

YOGA DARŚANA AND CORONARY ARTERY DISEASE

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Introduction

The Indian Yoga philosophy has got very wide horizon. In the recent years Yoga has been advocated to maintain a good health and in the treatment of diseases but unfortunately the concept of Yoga philosophy is not yet properly understood and sufficient research works have not been done so far to evaluate the whole philosophy. Here a noble approach has been made to discuss the effect of Indian Yoga philosophy and Coronary Artery Disease (CAD) including heart attack (Myocardial Infarction).

The first new concept of yoga philosophy as a modern science in the new millennium

Yoga philosophy is based on *Pañcabhūta*. The concept of Yoga can be explained completely on the basis of *Pañcabhūta* which dwells on the five states of a matter. This concept of *Pañcabhūta* can be explained on the basis of **Theory of Relativity of Einstein** and **Theory of Heisenberg**. Subsequently the theory put forward by **Stephen Hawking** and **Max Plank** also support the *Pañcabhūta* concept. Therefore, **Yoga philosophy is completely based on modern scientific concept**. The new concept of yoga philosophy in the new millennium can be explained by the comparative analysis of the following theories along with the concept of Yoga philosophy.

Pañcabhūta

Energy

<i>Pañcabhūta</i>	(Z)	<i>Pañcatanmātra</i>	(Z)	Indriyas
↓		↓		↓
Matter or mass		Wave length		Perception

According to Einstein's Theory of Relativity

$$E = mc^2$$

$$m = E/c^2$$

Where :

m : Matter or mass

E : Energy

c : Velocity of light or wavelength

Summary of Einstein's Equation

$$\text{Energy (Z)} \\ \text{Mass} \quad \text{Wavelength}$$

Theory of Heisenberg

$$\lambda = h/mv$$

$$\text{i.e. } m = \lambda/hv$$

$$h/v = E$$

$$\text{i.e. } m = E/\lambda$$

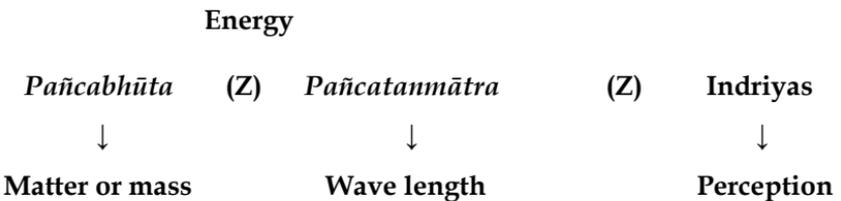
Summary of Heisenberg's theory

Mass (m) = Energy (E)/ Wavelength (λ)

$$\text{i.e. Mass} \quad \text{Energy (Z)} \quad \text{Wavelength}$$

Total Summary

Yoga philosophy :



Einstein's theory :

$$\text{Mass} \quad \text{Energy} \quad \text{Wavelength}$$

$$\quad \quad (Z) \quad \quad \quad$$

Heisenberg's theory :

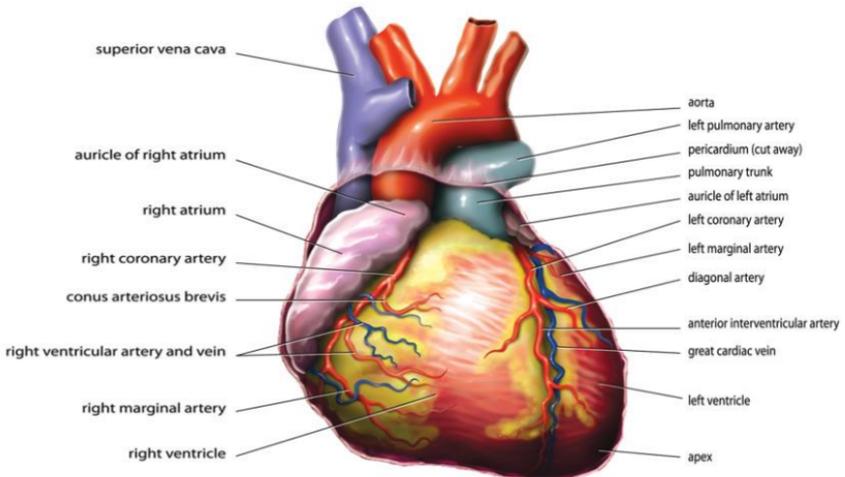
$$\text{Mass} \quad \text{Energy} \quad \text{Wavelength}$$

$$\quad \quad (Z) \quad \quad \quad$$

It is clear that all those theories are in accordance to the theory of Yoga philosophy. It is a new concept.

Coronary Artery Disease (CAD) and Heart Attack (Myocardial Infarction)

Coronary artery disease is an atherosclerotic disease of an coronary artery (or arteries) sufficient to cause narrowing of coronary arteries leading to a regional reduction in myocardial (heart muscle) blood flow and inadequate perfusion of the myocardium supplied by the involved coronary artery.



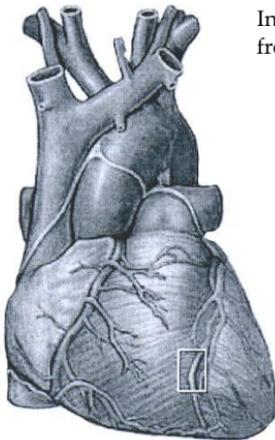
Heart attack or **Myocardial infarction** is characterized by myocardial cell death (death of heart muscle) due to complete obstruction of the coronary arteries leading to complete absence of blood supply to the heart muscle.

Pathogenesis of CAD and Heart attack

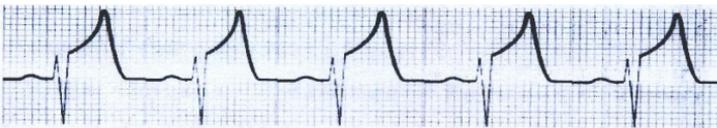
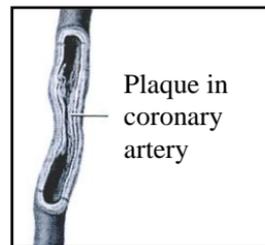
In coronary artery disease, atherosclerotic changes in the coronary vessels lead to narrowing of the lumen of these vessels leading to decreased blood flow to the heart muscles. In myocardial infarction these atherosclerotic lesions, known as plaques, rupture leading formation of a blood clot within the lumen of the coronary vessels and complete obstruction of the lumen which in turn leads to total absence of blood flow to the heart muscle and death of heart muscles. Patients with coronary artery disease fall into two large groups

Classification of CAD and heart attack

1. Chronic stable angina -Stable angina pectoris is characterized by chest or arm discomfort that is reproducibly associated with physical exertion or stress and is relieved within 5-10 min. by taking rest and/ or by putting sublingual nitroglycerin drug.



Insufficient blood flow to the heart muscle from narrowing of coronary artery



2. Acute coronary syndrome - This includes

- a. Unstable angina - This is defined that angina pectoris or equivalent ischemic discomfort with at least one of three features: (1) it occurs at rest (or with minimal exertion), usually lasting > 10 min; (2) it is severe and of new onset (i.e., within the prior 4-6 weeks); and/or (3) it occurs with a crescendo pattern (i.e., distinctly more severe, prolonged, or frequent than previously).
- b. ST elevation MI- Patients with acute myocardial infarction (MI) with ST-segment elevation on their presenting electrocardiogram and also elevation of cardiac biomarkers (i.e. enzymes)
- c. Non-ST elevation MI- A patient with the clinical features of UA develops evidence of myocardial necrosis (death), as reflected in elevated cardiac biomarkers.

Risk factors for CAD are : (1) Diabetes mellitus, (2) Hypertension, (3) Hyperlipidemia (increased levels of fatty material in blood), (4) Smoking, (5) High-fat and energy-rich diet, (6) Sedentary lifestyle, (7) Obesity, (8) **most importantly mental stress and strain.**

Patañjala Yoga Darśana

"*Yogaḥ Citta Vṛttinirodha* (Y.S.I.2)", Yoga means modification of mental mode or thought waves. "*Nirodha*" is commonly explained as "*Cessation*" but we have used the term "*modification*" in the light of medical science because the mind cannot be destructed when the person is alive. Mind is the composite actions of the whole brain tissues. According to Patañjali, Yoga is as methodical effort to attain perfection through the control of the different elements of human nature, physical and psychical. The special feature of the Yoga system is its practical discipline, by which the modification of mental modes is brought about through the practice of Yogic exercises and the conquest of desire.

Yoga means "*Aṣṭāṅga Yoga- Yama-Niyamāsana-Prāṇāyāma-Pratyāhārā-Dhāraṇā-Dhyāna-Samādhayoṣṭāvāṅgāni*" (Y.S.II.29) means eight limbs or steps of Yoga. They are Yama (Abstention or Restraint), *Niyamaḥ* (Observance), *Āsana* (Posture), *Prāṇāyāma*

(Breath control), *Pratyāhārā* (withdrawal of the senses), *Dhāraṇā* (fixed attention or concentration), *Dhyāna* (meditation), *Samādhi* (trance). The eight parts or limbs are complementary to each other. To attain perfection or the fruitful results of Yoga, the eight limbs should be practiced step by step. Unfortunately now a days without practicing *Yama* and *Niyama*; *Āsana* and *Prāṇāyāma* are performed and it is not true Yoga in the light of Yoga Sutra. Moreover though *Pratyāhārā*, *Dhāraṇā*, *Dhyāna* have vast differences practically, but the people presently use the term **Meditation** or **Concentration** interchangeably. Patañjali was a very practical medical scientist. Mere advice or practice cannot lead to meditation. Therefore, he added external aid or path (in Śrīmad Bhagvat Gītā described as *Bahirāṅga*), which definitely helps to achieve meditation. They are *Yama* and *Niyama*. *Yama* includes *Ahimsā* (abstinence from injury or killing), *Satya* (Veracity), *Asteya* (abstinence from theft), *Brahmacharya* (to control over sexual activity), *Aparigraha* (abstinence from avariciousness). *Niyama* includes—*Śauca* (cleanliness), *Samtoṣa* (contentment), *Tapaḥ* (Mortification), *Syvādhyā* (study) and *Īśvara pranidhanani* (the making of *Īśvara* the motive of all action means the doing of all actions to fulfill the purpose of that great teacher). These two first steps of *Aṣṭāṅga Yoga* to be practiced first and then *Āsana*, *Prāṇāyāma* and so on. Śrīmad Bhagvat Gītā and Śrīmad Bhāgavat Mahāpurāṇa describe *Antarāṅga* or internal aid which includes *Pratyāhārā*, *Dhāraṇā*, *Dhyāna* and *Samādhi*. All those four described steps with different disciplines should be practiced step by step to achieve concentration. Therefore, meditation (*Dhyāna*) or concentration can be achieved by methodically following *Antarāṅga* only.

Patañjala Yoga Darśana and Coronary artery disease

Yoga Sūtra of Patañjali is the methodical compilation of all the Yoga of Indian Yoga Philosophy. Max Muller, Dr. S. Radhakrishnan, Charles Moor had extensively discussed the Patañjali Yoga Darśana in the light of philosophy or religion only. But here it is tried to explore him as a great medical scientist and a cardiologist. As for example, the basic concept of coronary artery disease at the present time had been explained by Patañjali a thousand years B.C. The modern approach towards coronary artery disease (CAD) in the medical science is (I) Primary prevention--

Abstinance of CAD in the society or to adapt necessary measures so that the disease is prevented. Patañjali said it as, "*Heyam duḥkham anāgatam*" (Y.S.II.16). *Heyam* means to prevent the disease before appearance in the society, (2) If CAD prevails then to find out the cause of CAD i.e. Diagnosis of the disease, which is the second step towards CAD in the medical science. Patañjali says, "*Draṣṭṛ drśyayoḥ Saṁyogo heya hetuḥ*" (Y.S.II.17). Patañjali also says "*heya hetuḥ*" means to diagnose CAD or sufferings. (3) After diagnosis' of CAD, "to treat the disease for complete removal or eradication of the disease i.e. Treatment. Patañjali also says, "*Tad abhāvāt saṁyogābhāvo hānam tadṛśeḥ kaivalyam*" (Y.S.II.25). "*hānam*" means to root out or treatment of CAD. (4) The ways, the means, methods, procedures or; treatment or management which are put forward to cure CAD; to prevent the subsequent occurrence i.e. the present medical concept is Secondary Prevention. Patañjali says "*Viveka Khyātiraviplavā Hānopāyāḥ*" like Secondary Prevention. *Hānopāyāḥ* scientifically means to find out the means to prevent the reoccurrence of the disease. Therefore, the "Yoga", as described by Patañjali is completely based on Medical Science which we follow at the present time. It is a new concept of the scientific explanation of the Patañjala Yoga Darśana.

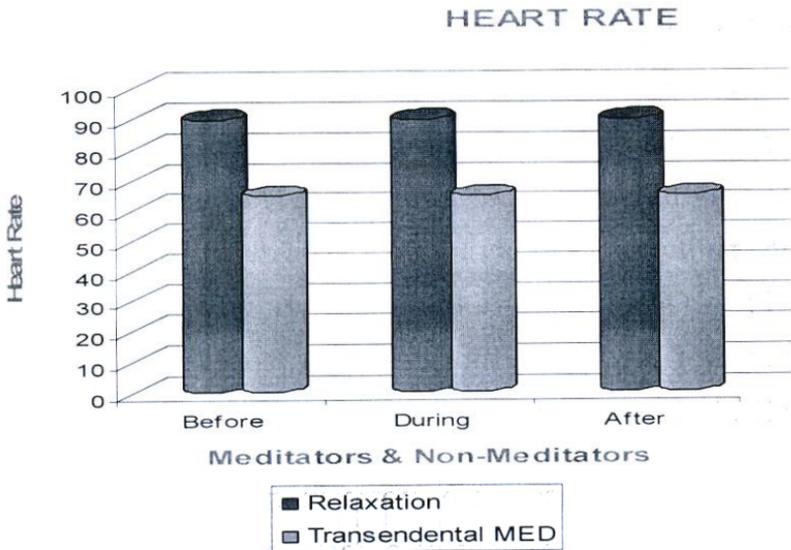
Effects of Yoga in Coronary Artery Disease including Heart attack

Various diseases like hypertension (high blood pressure) and Coronary Artery disease in particular are associated with Mental Stress and strain though other precipitating factors are also defined. It is observed that there is a strong relationship exists between environmental stress and strain, sympathetic nervous system, hypertension and coronary artery disease. Catecholamines are responsible for the pressure mechanism that initiates the rise in blood pressure and the mechanism that maintains hypertension via vascular hypertrophy (Yu et. al., 1996)¹. It is seen that the blood pressure remains normal among nuns in a secluded order over a 20 year period; whereas it rises with age in women living nearby in the outside world (Timio et. al., 1988)². The air traffic controller, who work under high level psychological stress annually develops hypertension at a rate 5.6 times greater than do nonprofessional pilots (Cobb and Rose, 1973)³. Among healthy men job strain are

associated with a 3.1 times greater odds ratio for hypertension (Schnall et al., 1990)⁴ and higher ambulatory blood pressure (Schwartz et al., 1996)⁵. People who migrate to more urbanized, modern disorganized societies have higher blood Pressure (Poulter et al., 1990; Kaufman et al., 1996)⁶. Again, it is also observed that social-disorganisation is associated with more hypertension (Bland et al., 1991)⁷. Interestingly there is a strong relationship between social stress and strain, anger and hypertension (Shapiro et al., 1996)⁸. As the Aṣṭāṅga Yoga can reduce or eliminate mental stress and strain, worries and anxieties, the hypertension can be controlled.

Āsana and *Prāṇāyāma* have been tried in coronary artery diseases (Schell, F.J.; Allolio, B.; Schonecke, O.W.; 1994)⁹ and meditation also showed beneficial effect on cardiovascular system (Nagarthna R. Nagendra, HR.; 1995;¹⁰ Tellers, S. Nagarathna, R. Nagendra, HR.; Desiraju, T.; 1993¹¹) as it alters the heart rate and cardiac output.

The Graph Showing variation of Heart Rate during Meditation.



Modern cardiologists are of the opinion that heart rate is very important in the management of coronary artery disease,

hypertension, congestive cardiac failure and in so many cardiac conditions. Therefore, meditation may help in the treatment and/or prevention of the above conditions. Even Yoga can help in regressing the atherosclerotic process in post CABG cases and post PTCA cases which have already been documented in research works.

If *Āsana*, *Prāṇāyāma* and meditation in combination with *Yama* and *Niyama* advocated the results will be very much effective. Again *Āsana* and *Prāṇāyāma* was tried in patients of Diabetes mellitus (B. Sahay, Dr. Dean Ornish, Dr. Phulgenda Sinha). As meditation has enormous effect on neuroendocrinal system, more beneficial effects will be found in combination (*Aṣṭāṅgn Yoga*). Meditation has tremendous effect in psychological disorders and psychosomatic disorders which have been proved already (Dr. A.K. Agarwal, 1995,¹² Schultz, J.H., 1932,¹³ Walton D., 1961, Benson H., Ronner, B. Marzetta, B. and Kelmchuk, H., 1974¹⁴). It is quite possible if *Aṣṭāṅgn Yoga* is followed methodically in these situations results will be wonderful.

Table - 1

Showing the effect of *Āsana* and *Prāṇāyāma* in Coronary Artery Disease.

(Adopted from the Ph.D. thesis of Dr. R.K. Kotokey¹⁵)
for references, refer to the thesis.

Author		Effect	
1.	Tellers S., Nagarathna R., Nagendra H.R., Desiraju T., 1993	1.	Blood pressure reduction
		2.	Improved Lung Functions
		3.	Reduction of Heart rate
		4.	Reduction of respiratory rate
		5.	Balance in autonomic function
2.	Bera T.K., Rajapurkar M.V., 1993	1.	Improvement in ideal body weight and body density
		2.	Improvement in Cardiovascular endurance and anaerobic power.
		3.	Reduction in fat folds and reduction in waist, umbilical, hip circumferences.

3.	Bulavin V.V., Klluzhev V.M., Kliachkin I.M., Lakshman Kumar, Zuikhin N.D., Vlasova T.N., 1993 (In Post heart attack cases)	1.	Improvement in exercise tolerance
		2.	Improvement in Psychosomatic condition.
4.	Rai L., Ram K., Kant U., Madan S.K., Sharma S.K., 1994	1.	Greater minute ventilation
		2.	Larger Tidal Volume
		3.	Higher Oxygen consumption
		4.	Greater CO ₂ elimination.
5.	Kotokey R.K., 2002	1.	Reduction in blood pressure and more than 5mm of Hg.

A few scientific effects of *Āsana* and *Prāṇāyāma* in the treatment of CAD are -

- (1) How to remove mental stress and strain, anxiety, worries etc. which are now thought to be one of the precipitating factors responsible for heart attack with the help of *Yoga*.
- (2) How to reduce cholesterol, how to control high blood pressure (hypertension), how to control diabetes which are also considered as precipitating factors of heart attack and can be prevented with the help of *Āsana* and *Prāṇāyāma*.
- (3) The role of *Yoga* in controlling overweight, lack of activity, undue social interactions etc.-- Nagarthan and Nagendra in 1995 tried meditation in coronary artery disease and found a satisfactory result. Harte, Eifert and Smith had tried meditation and *Asana* in coronary artery disease and found a satisfactory outcome. In India, Dr. Manchanda from All India Institute of Medical Science, New Delhi has shown the improvement in the atherosclerosis changes of the coronary arteries in heart attack patients. All these results prove that *Yoga* is beneficial in the prevention and treatment of heart diseases.

In the late seventies in USA it had been proved that Transcendental Meditation can relieve mental instability, worries and anxieties; and counter psychiatric illnesses, psychosomatic diseases with the following scientific mechanisms—

- (1) Reduced nervousness, (2) Reduced depression, (3) Reduced irritability, (4) Increased sociability, (5) Increased Self-assuredness,

(6) Decreased tendency to dominate, (7) Decreased inhibition, (8) Increased emotional stability, (9) Increased staying power and efficiency, (10) Decreased anxiety and increased inner control.

A few scientific effects of Meditation are –

- (1) It stabilizes neuroendocrine system of the body.
- (2) It reduces the stress by balancing different hormones like adrenaline, nor-adrenaline etc.
- (3) It stabilizes the mind and thus brings peace and tranquility.

The different aspects of Psychiatric and behavioral modifications, which help in preventing Coronary Artery disease, can be achieved with the help of Yoga therapy.

It appears from the studies already mentioned, coronary artery disease including heart attack and all other precipitating factors like hypertension, diabetes mellitus, obesity, mental stress and strain etc. can be prevented (primary prevention and secondary prevention) with the methodical practice of Aṣṭāṅga Yoga.

Yoga includes proper and balanced diet which is very much essential for maintenance of positive health i.e. good health. It is quoted in Śrīmad Bhagavad Gītā “*Yuktaharaviharasya yuktachestasya karmasu, Yuktaswapnabodhasya yogo bhavati duhkaha* - Śrīmad Bhagavad Gītā, 16//17”. It means “A person having balanced qualities, taking balanced diet, working regularly and having regular and balanced sleep-wakeful hours drives away the worldly miseries and sufferings. It appears clearly that Yoga puts very much importance on “Life-style modification” concept of the present day Coronary Artery Disease treatment.

The all-pervasive stress and stress-induced disorders like hypertension and angina are fast growing epidemics and bane of "modern" society. The holistic science of Yoga is the best method for prevention as well as management of stress and stress-induced disorders. The psychophysiological responses to Yoga are opposite to the stress response. Śavāsana, Yoganidrā meditation and slow rhythmic *Prāṇāyāma* breathing are very effective in calming the mind and promoting psychosomatic health. Cardiac patients are sensitive and reactive. Yoga relaxation techniques calm the mind and make one emotionally balanced. Consequently, minor

disturbances do not cause emotional upsets and cardiovascular problems.

Therapeutic effect of Yoga may be due to

(1) Management of stress, (2) Improvement of cardiorespiratory function and overall fitness, (3) Modulation of autonomic functions, (4) Reduction in glucose level in blood in Diabetes Mellitus patients. (5) Reduces Hypertension, (6) Reduces body weight, (7) Increases coronary blood flow. (8) Reduces the atherosclerotic plaques in the coronary artery, (9) reduces the lipid level in blood.

Stress is an important causative factor in cardiovascular diseases like hypertension, angina and heart attack. It has been demonstrated that subjects trained in yoga can achieve a state of deep Psychosomatic relaxation associated with highly significant decrease in oxygen consumption within five minutes of practising Sāvitrī Prāṇāyāma (a slow, rhythmic and deep breathing) and Śāvāsana. These findings are consistent with the report that Yoga training not only produces a significant decrease in basal anxiety level, but also attenuates the change in anxiety score in stressful situations such as examination. It has also been reported that yoga training helps in development of resistance against stress. Practice of Āsana And Prāṇāyāma results in overall improvement in physical fitness and cardio-respiratory functions. It has also been demonstrated that Yoga training of 12 weeks duration produces a significant increase in respiratory pressures, breath holding time and handgrip strength. This indicates an improved physical strength and cardio-respiratory function. It has been proved that after Yoga training, exercise-induced stress to cardiovascular system is less severe. Yoga training promotes emotional and physiological balance. In an interesting study, it was found that a brief (15 min) Yoga based relaxation training normalizes the function of autonomic nervous system by deviating both sympathetic and parasympathetic indices towards more "normal" middle region of the reference values. These studies show that Yoga has a great potential to improve our physiological functions, psychosomatic health and overall performance.¹⁶

Yoga based lifestyle modifications help in regression of coronary lesions and in improving myocardial perfusion. This is translated into clinical benefits and symptomatic improvement. Yoga and meditation appear to improve endothelial function which is a predictor of development of CAD.¹⁸

Therefore Yoga is accepted as a primary and secondary preventive measure in CAD including heart attack.

Conclusion

The Yoga philosophy is not an imagination but based on modern scientific facts. Yoga sūtras should be considered in the light of evidence based modern medical science. Tremendous benefit of yoga in the treatment of coronary artery disease including myocardial heart attack can be achieved provided it is done methodically and holistically. Patañjali believes that during the acute stage of the disease proper diagnosis and treatment should be instituted. But in primary and secondary prevention of coronary artery disease and heart attack beneficial effect is well established and Aṣṭāṅga Yoga is the answer. Considering the concept and analyzing the scientific knowhow the external thesis examiners commented as follows (Report submitted by the University), "*Fantastically original research work ... Thesis breaths an air of freshness through and through, as a result of which it is capable of being regarded as lasting contribution to enrichment of the stock of human knowledge in the field of medical and Sanskrit Studies.*"

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