pain. It is impossible that the senses can comprehend objects without coming into contact with them when they attain a high degree of development, for no amount of development can change the nature of the sense organs. If the Yogic intuition apprehends things perceived in the past, then it is a case of memory. If it apprehends objects that have not been previously apprehended, then its validity is doubtful. Knowledge of past, future and distant objects can be got only through the Vedas.

B. INFERENCE

The Mimamsa accounts of inference also generally agrees with that of the Nyaya.There are certain minor differences like the Mimamsaka recognizes only three members of a syllogism, either the first three or the last three.

C. COMPARISON

The Mimamsa view of Comparison or Upamana differs from the Nyaya view. According to Nyaya, comparison is the knowledge of the relation between a word and the object denoted by the word. It is the knowledge of similarity of an unknown object like a wild cow with a known object like a cow. The knowledge is like this- 'the perceived wild cow is like the remembered cow'. The Mimamsaka refutes this account of comparison. According to Mimamsaka the knowledge of the relation between a word and the object denoted by the word is derived by verbal authority (e.g. by the words of the person who tells that a wild cow is similar to a cow) and not by comparison. It is known through the recollection of what was learnt from the verbal authority of the person and the knowledge of the wild cow itself is duo to perception and not comparison. Hence comparison, according to Mimamsaka, apprehends the similarity of the remembered cow to the perceived wild cow. This knowledge is like this; 'the remembered cow is like the perceived cow'. It is the cow as possessing similarity with the wild cow that is known as comparison. A person need not be told by anybody that a wild cow is similar to a cow. Any person who has seen a cow and happens to see a wild cow himself remembers the cow as similar to the wild cow he perceives. This knowledge of similarity is comparison.

D. VEDIC TESTIMONY

The aim of Mimamsa is to ascertain the nature of Dharma. Dharma is not a physical existent, and so it cannot be apprehended through the senses. Vedic testimony gives us the knowledge of duties. Perception, inference, comparison, presumption and non-apprehension cannot yield the knowledge of Dharma.E.g. The knowledge that the performer of the Agnistoma sacrifice will go to heaven cannot be given by them. Vedic testimony is the only source of our knowledge of duties relating to supersensible entities. The Vedic texts, which enjoin us to perform certain actions, which lead to beneficial results, are authoritative.

Kumarila divides testimony into human and superhuman. The former is the testimony of the trustworthy persons, while the latter is the testimony of the Vedas. The former is valid, if it is uttered by persons of trustworthy character, while the latter is valid in it. Both are valid, since they are free from the defects of being composed by untrustworthy persons, and words are valid in themselves. The former gives us the knowledge of existing objects e.g. jar, wall etc. The later gives us the knowledge of directing us to perform an action e.g. bring a jar. The former gives us the knowledge of existential propositions, while the latter gives us the knowledge of injunctive propositions.

E. PRESUMPTION

The Mimamsaka unlike the Nyayayika admit Arthapatti or Presumption as an independent means of valid knowledge. It is also called as Postulation or Implication. It is the assumption of an unperceived fact in order to reconcile two apparently inconsistent perceived facts.E.g. If Devadatta is alive and he is not in his house, we presume that he is elsewhere. ‘Being alive’ and ‘not being in the house’ are two perceived facts, which appear to be inconsistent. Their apparent inconsistency is removed when we presume the fact of ‘Being elsewhere’. If Devadatta is fat and he does not eat during the day, we presume that he must be eating during night; otherwise the inconsistency between ‘being

fat' and 'not eating during day' cannot be explaied. The Nyayayika reduces presumption to inference. But, Mimamsaka regards it as an independent pramana.

Prabhakara holds that the element of doubt distinguishes presumption from inference. In presumption, there must be a doubt regarding the truth of the two perceived facts where doubt is removed by presumption, while in inference there is no such doubt. From the undoubted perception of smoke we can infer the existence of fire. The sign is free from doubt. But the perceived absence of Devadatta from his house leads to the presumption of his living outside his house only when it has made the fact of his living doubtful. Thus there is doubt in presumption, while there is no doubt in inference. Presumption removes doubt, and reconciles two apparently inconsistent facts, and cannot be regarded as inference.

F. NON-APPREHENSION

Non-apprehension is defined as the absence of any means of valid knowledge, which cognizes the non-existence of an object, which is not present to a sense organ. Kumarila holds that non-apprehension is the means of knowing the non-existence of an object, which cannot be known by perception, inference, comparison, testimony and presumption. Non-existence is real and apprehended by non-apprehension.
E.g. the non-existence of curd in milk is prior non-existence. The non-existence of milk in curd is posterior non-existence. If non-apprehension were not recognized as an independent means of knowledge, there would be the existence of curd in milk, or of milk in curd. Non-existence is real, which is cognized by non-apprehension, just as existence is cognized by perception, inference, comparison, testimony and presumption.

Non-apprehension being negative in character, it cannot cognize positive existence. Similarly perception, inference, comparison, testimony and presumption being positive in character, they cannot cognize non-existence.

Non-existence is not cognized by perception, since there is no intercourse of sense organ with it. Nor can non-existence be inferred from the knowledge of a sign, because

the invariable concomitance between them is not known. Further, no sign pervaded by non-existence is known. Nor is non-existence known by comparison, testimony and presumption because in the knowledge of non-existence there is neither knowledge of similarity, nor knowledge of verbal statement, nor knowledge of inconsistency between two perceived facts, which may be reconciled by presumption. It can only be known by non-apprehension, which is a distinct means of valid knowledge.The Nyayayika dose not believes in non-apprehension as an independent means of knowledge. According to Nyaya, the same sense organ, which perceives any object, can perceive its non-existence also. The same inference, which infers the existence of any object, infers its non-existence also. Thus, Nyaya reduces non-apprehension either to perception or to inference.

5.1.6 ACCORDING TO UTTAR MIMAMSA

The Bhatt school of Uttar Mimamsa accepts the means of valid knowledge similar to the Purva Mimamsa. According to the Uttar Mimamsa the validity of the means of knowledge is of two kinds; that which apprehends the true nature of Brahman is of the first validity, since their objects are free from contradiction during the phenomenal state of existence. The second kind of validity belongs to Vedantic texts that set forth the identity of the individual self with Brahman.

The final object of the Advaita theory of knowledge is to show with the help of the different methods (pramanas) that the world of multiplicity cannot be consistently explained without admitting one underlying unity which transcends all changes and diversities and which therefore is the highest Reality. The Vedas including Upanishads also known as Vedanta contain the great declaration of unity called the mahavakyas that are the reports of the direct realization of unity by the seers. He, who desires to liberate himself from the delusive appearance of multiplicity, and realizes one Brahman behind all and also realizes the unity of his own self and Brahman, can utilize the teachings of the seers. These are to start with mediate knowledge for him, by constant meditation they can be turned into immediate knowledge with the help of authority i.e. Shabda pramana.

CHAPTER 6
FUTURE SUGGESTIONS

1. To study in detail about the means of knowledge.
2. Implementation of these pramanas with better understanding.

CHAPTER 7
CONCLUSION

Means of understanding are very important as are the means so is the end. If means are proper then understanding will be correct. With proper understanding one can organize his activities well. When activities are well organized its usefulness is confirmed. This is how the whole mechanism of one's success takes place.

As regards the means of knowledge there is great divergence among the different systems of philosophy. The Charvakas who are out and out materialists believe only in perception; the Buddhists and the Vaisheshikas in perception and inference; the Sankhya and Yoga schools in perception, inference and verbal testimony (shabda); the Nyayayika adds to these comparison as well; the Prabhakara school of Mimamsaka includes presumption; while the Vedantists, along with the Bhatt school of Mimamsaka believe in six means of knowledge, viz., perception, inference and verbal testimony (shabda), presumption and non apprehension.

With regard to the conception of knowledge, Nyaya holds that knowledge is a product of the contact of the mind with the self; while according to the Vedanta it is eternal pure consciousness (chaitanya), only it is manifested through mental states (vritti). According to Samkhya, in all knowledge, three factors are involved: the object known, the subject knowing, and the process of knowledge. In the Samkhya philosophy, the pure consciousness is the knower (pramata), the modification (vritti) is the pramana, prama is the reflection in the consciousness of the modifications in the form of the objects. Experience belongs to purusha. Budhhi (intellect), ahankara (self-sense), manas (mind), and the senses constitute the apparatus by means of which the subject apprehends the external object. Knowledge according to Yoga is a state or modification of the empirical Self. But as Purusha, in itself, knows no change whatsoever, this modification must be solely of the internal organ. The cognitive situations, involve not only Purusha and some modifications of the internal organ but also an appropriate object. Of these three factors the internal organ mediates or serves as a connecting link between Purusha and the object and it is supposed to do so by taking on a "form" through which alone an object can be known, is called its mode (vritti) and knowledge means that mode as informed or illuminated by the light of Purusha. According to Mimamsa, the nature of valid knowledge is defined as an apprehension of an object, which is produced by, causes free from defects and which is not contradicted by subsequent knowledge.The theory of knowledge forms an essential part of philosophy. All schools of philosophy regard ignorance as the root cause of the human suffering. So, each system tries to discover the means and the processes of true knowledge by means of which reality could be known and life could be so lived as to overcome misery or minimize suffering. According to the first Nyaya sutra of Gotama, the study of the source of knowledge (pramana) is necessary, because through it alone can we properly know reality and thereby guide our actions so as to be able to attain desirable ends and avoid sufferings.

Knowledge whether perceptual, inferential or verbal is essentially a process directed to the attainment of truth. Thus, truth is an intrinsic characteristic of knowledge. If the knowledge fails to attain truth, it is because some special hindrance stands in the way of knowledge itself. In order to overcome the hindrances and to gain the knowledge

of that truth one should first of all go through the fourfold mental and moral discipline namely discrimination between the eternal and non eternal, giving up desires for enjoyment of fruits of action, acquisition of self control, powers of endurance, concentration etc., and ardent determination for liberation. Prepared thus one should enter upon the three steps under the guidance of a master who himself has realized Brahman. The steps are (1) Listening (shravana) to the Upanishadic teachings, (2) Reasoning (manana) about their truth, (3) Intensive meditation (nidhidhyasana) on the truths accepted. By long and continued contemplation the truths known from authority attain maturity. Brahman shines forth as the only Reality in all outer things and the inner self. It is thus that teacher's precept, "Thou art Brahman", comes to be realized by the pupil in an immediate consciousness of the form, "I am Brahman". This is the Ultimate Knowledge.

Epistemology thus becomes closely linked up with ontology and both of them again with ethics. Knowledge and moral perfection are regarded as necessary to each other in almost all system of Indian philosophy. Sometimes knowledge is regarded as the means to the good life and moral purity is regarded as indispensable for perfect knowledge, so that morality and knowledge are regarded as the two inseparable aspects of perfection.

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PART II

EXPERIMENTAL RESEARCH

CONTENTS

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ABSTRACT

Background:

Complementary therapies have been used with beneficial effects in the postoperative period after Coronary Artery Bypass Grafting (CABG). The aim of the present study was to know the effect of Yogic relaxation technique namely Mind Sound Resonance Technique (MSRT) and Deep Relaxation Technique (DRT) on the cognitive variables and psychological variable in the first post operative week and followed up to sixth week after CABG in patients with Coronary Artery Disease (CAD).

Methods:

After informed consent was taken 60 male as well as female patients with age range 35-65 years who were posted for Coronary artery bypass grafting randomly allocated into two groups i.e. Yoga (n=30) and control (n=30). Cognitive variables such as memory were assessed by verbal and spatial memory test while sustained attention was assessed by six-letter cancellation test. Psychological variable such as Stress was assessed by perceived stress scale.

Yoga group practiced Mind Sound Resonance Technique (MSRT), which provides deeper relaxation at the mental level through its resonance effect and Deep Relaxation Technique (DRT), which provides deeper relaxation at physical level by relaxing each and every part of the body one by one. This was practiced through a pre-recorded cassette for 20 minutes twice a day from the 5^{th} to 10^{th} postoperative day along with conventional medical management. The control group continued to have conventional medical management.

Result:

Data was analyzed by using non-parametric Wilcoxon Signed Rank Test and Mann Whitney Test. The variables were not normally distributed ($p<0.05$ Shapiro Wilks Test). The base line data were not well matched ($p>0.05$ Mann Whitney U Test) for pre values.

Yoga group showed highly significant recovery of 75% in verbal memory from 8th to 45th day compared to control group. It showed highly significant difference between the groups in all the cognitive variables on 45th day. Off-pump yoga group showed highly significant recovery of 49.32%, 81.82% in verbal and spatial memory respectively and 33.33% improvement in attention from 8th to 45th day compared to on-pump yoga group.

There was a significant reduction in stress level after the practice of yogic relaxation techniques like MSRT and DRT for six weeks. The reduction in stress level was by 36.74% in the yoga group when compared to control group which was 12.23% at the end of sixth week.($p<0.01$ Wilkcoxon Signed Rank Test).Yogic relaxation technique appears to be effective tool for cardiac rehabilitation.

Conclusion:

Yogic Relaxation Techniques such as MSRT and DRT can reduce stress level and promote early recovery in memory postoperatively in CABG patients.

Key words:

Yogic relaxation technique, postoperative week, CABG, verbal memory, spatial memory, sustained attention, stress.

CHAPTER 1
INTRODUCTION

Coronary arteries are the small blood vessels that supply the heart muscle with oxygen and nutrients. When one or more of the coronary arteries become partially or totally blocked, the heart does not get adequate blood supply. This is called Ischemic heart disease or coronary artery disease (CAD).

CAD is the most common form of heart disease and is the single most important cause of premature death in many countries across the globe.[1] The wrong life style increased stress in life, obesity, increased intake of saturated fat in diet, smoking etc.are known risk factors for CAD. The Heart bypass surgery creates a detour or "bypass" around the blocked part of the coronary artery so that the blood flow is restored to the heart tissue that has been deprived of blood because of CAD. This surgery is commonly called as *Coronary Artery Bypass Graft*. It is the most commonly performed open-heart surgery worldwide. The type of graft used here is the Saphenous Vein located in the leg running from the ankle to the groin or an artery Left Anterior Descending Artery (LAD) or Radial Artery.

Cardiac surgery triggers a specific emotional and physiological response in patient. The constant pressure associated with living in a fast paced world has created an environment where everyone is suffering to some degree from excessive stress. A major cardiac event evokes feelings of anxiety with initial concern about diagnosis and treatment and later concern about the impact of impaired health. Because of association observed between the heart disease and the stress levels the use of conventional treatment modalities have been the subject of interest.[2]

Coronary Artery Bypass Grafting (CABG) is one of the most commonly performed cardiac surgeries today and is recognized to be a highly effective procedure for reducing angina and stabilizing ventricular dysfunction. CABG is successful in revascularising the heart but the surgical procedure may have adverse effects on the

brain. There is a high prevalence of persistent neurocognitive decline in patients who have undergone conventional coronary artery bypass surgery.[2]

Cerebral injury during cardiopulmonary bypass: emboli impair memory. Cognitive deficits occur in 80% of patients after cardiac surgery where emboli are associated with memory loss. A study done on 70 patients investigated the influence of cerebral perfusion and embolisation and cognitive functions deteriorated after the surgery. [3] Residual cognitive dysfunction at 6 months following CABG surgery. A study done on 63 patients showed that for recent memory patient's scores showed a significant deterioration at 1 month after CABG surgery and this effect had not completely disappeared at 6 months postoperatively. For attention and verbal fluency, patient's scores had deteriorated significantly at 1 week after surgery with incomplete recovery at 6 months. [4] Neuropsychological alterations after cardiac operation. Postoperative deficit was significant on measures of attention, psychomotor speed and fine motor dexterity. [5]

Subjective reports of cognition in relation to assessed cognitive performance following coronary artery bypass surgery. This study examines whether those patients who report cognitive deterioration after CABG do show cognitive changes as assessed by neuropsychological testing. When mood state was examined, it was found that those who report deterioration in a particular cognitive function tented to have significantly higher levels of depression as assessed by the Beck Depression Inventory and higher levels of state anxiety. [6]

CABG is performed with two primary techniques: ON-PUMP and OFF-PUMP. In on pump surgery, cardiac arrest is induced and cardioplegia solution is used to keep the heart in the arrested state, while a pump takes over cardiopulmonary function. During off pump procedure no tubes are placed in the aorta, cardioplegia is not used and the heart continues to beat and supply oxygenated blood to the body. [7]

Assessments of neurocognitive impairment after off pump and on pump techniques for CABG surgery: prospective randomized controlled trial.60 patients

undergoing CABG prospectively randomized to the off pump and on pump technique, in which the on pump group showed a significantly greater neurocognitive deterioration at 1st week and 10th week postoperatively respectively than the off pump group. [8]

With a growing awareness of the possibilities of cognitive decline following CABG, researchers have begun to investigate preventive methods to lower the risk. Such methods include both non-pharmacologic strategies such as emboli reduction, temperature regulation etc. and pharmacologic strategies in which drugs are used. But none of these strategies have been systematically evaluated for efficacy in preventing post-CABG cognitive decline.[9]

A study on Transcendental Meditation has shown enhancement in attention, spontaneous organization of memory and short-term recall. [10] A study on music therapy, music video and scheduled rest therapies on the 2nd and 3rd post operative day in 96 patients undergoing CABG showed significant reduction in anxiety and improved mood. [11] A 10 weeks relaxation based stress management program on the quality of life following CABG has been shown to have greater improvement in emotional status and quality of life than controls. [12]

With this background the present study is to further the previous work of above given studies. Here by using yogic practices such as Deep Relaxation Technique (DRT) and Mind Sound Resonance Technique (MSRT) as a combination. This study aims to assess the effect of yogic relaxation techniques on the early recovery of memory and improvement in attention along with psychological states in postoperative CABG patients.

1.1Yogic Relaxation Technique

Relaxation is shutting down of all unnecessary activities and having a deeper level of rest to rejuvenate the body and the mind. Different relaxation techniques have been mentioned in traditional text. Relaxation in Hatha Yoga Pradipika is mentioned as Vishranti.[13]

1.1.1Mind Sound Resonance Technique

Mind sound resonance technique is one of the advanced yoga technique used by Swami Vivekananda Yoga Anusandhana Samsthana for achieving positive health, to strengthen the immune defense, to improve will power, provide greater relaxation and hence achieve a better health. Mind sound resonance technique takes one to deeper and deeper levels of silence. A resolve made in this technique helps to get rid of fear of death. It brings about tremendous expansion within oneself, which brings about powerful healing. Mind sound resonance works at mental and emotional level and thus removes negativity and brings the changes in physical and mental level. [14]

1.1.2Deep Relaxation Technique

Deep relaxation technique works at all levels – physical, mental, emotional, intellectual and spiritual levels. DRT is a relaxation technique where one relaxes the body part by part by directing the attention of the mind on different parts of the body right from the toes till the head region. A feeling of relaxation is propagated throughout the body. Relaxation helps people to develop a greater awareness of connection between their emotion, physiology and behavior and ultimately achieve greater mastery of their health and well being. [15]

1.2Memory and Attention

Human learning and behaviour are dependent upon the ability to pay attention to critical features in the environment; retain and retrieve information; and select, monitor and control cognitive strategies to learn, remember, and think. Without these abilities, we could not plan, solve problems, or use language. Likewise, being absent of the capacity to attend, remember and organize, we would be incapable of modifying our behaviour when confronted with new situations. It would be impossible to generalize what we already know to novel situations and to acquire new concepts and strategies in coping with current, anticipated and forthcoming events if we were not vigilant and attentive, if we

could not remember the relevant cues in the environment that led to previous reinforcement. Thus, attention and memory, which are mental control processes, play a central role in reading, writing, thinking, problem solving and social behaviour.

Memory is the capacity to retain the known or learnt things and reproduce whenever needed. The function involves past experiences. It is the totality of past experiences that can be remembered. [16]

Attention is the mental process of concentrating effort on a stimulus or a mental event. This process focuses a mental commodity or effort on either external stimulus or an internal event. Attention is the limited mental energy or resource that powers mental system. It is a commodity, the stuff that gets focused when we are attentive. Attention is limited or finite.Sustained attention is the duration of an individual attention to a single object or event. [16]

1.3 Stress

Stress is the wear and tear of the body experiences in reaction to everyday challenges, tensions and pressures. Too much stress wears down the immune system increasing the risk of everything. Chronic stress can contribute to heart disease, high blood pressure, stroke, depression and anxiety and sleep disorders. It is a well-known fact through researches that there is direct relation between stress and cardiovascular system. There has been a literature might play a role in outcome for patients who undergo bypass surgery. [17]

Since the preoperative and the postoperative outcome after CABG can be influenced by psychological status also, yogic relaxation techniques would bring about psychological and emotional stability.Various forms of neurologic and cognitive changes after CABG have therapeutic implications. There is a great interest in therapeutic treatments that may have neuroprotective effects against a variety of insults to the brain during the bypass surgery.

The population of the patients undergoing CABG is an ideal group in which to evaluate such therapeutic treatment by introducing it in a controlled way immediately

after surgery.Since, the postoperative outcomes after CABG would be influenced by surgery, techniques of yoga would help in bringing about neurocognitive stability.

1.6Backgroun and scope

Although many other earlier studies on relaxation therapies have shown better calmness and subjective well-being.

There is no study conducted on the effect of DRT and MSRT on verbal memory, spatial memory and sustained attention. Also on psychological status such as anxiety and depression, emotional status, stress and quality of life in CABG patients. Hence, this study was designed to observe the cognitive level and psychological status after the practice of DRT and MSRT.

CHAPTER 2

AIMS AND OBJECTIVES

1. To study the cognitive state in patients undergoing CABG.
2. To study the psychological state in patients undergoing CABG.
3. To compare cognitive state between on-pump and off-pump state in patients undergoing CABG.
4. To evaluate the effect of yogic relaxation techniques on cognitive variables and Psychological variable in the CABG patients.

CHAPTER 3
LITERATURE REVIEW

3.1General studies on cognitive outcomes in CABG patients:

1. Van Dijk D, Jansen EW, et al. studied cognitive outcome after off pump and on pump coronary artery bypass graft surgery. Cognitive outcome could be determined at 3 months in 248 patients. Cognitive decline occurred in 21% in the off pump group and 29% in the on pump group and at 12 months cognitive decline occurred in 30.8% in the off pump group and 33.6% in the on pump group. [18]

2. Van Dijk D, Moons KG, et al. conducted study to describe the association between cognitive outcome in the first post operative week and that at 3 months after both off pump and on pump coronary artery bypass surgery. Cognitive outcome in the first week for 219 patients was a predictor of cognitive decline after 3 months. Early decline was present in 54 patients (49%) after off pump surgery and 61 patients (57%) after on pump surgery. [19]

3. Selnes OA, Grega MA, et al. conducted study on patients undergoing coronary artery bypass surgery and non surgical control group and found out that the relative risk of developing new self reported memory symptoms between 3rd and 12th months was 2.5 times higher among CABG patients than among non surgical Control group. [20]

4. A study done on 50 CABG patients by Qian YN, Zhang Z, et al. to establish the changes of cognitive function after open-heart surgery with cardiopulmonary bypass were studied on the day before operation and 14th day postoperatively with basic cognitive capacity test battery. The total score of the basic cognitive capacity test 14 days postoperatively in 31 out of the 50 patients (62%) was significantly lower than the preoperative score. [21]

3.2Studies on stress,depression and anxiety in cardiac patients:

1.A study done by Rymaszewska J, et al. on depression and anxiety in coronary bypass grafting patients. The study was done on 53 patients who submitted to CABG were examined a few days before and after the operation and 3 months after CABG. They completed Speil Berger anxiety questionnaire and beck depression inventory. The results showed that 55% of the patients had high levels of anxiety before surgery, 34% of the patients immediately after surgery and after 3 months 32% had clinical relevant results of anxiety. 32% of the patients before surgery, 28% immediately after CABG and 26% at the follow up were depressed. [22]

2. A study was done on anxiety and depression after acute myocardial infarction by Crowe J M, et al. to assess the symptoms of anxiety and depression in hospitalized patients who had acute myocardial infarction (AMI). They observed 785 hospitalized patients with AMI; with one year follow up of 201 selected patients from this sample by state-trait anxiety inventory and short form of beck depression inventory data were collected in the hospital 3 days after AMI and the patients were followed up 14, 24, 41 and 56 weeks after AMI. They concluded that the symptoms of anxiety were prevalent among hospitalized patients who had an MI; where as depressive symptoms were rare. [23]

3.Woolery A, et al. examined the effects of a short term Iyengar yoga course on mood in mildly depressed patients on 28 volunteers by Beck depression Inventory state, Trait Anxiety Inventory, profile of mood states, morning cortisol level. Changes were observed in acute moods, with the subjects reporting decreased levels of negative mood and fatigue following yoga classes, and there was a trend for higher morning cortisol levels in yoga group compared to the controls. [24]

4.A study on yoga based isometric relaxation (IRT) verses supine rest on oxygen consumption, breath rate and volume and autonomic measures by Vempati RP, et al. showed a significant decrease in breath rate after IRT. The results suggest possibilities for IRT in reducing some physiological signs of anxiety. [25]

3.3Studies on relaxation therapies after CABG:

1.A study was done by Bohachick P. on progressive relaxation training in cardiac rehabilitation. The purpose of the study was to investigate the effect of progressive relaxation training as a stress management technique for cardiac patients who were participants in cardiac exercise program. The instruments to measure the stress levels were – Speil Berger state anxiety scale and selected dimensions of symptoms check list-90-revised. At the completion of the relaxation of training program, both group of patients were rested on stress level measures. The findings were: post treatment mean anxiety scores for the treatment group were significantly lower than that of the control. [26]

2.Aurthur HM, et al. reported the efficacy of multidimensional pre operative intervention including exercise therapy, education and monthly telephone calls during the preoperative waiting period in 249 patients of elective CABG, waiting for minimum of 10 weeks. They showed significant reduction in ICU stay and hospital stay and better quality of life. [27]

3. A study on autonomic variable in CABG patients done by Chaitanya CH. et al. showed a reduction in power of low frequency (LF) and significant decrease in LF/HF ratio in yoga group. The power in high frequency (HF) is increased in yoga group. There was a reverse effect in control group. There was a significant increase in heart rate by 33.90% in yoga group and 43.08% of increase in control group. [28]

4.A study done on autonomic variable in CABG patients by Ujwala T. et al. showed a reduction in power of low frequency (LF) and significant decrease in LF/HF ratio in yoga group. The power in high frequency (HF) is increased in yoga group. There was a reverse effect in control group. There was a significant increase in heart rate by 33.90% in yoga group and 43.08% of increase in control group. [29]

CHAPTER 4

METHODOLOGY

4.1Subjects

Out of 450 patients with coronary artery disease who were posted for CABG were screened for inclusion criteria. Of these 60 patients were selected. They were in the age range of 35-65 years. The sample size was calculated from effect size 0.85 which was derived from previous study.

4.1.1Inclusion criteria:

- Both Male and Female subjects
- Age range 35-65 yrs
- Patients who are not critically ill

4.1.2Exclusion criteria:

- CABG surgery with valve replacement, aneurysm, VSD repair
- Patients with renal failure
- Critically ill patients

4.1.3Informed consent:

Informed signed consent was taken from all the subjects. The consent for the study was obtained by institutional ethical committee of SVYASA and Narayana Hrudayalaya.

4.1.4Source of the subjects:

The subjects were selected from Narayana Hrudayalaya, a muiltispecaility 500-bedded hospital, Hosur road, Bangalore, India, which is situated 20 km. from Prashanti Kutiram, the main SVYASA campus.

4.2Design:

Sixty patients selected for study (M=55, F=5) were randomly allocated into two groups i.e. Yoga (n=30) and Control (n=30) through computer generated randomizer. The verbal and spatial memory test, letter cancellation test along with perceived stress scale were administered on the pre-operative day in the pre-

operative bed for both the groups. The Yoga group received yogic relaxation techniques two times in a day and control group received normal care. The yoga therapist had interaction with the subjects in both the groups for the same duration of time on the day before surgery and empathetic counseling to cope with pain after the surgery. The conventional hospital management strategy was the same for yoga and control group. The cognitive scores along with psychological parameters were recorded on 8th postoperative day for both the groups, on the day before discharge from the hospital. The same were also recorded at the end of 6th week of post operation for both the groups. The home practice of the relaxation techniques was ensured by maintenance of diaries and regular phone reminders.

Design for recording Control Group:

Day1 PRE DATA	**Day 2** CABG	**Day 3-4 ICU**	**Normal care for six days**						**Normal Care Continued**	**Day45 POST DATA**
			5	**6**	**7**	**8**	**9**	**10 POST DATA**		

Design for recording Yoga Group:

Day1 PRE DATA	Day 2 CABG	**Day 3-4 ICU**	**Yogic relaxation technique for six days**							**Day45 POST DATA**
			5	**6**	**7**	**8**	**9**	**10 POST DATA**	**YRT Continued**	

4.2.1Design of the data acquisition:

Day 1- The verbal and spatial memory test, letter cancellation test along with perceived stress scale were administered on the pre-operative day.

Day 2- Surgery

Day 3 & 4-Stay in ICU ward.

Day 5,6,7,8, 9, 10 –Intervention in postoperative bed.

Day10-The cognitive scores along with psychological parameters were recorded on the 8th postoperative day in the postoperative bed for both the groups.

Day 45- Final recordings of the cognitive scores along with psychological parameters were also recorded at the end of 6th week of post operation for both the groups.

4.3Assessment:

4.3.1Procedure of data acquisition:

Verbal and Spatial Memory Test

The verbal and spatial memory tests were assessed for 60 subjects. The material was projected on the laptop, allowing 10 seconds for each slide. After the 10 slides were shown, a mathematical problem (e.g. 2 plus 8 minus 3 plus 5 minus 1 minus 6 plus 7 minus 4) was projected on the screen. Immediately after this, the subjects were asked to recall and right down (or in the case of spatial memory, to draw) within 60 seconds the 10 test items that had been shown to them.

To test verbal memory, standard nonsense syllables of three letters, e.g. XOC, were selected from prepared list. Three different sets of 10 non-sense syllables were presented on Day 1st, Day 8th and Day 45th. The test for spatial memory consisted of 10 simple line drawings. Geometrical or other shapes, which could be described verbally, e.g. a square or a circle, were not used. The drawings were very simple and easy to reproduce. As described for verbal memory, there were three separate, similar sets of 10 line drawings each for Day 1st, Day 8th and Day 45th. For both verbal and spatial memory tests a correct answer was scored as "1" and a wrong answer was scored "0". [30]

Six Letter Cancellation Test (SLCT)

Cancellation test requires visual selectivity and repetitive motor response. A Six Letter Cancellation Test (SLCT) was administered to assess function such as selective and focused attention, visual scanning and the activation and inhibition of rapid responses.

Testing Procedure:

The work sheet consisted of 3 parts (i) Instructions. (ii) The six target letters to be cancelled and (iii) the working section that consisted of letters of the English alphabets arranged randomly in 22 Rows and 14 Columns. The subjects were asked to cancel as many target letters as possible in the specified time i.e.90 seconds. The letter cancellation can be undertaken following a horizontal, vertical or randomized path by selecting any target alphabet mentioned. The total number of cancellations and wrong cancellations were scored and net scores were calculated by deducting wrong cancellations from the total cancellations attempted. [31]

Perceived Stress Scale

Out of the 10 items in Perceived Stress scale questionnaire 4 items are positively stated. The scores are obtained by reversing the scores of these 4 positively stated items and then summing across all ten items. [32]

4.3.2Data Extraction and Analysis:

The patients were made comfortable in their respective wards and proper explanation was given about the tests that were going to be conducted. After clearing the doubts of the patients regarding tests, verbal and spatial memory test was conducted first. Ten slides containing meaningless words were shown on the laptop. Each slide was shown for ten seconds followed by an arithmetic sum to divert their attention. But, the patients were unaware of this fact. Pencil and sheets were provided and instruction was given that only answer should be written on the top of the sheet after calculation. One minute was given to recall and reproduce the letters on the sheet. Similar procedure was followed for spatial memory test by showing the slides of non-geometric diagrams. After completion of the test the sheets were collected back. Each correct diagram and letters carried one mark.

After this test six-letter cancellation test was conducted. Cancellation sheets were provided. The patients were asked to cancel as many target letters as possible in the specified time i.e.90 seconds. After completion of the test the sheets were collected back. The total number of cancellations and wrong cancellations were scored and net scores were calculated by deducting wrong cancellations from the total cancellations attempted.

After this the patients were given questionnaire to fill up. Perceived stress scale questionnaire was filled up with aid.

The data were scored and are shown as tabulated in appendix 1.Data were analyzed using statistical package (SPSS VERSION 10.0). The data of the groups were assessed with tests of normality. As data were not normally distributed, non-parametric test were used.

4.4Intervention:

Yoga group practiced Mind Sound Resonance Technique (MSRT) and Deep Relaxation Technique (DRT) through headphones with a pre recorded audiocassette for 20 minutes two times a day. The timings were 9.30am in the morning and 3.30pm in the afternoon for six days starting from fifth post-operative day in post-operative ward. The control group continued to have normal care. Pre recorded audiocassettes of MSRT and DRT lasted for 20 minutes each and is done in different phases of stepwise relaxation emphasizing more on relaxation and healing.

Mind Sound Resonance Technique (MSRT):

MSRT has three main components – mind, sound and resonance. Mind is the conglomeration of thoughts. It exists in two forms manifest and unmanifest. Manifest in wakeful and dream state, unmanifest in deep sleep state. Sound or shabda is a form of energy and is of two types. Audible and inaudible. Inaudible or mental sounds are inner sounds i.e. the subtler sounds that are heard by deep meditators. When two sound waves match, resonance occurs. Resonance is the prolongation and manifestation of sound produced by transmission of its vibrations.

The resonance spreads all over the body when the frequency of the body matches with the frequency of the sound, which is produced loudly or mentally. Mind sound resonance technique is to generate resonance throughout the body by repeating a mental sound, which helps to gain mastery over the mind and to have soothing and relaxing effect.

The steps of MSRT included

(1) Prayer- Offering prayer (mahāmṛtyuñjaya mantra) to the God.

(2) A. Loud chanting of A-U-M and AUM thrice. Feel the resonance throughout the body. (2) B. Chanting of A-U-M and AUM mentally thrice. Feel resonance effect.

(3) A. Loud chanting of mahāmṛtyuñjaya mantra thrice, each time feels the resonance.

(3) B. Mental chanting of mahāmṛtyuñjaya mantra thrice, feel the effect of resonance.

(4) Chant AUM mentally nine times, feel the spread of resonant waves through the body.

(5) Mental chanting of OM (Ajapajapa) for nine rounds.

(6) Stay in silence for some time.

(7) Resolve- Take resolve such as "my nature is fearlessness", "my heart is strong and

healthy.

(8) End the practice with prayer.

Deep Relaxation Technique (DRT):

The steps of DRT includes,

a. Lying on the bed gently move your legs and hands apart from the body. Close your eyes and follow the instructions given.
b. Phase-1 relaxation from toes to waist:

Bring your awareness to the tip of the toes, gently move your toes and relax. loosen the ankle joints; relax the calf muscles; gently pull up the kneecaps release and relax; relax the thigh muscles, buttock muscles; loosen the hip joints, relax the pelvic region and the waist region. Totally relax the lower part of the body. R..e..l..a..x… inhale and chant A- Kara three times and feel the vibrations in your lower parts of the body.

c. Phase-2 relaxation from waist to neck:

Gently bring your awareness to the abdominal region and relax your abdominal muscles and the chest muscles. Gently bring your awareness to the lower back, relax the lower back and loosen all the vertebral joints one by one. Relax the middle back, shoulder blades and upper back muscles. Shift the awareness to the tip of the fingers and relax them one by one. Relax the palms, loosen the wrist joints, relax the forearms, loosen the elbow joints, relax the hind arms- triceps, biceps and relax your shoulders. Shift the awareness to the neck, slowly turn the head to right and left, and again bring back to the center. Relax the middle part of the body R..e..l..a..x… inhale and chant U- Kara three time and feel the vibrations in your lower parts of the body.

d. Phase-3 relaxation of head region:

Gently bring the awareness to the head region. Relax the chin, upper jaw and lower jaw, lower and upper gums, lower and upper teeth and relax the tongue. Relax the hard and soft pallets; relax the throat and vocal chords. Gently shift the awareness to the lips and relax . Shift the awareness to the nose and relax the nostrils. Relax the cheek muscles. Relax the eyeball muscles, relax the eyelids, eyebrows and the eyebrows. Relax the head region totally. Relax the head region totally, totally relax. R..e..l..a..x… inhale and chant M- Kara three times and feel the vibrations in your lower parts of the body

e. Phase-4 complete body awareness:

Observe the whole body from toes to head and relax. To enhance the whole relaxation technique inhale and chant 'AUM'kara for three times. Feel the resonance throughout the body.

f. Phase-5 body apartness and merger with the sky:

Allowing one to feel apart from one's physical body with the feeling of expansion by merging with the limitless sky and ocean. The session ended with a resolve in which the sentence " my immune system is healing the wound quickly" were repeated with deep internal awareness.

h. Slowly come back to body consciousness. Gently move the whole body. Feel the lightness, alertness and movements of energy throughout the body.

CHAPTER 5

DATA ANALYSIS

Data were analyzed using the statistical package for social status (SPSS Version 10.0)

Step 1: The base line values for yoga and control group were checked for normal distribution by using Shapiro-wilk test.

Step 2: The comparison between the baseline values of yoga group was done by using Mann Whitney test.

Step3: The comparison between the baseline values of control group was done by using Mann Whitney test.

Step 4: The comparison of changes within the groups was done using Wilcoxon Signed Rank Test.

Step 5: The difference in the post values between the groups was assessed by Mann Whitney test.

Step 6: Percentage of the changes between the groups is presented graphically.

Non-parametric tests were used, as the data was not normally distributed.

CHAPTER 6

RESULTS

Trial Profile is given in Appendix 1.

In this randomized control study 450 patients were screened out of which 300 patients satisfied the inclusion and exclusion criteria. Out of these 120 patients were consented and randomized into 60 each in yoga and control group. Because of the drop outs on 6^{th} and 45^{th} day the final number of patients were 30 each in yoga and control.

The data of the variables is not normally distributed ($p<0.05$ Shapiro Wilks Test). The base line data of the two groups are not well matched ($p>0.05$ Mann Whitney U Test) with the pre values.

Demographic Data: Total patients=60 **Control: 30 Yoga: 30**				
BMI: Control: 24.74±2.57**Yoga:** 24.60±3.07				
Age: Control: 53.00±7.90 **Yoga:** 54.47±7.74				
Disease	**Control**	**Yoga**	**Total**	**%**
DM	**16**	**14**	**30**	**50.00**
HT	**17**	**15**	**32**	**53.33**
TVD	**17**	**20**	**37**	**61.66**
DVD	**12**	**9**	**21**	**35**
CAD HISTORY				
1 – 15 days	**12**	**17**	**39**	**65**
16 – 90 days	**4**	**7**	**11**	**18.33**
91 – 365 days	**7**	**5**	**12**	**20**
1 – 2 years	**0**	**0**	**0**	**0**
Above 2 years	**1**	**1**	**2**	**3.33**
WEIGHT DISTRIBUTION				
Severely Over Wt	**0**	**1**	**1**	**1.66**
Over Wt	**3**	**2**	**5**	**8.33**
Marginally Over Wt	**4**	**4**	**8**	**13.33**
Healthy Wt	**22**	**23**	**45**	**75**
Marginally Under Wt	**0**	**1**	**1**	**1.66**

Demographic Data:

EF=Ejection Fraction

BMI=Body Mass Index

M±Sd.=Mean±Standard Deviation

DM=Diabetes Mellitus

HT=Hypertension

TVD/DVD=

TABLE 1- Comparison of changes in VM, SM and LC in YOGA and CONTROL group

Variable		M±Sd.	%Change	M±Sd.	%Change	M±Sd.	%Cha
		1st Day	1-8	8th day	8-45	45th day	1-45
VM	Y	3.33±1.45	↓39.94***	2.00±1.41	↑75.00***	3.50±1.30	↑5.11 N
	C	3.37±1.03	↓48.66***	1.73±1.20	↑40.46**	2.43±1.39	↓27.89*
	MW	0.813NS	-	0.483NS	-	0.000***	-
SM	Y	4.77±1.68	↓41.93***	2.77±1.41	↑80.51***	5.00±1.72	↑4.82 N
	C	4.03±1.50	↓49.63***	2.03±1.30	↑52.71***	3.10±1.36	↓23.07
	MW	0.074NS	-	0.034*	-	0.000***	-
LC	Y	25.53±9.45	↑0.27NS	25.60±10.44	↑30.47***	33.40±9.85	↑30.83*
	C	20.33±7.45	↓8.51*	18.60±7.89	↑23.12***	22.90±9.40	↑12.64
	MW	0.031*	-	0.008**	-	0.000***	-

*****p≤0.001, **p≤0.01, *p≤0.05 Wilkcoxon Signed Rank Test. MW=Mann Whitney U Test.**

↑ = Improvement /recovery, ↓ = Deterioration, M±Sd.=Mean±Standard Deviation, Y=Yoga C=Control

Table 1 shows there is significant deterioration in verbal and spatial memory from 1st to 8th day in both yoga and control group, yoga group shows recovery in memory and significant improvement in attention from 1st to 45th day compared to control group. It shows significant difference between the groups in all the cognitive variables on 45th day.

TABLE 2-Comparison of changes in VM, SM and 6LC in ON PUMP-OFF PUMP YOGA group

Variable		M±Sd.	%Change	M±Sd.	%Change	M±Sd.	%Ch
		1st Day	1-8	8th day	8-45	45th day	1-4
VM	ONY	3.90±1.73	↓46.15**	2.10±11.45	↑65.24*	3.47±10.88	↓11.03 N
	OFY	3.05±1.23	↓27.54**	2.21±12.05	↑49.32***	3.30±0.57	↑8.19

	MW	**0.138NS**	**-**	**0.617NS**	**-**	**0.507NS**	**-**
SM	**ONY**	5.00±2.80	↓44.00**	2.80±1.48	↑54.64**	4.33±1.41	↓13.4
	OFY	4.65±1.63	↓40.86***	2.75±1.41	↑81.82***	5.00±1.30	↑7.5
	MW	**0.654NS**	**-**	**0.945NS**	**-**	**0.946NS**	**-**
LC	**ONY**	27.90±9.68	↓9.68**NS**	25.20±12.53	↑24.60**	31.40±11.0	↑12.5
	OFY	24.35±9.36	↑5.95 **NS**	25.80±19.58	↑33.33***	34.40±9.36	↑41.2
	MW	**0.378NS**	**-**	**0.675NS**	**-**	**0.402NS**	**-**

***p≤0.001, **p≤0.01, *p≤0.05 Wilkcoxon Signed Rank Test. MW=Mann Whitney U Test.
↑ = Improvement /recovery, ↓ = Deterioration. M±Sd.=Mean±Standard Deviation.
ONY=On-pump Yoga group, OFY=Off-pump Yoga group

Table 2 shows that there is significant recovery in verbal and spatial memory and improvement in attention in off-pump yoga group from 8th to 45th day compared to on-pump yoga group. It shows no significant difference between the groups in all the cognitive variables on 45th day.

TABLE 3-Comparison of changes in VM, SM and 6LC in ON-PUMP AND OFF-PUMP CONTROL group

Variable		**M±Sd.**	**%Change**	**M±Sd.**	**%Change**	**M±Sd.**	**%Ch**
		1st Day	**1-8**	**8th day**	**8-45**	**45th day**	**1-**
VM	ONC	3.40±0.85	↓55.88**	1.50±11.51	↑73.33**	2.60±1.17	↓23.5
	OFC	3.35±1.29	↓44.78***	1.85±1.04	↑27.03*	2.35±0.59	↓29.
	MW	**0.908NS**	**-**	**0.307NS**	**-**	**0.327NS**	
SM	**ONC**	3.30±1.49	↓57.57**	1.40±1.58	↑81.43**	2.54±0.92	↓23.0
	OFC	4.40±1.39	↓46.59***	2.35±1.04	↑38.29***	3.25±0.97	↓26
	MW	**0.025***	**-**	**0.025***	**-**	**0.328NS**	
LC	**ONC**	19.80±7.21	↓7.07 **NS**	18.40±10.01	↑32.07*	24.30±13.20	↑22.7
	OFC	20.60±7.74	↓9.22*	18.70±6.88	↑18.72 **NS**	22.20±7.13	↑7.7
	MW	**0.522NS**	**-**	**0.643NS**	**-**	**0.860NS**	

*****p≤0.001, **p≤0.01, *p≤0.05 Wilkcoxon Signed Rank Test. MW=Mann Whitney U Test.**
↑ = Improvement /recovery, ↓ = Deterioration. M±Sd.=Mean±Standard Deviation.
ONC=On-pump Control group, OFC=Off-pump Control group

Table 3 shows that there is significant deterioration in spatial memory in off-pump and on-pump control groups. Off-pump control group shows significant recovery in memory from 1st to 45th day and from 8th to 45th day compared to on-pump control group. It shows significant difference between the groups in spatial memory on 1st and 8th day.

TABLE 4-Comparison of changes in VM, SM and 6LC in ON-PUMP YOGA AND CONTROL group

Variable		M±Sd.	%Change	M±Sd.	%Change	M±Sd.	%Ch
		1st Day	1-8	8th day	8-45	45th day	1-
VM	ONY	3.90±1.73	↓46.15**	2.10±11.45	↑65.24*	3.47±10.88	↓11.(
	ONC	3.40±0.85	↓55.88**	1.50±11.51	↑73.33*	2.60±1.17	↓23
	MW	**0.333NS**	**-**	**0.333NS**	**-**	**0.013***	
SM	**ONY**	5.00±2.80	↓44.00**	2.80±1.48	↑54.64*	4.33±1.41	↓13.
	ONC	3.30±1.49	↓57.58**	1.40±1.58	↑81.43**	2.54±0.92	↓23.(
	MW	**0.024***	**-**	**0.030***	**-**	**0.002****	
LC	**ONY**	27.90±9.68	↓9.68 **NS**	25.20±12.53	↑24.60**	31.40±11.0	↑12.
	ONC	19.80±7.21	↓7.07 **NS**	18.40±10.01	↑32.07**	24.30±13.20	↑22.
	MW	**0.019***	**-**	**0.030***	**-**	**0.087NS**	

*****p≤0.001, **p≤0.01, *p≤0.05 Wilkcoxon Signed Rank Test. MW=Mann Whitney U Test.**

↑ = Improvement /recovery, ↓ = Deterioration.

M±Sd.=Mean±Standard Deviation.

ONY=On-pump Yoga group, ONC=On-pump Control group

Table 4 shows that there is significant deterioration in verbal and spatial memory from 1st to 8th day in both on-pump yoga and control group. Both group shows significant recovery in memory and improvement in attention from 8th to 45th day

but not from 1st to 45th day. It shows a significant difference between the groups in all the cognitive variables except letter cancellation on 45th day.

TABLE 5- Comparison of changes in VM, SM and 6LC in OFF-PUMP YOGA AND CONTROL group

Variable		M±Sd.	%Change	M±Sd.	%Change	M±Sd.	%Cha
		1st Day	1-8	8th day	8-45	45th day	1-4
VM	OFY	3.05±1.23	↓27.54**	2.21±12.05	↑49.32**	3.30±0.57	↑8.19
	OFC	3.35±1.29	↓44.78***	1.85±1.04	↑27.03*	2.35±0.59	↓29.8
	MW	**0.382NS**	**-**	**0.989NS**	**-**	**0.000*** **	**-**
SM	**OFY**	4.65±1.63	↓40.86***	2.75±1.41	↑81.82***	5.00±1.30	↑7.53
	OFC	4.40±1.39	↓46.59***	2.35±1.04	↑38.29**	3.25±0.97	↓26.1
	MW	**0.586NS**	**-**	**0.281NS**	**-**	**0.000*** **	**-**
LC	**OFY**	24.35±9.36	↓5.95NS	25.80±19.58	↑33.33***	34.40±9.36	↑41.27
	OFC	20.60±7.74	↓9.22*	18.70±6.88	↑18.72 ***	22.20±7.13	↑7.77
	MW	**0.208NS**	**-**	**0.017***	**-**	**0.000*** **	**-**

***p≤0.001, **p≤0.01, *p≤0.05 Wilkcoxon Signed Rank Test. MW=Mann Whitney U Test.

↑ = Improvement /recovery, ↓ = Deterioration. M±Sd.=Mean±Standard Deviation.

OFY=Off-pump Yoga group

OFC=Off-pump Control group

Table 5 shows that there is significant deterioration in all the variables from 1st to 8th day in both the groups. Off-pump yoga group shows significant recovery in spatial memory from 8th to 45th day and improvement in attention from 1st to 45th day compared to the off-pump control group. It shows a highly significant difference between the groups in all the cognitive variables on 45th day.

TABLE 6- Comparison of changes in PSS in yoga and control group.

Variable		M±Sd.	M±Sd.	%Change
		1st Day	45th day	1-45

PSS	Y	21.77±2.11	13.77±1.96	↓36.74***
	C	21.57±1.91	18.93±1.64	↓12.23***
	MW	**0.804NS**	**0.000*** **	**-**

*****P≤0.001, **P≤0.01, *P≤0.05 Wilkcoxon Signed Rank Test MW=Mann Whitney U Test.** ↑ = Increase, ↓ = Decrease. M±Sd.=Mean±Standard Deviation.

PSS=Perceived Stress Scale.

Table 6 shows that in the yoga and control group there is a significant decrease in the perceived stress level. It shows significant difference in the stress level between the groups on the 45th day.

Results:

Verbal memory showed significant deterioration by 39.94% in yoga group while 48.66% in control group from 1st to 8th day after the surgery. The was significant recovery in verbal memory by 75% in yoga group while 40.46% in control group from 8th to 45th day. The was recovery in verbal memory which was 5.11% in yoga group while control group showed deterioration by 27.89% from 1st to 45th day. Spatial memory showed significant deterioration by 41.93% in yoga group while 49.63% in control group from 1st to 8th day after the surgery. The was significant recovery in spatial memory by 80.51% in yoga group while 52.71% in control group from 8th to 45th day. The was recovery in spatial memory by 4.82% in yoga group while control group showed deterioration by 23.07 % from 1st to 45th day. Sustained attention was significantly affected by 8.51% in control group while yoga group showed improvement by 0.27% from 1st to 8th day after the surgery Sustained attention showed significant improvement by 30.47% in yoga group while 23.12% in control group from 8th to 45th day and 30.83% and 12.64% respectively from 1st to 45th day. There was significant difference within the groups (p≤ 0.001Wilkcoxon Signed Rank Test). There was significant difference between the groups (p≤ 0.001 Mann Whitney U Test) on the 45th day.

Verbal memory showed significant deterioration by 46.15% in on-pump yoga group while 27.54% in off-pump yoga group from 1st to 8th day after the surgery. The was significant recovery in verbal memory by 65.24% in on-pump yoga group while 49.32% in off-pump yoga group from 8th to 45th day. Verbal memory showed deterioration by 11.03% in on-pump yoga group while off-pump yoga group showed recovery by 8.19% from 1st to 45th day. Spatial memory showed significant deterioration by 44.00% in on-pump yoga group while 40.86% in off-pump yoga group from 1st to 8th day after the surgery. The was significant recovery in spatial memory by 54.64% in on-pump yoga group while 81.82% in off-pump yoga group from 8th to 45th day. Spatial memory showed deterioration by 13.4% in on-pump yoga group while off-pump yoga

group showed recovery by 7.53% from 1st to 45th day. Sustained attention was affected by 9.68% in on-pump yoga group while off-pump yoga group showed improvement by 5.95% from 1st to 8th day after the surgery. Sustained attention showed significant improvement by 24.60% in on-pump yoga group while 33.33% in off-pump yoga group from 8th to 45th day and 12.54% and 41.27% respectively from 1st to 45th day. There was significant difference within the groups (p≤ 0.001Wilkcoxon Signed Rank Test). There was significant difference between the groups (p≤ 0.001 Mann Whitney U Test) on the 45th day.

Verbal memory showed significant deterioration by 55.88% in on-pump control group while 44.78% in off-pump control group from 1st to 8th day after the surgery. The was significant recovery in verbal memory by 73.33% in on-pump control group while 27.03% in off-pump control group from 8th to 45th day. Verbal memory showed deterioration by 23.53% in on-pump control group while 29.85% in off-pump control group from 1st to 45th day. Spatial memory showed significant deterioration by 57.57% in on-pump control group while 46.59% in off-pump control group from 1st to 8th day after the surgery. The was significant recovery in spatial memory by 81.43% in on-pump control group while 38.29% in off-pump control group from 8th to 45th day. Spatial memory showed deterioration by 23.03% in on-pump control group while 26.14% in off-pump control group from 1st to 45th day. Sustained attention was affected by 7.07% in on-pump control group while 9.22% in off-pump control from 1st to 8th day after the surgery. Sustained attention showed significant improvement by 32.07% in on-pump yoga group while 18.72% in off-pump control group from 8th to 45th day and 22.73% and 7.77% respectively from 1st to 45th day. There was significant difference within the groups (p≤ 0.001Wilkcoxon Signed Rank Test). There was significant difference between the groups (p≤ 0.001 Mann Whitney U Test) on the 45th day.

Yoga group showed reduction in stress level by 36.74% while control group showed reduction in stress level by 12.23% from 1st to 45th day. There was

significant difference within the groups ($p<0.001$ Wilkcoxon Signed Rank Test). It also showed significant difference between the groups ($p<0.001$ Mann Whitney U Test).

CHAPTER 7
DISCUSSION

In this randomized control study, on 60 patients both male and female undergoing CABG, there was significant cognitive decline in both Yoga and Control group on the post operative 8th day. In the case of sustained attention also there was declination in both the groups. The recovery in memory and attention was seen in both the groups but it was greater in the intervention group as compared to control group on the 45th day.

Bruggemans EF, Van Dijk JG, et al.[33] observed in their study that there was significant cogn itive deterioration at 1 month after CABG surgery and this effect had not completely disappeared at 6 months postoperatively. For attention and verbal fluency, patient's scores had deteriorated significantly at 1 week after surgery with incomplete recovery at 6 months. There are many causes such as surgical related trauma, genetic susceptibility, microembolisation, vascular or ischemic changes, mental stress, hospital anxiety and depression etc., which are responsible for the cognitive decline. But in present study it is observed that there is early recovery of memory that is on the 6th week after the CABG surgery.

A study done by Naveen KV, Nagarathana R, et al.[34] showed an increase in spatial memory scores following a particular normal breathing. A study done by Saltz

[35] showed that reduced anxiety can improve the performance on tasks requiring attention and memory. Platania-solazzo A, Field T M, et al.[36] showed anxiety reducing effects of yogic practices and the anxiety reducing effects of meditation. A study on transcendental Meditation by Berrettini RB.[37] has shown enhancement in attention, spontaneous organization of memory and short-term recall. Reduced anxiety and calmness of mind due to yogic relation techniques could have facilitated in improving memory and sustained attention in the present study. This might possibly be the reason why yogic relaxation techniques bettered the memory scores and sustained attention.

There was highly significant decline in verbal and spatial memory in both yoga and control group post operatively. The cognitive variable that is sustained attention was not significantly affected in yoga group but in control group it was affected quite significantly. There was highly significant recovery in verbal memory and sustained attention in yoga group on the 45th day compared to control group.

There was significant decline in verbal and spatial memory in On-pump group as compared to Off-pump group. There was no significant recovery in all the cognitive variables of On-pump group but significant recovery in Off-pump group on the 45th day. There was highly significant recovery in all the cognitive variables in Off-pump Yoga group as compared to the Off-pump Control group on the 45th day.

There was a significant reduction in stress level after the practice of yogic relaxation techniques like MSRT and DRT. Rynanzchocka showed that apparently 55% of patients had high level of anxiety and 28% had significant depression before surgery, which was brought down slowly over a period of six weeks.

In the present it is observed that the reduction in stress level was by 36.74% in the yoga group at the end of sixth week by the practice of mind sound resonance technique and deep relaxation technique.

It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment. Through the present study it is observed that, these aspects of the individual affected in anyway could be improved by the regular practice of yogic relaxation techniques.

CHAPTER 8
SUMMARY AND CONCLUSION

- The randomized control study was aimed to determine the effect of yogic relaxation techniques on cognitive variables and psychological status by administering questionnaires on 60 CABG patients in both yoga and control group who were posted for CABG at Narayana Hrudayalaya, Hosur Road, Bangalore, India.
- The mean age of yoga group was 54.47±7.74 and that of control group was 53.00±7.90.
- The yoga group practiced yogic relation technique- DRT and MSRT through a pre recorded audiocassette for 20 minutes and the control group received the normal care.
- Memory both verbal and spatial was tested along with attention. Cognitive variables were measured by verbal and spatial memory test while sustained

attention was measured by six-letter cancellation test (SLCT). Psychological variables, stress was measured by Perceived stress scale.

- **Yoga group showed significant recovery of 75% in verbal memory from 8th to 45th day compared to control group. It showed significant difference between the groups in all the cognitive variables on 45th day. Off-pump yoga group showed significant recovery of 49.32%, 81.82% in verbal and spatial memory respectively and 33.33% improvement in attention from 8th to 45th day compared to on-pump yoga group. There was significant reduction in stress level from 1st to 45th day in yoga and control groups. Yogic relaxation technique appears to be effective tool for cardiac rehabilitation.**
- **It is suggested from the study that the yogic relaxation techniques such as MSRT and DRT were beneficial for the patients undergoing CABG, further study on the large population and for the longer period of follow up is necessary to get the desired results.**

CHAPTER 9
LIMITATIONS AND SUGGESTIONS FOR FUTURE

LIMITATIONS:

1. Hospital atmosphere and schedule affected the timings of intervention. In the present study intervention was given only for two times.
2. Effects of medicine, drugs and disturbance in the ward affected the quality of relaxation.
3. The economic status of the subject should be included in the inclusion criteria.

SUGGESTIONS FOR FUTURE:

1. The study can be followed for a longer duration for at least 3 months.
2. The number of times of intervention in a day can be increased.

APPLICATION OF THE STUDY:

These yogic relaxation technique i.e. Mind Sound Resonance Technique and Deep Relaxation Technique is a simple, non-pharmacological, non-invasive technique which can be easily used during any postoperative week with beneficial effects. It can help you break through stress that's preventing you from feeling good, being in control, and achieving your goals. The postoperative symptoms such as distracted mind lack of concentration and attention and forgetfulness can be avoided with proper relaxation. It helps in preventing stress, managing the emotions associated with stress and creating better health. It can be easily administered by any caregiver.

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