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Understanding the Science of Yoga

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Abstract: In this paper we discuss methodology of yoga, together with significant aspects of integration of yoga and modern medicine. We suggest two way integration of experimentally oriented modern science and experientially modeled learning of yoga, that can bring us many answers for the challenges which burden modern individual. We emphasize importance of connecting the yoga knowledge and practice with the modern medical approaches to health, with the aim to improve the quality of life. Yoga is comprehensive, holistic science about human being, which at the same time deals with all aspects of philosophy, psychology and functionality of the conscious evolution. This corpus of knowledge given through the intensive, systemathic, introvert research of the functioning of human mind, is passed from Master to student for centuries.

Key words: yoga science, integration, modern medicine

Introduction

Yoga is a way of life, an experiential science of human nature that enables us to realise our real selves. "...Take up the study of the yoga science as you would any other science of material nature and remember that there is no mystery nor danger in it" (Vivekananda, 1896). Yoga is the original, timeless knowledge about the "essence". Yoga could be rightly termed the science of infinite human possibilities as it enables us to manifest in totality, our inherent potentiality. Yoga simultaneously deals with all aspects of the philosophy, psychology and practicality of conscious evolution. Yoga doesn't provide only concepts but also the tools and technology needed find and realize the "essence". Yoga enables us to search the depths of the being theoretically, but first of all, experientially.

In an attempt to show importance of yoga, Ornish and Taimini have significant role. "Yoga is a system of perfect tools for achieving union as well as healing" (Ornish, 2010), while Taimni, names yoga the "science of sciences".

Yoga as a science

Yoga can be understood as a body of knowledge handed down through millennia from Guru to Chela. This has been gained through intense, systematic, introverted investigation into the workings of the human mind in search for the sense of existence. The major hypothesis is that the human in essence is the "divine being", thus fully capable of experiencing Sat Chit Anandam. Since the mind controls matter (mind controls body, thoughts and feelings), health and happiness are our birthright (possibilities), so freedom from all limitation (moksha) is the goal of human existence. General laws that govern the mind, emotions and body have been discovered through the thousands of years old introverted investigation, thus discovering that living in conformity to these cosmic laws (Sanatana Dharma) produces peace, health, happiness and spiritual evolution.

The science of yoga can be perceived as a distillation and sublimation of all the finest, most noble attitudes bequeathed as the legacy of the yoga sages (rishis), a treasure trove of thoughts. The ancient Indian scriptures Vedas and Upanishads are the treasury house wherein are stored these precious thought forms for safe keeping.

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The wise soul knows how to approach the keeper of this treasure and avail himself of the wealth of wisdom contained therein.

Yoga has the terminology used to describe different phenomena as well as the technology in the form of excellent instruments (asanas, pranayama, kriyas, mudras, bandhas, shat karma etc.) to discover the unity and usage of this truth in every day life. Yoga has the methodology of an experiential and experimental approach which implies performance of the various physical and mental actions (abhyasa) and observing the resultant effects with a dispassionate sense of objectivity (vairagya). Yoga also has an accumulated body of knowledge through millennia, as the result of experiential and experimental studies by the great Rishis as recorded in the Vedas, Upanishads, Puranas, Itihasas, Shastras etc. The final aspect, the 'proof of the pudding' is that all of these experiences are open to verification.

	CHARACTERISTIC OF SCIENCE	CHARACTERISTIC OF YOGA
1	Objectivity	<i>Vairagya</i> – dispassionate objectivity
2	Intelligent inquiry and careful	Pariprasna or enquiry coupled with Viveka
	detailed observation	or discerning intellect
3	Rigorous controlled experimentation	Abhyasa – systematic practice
4	Burning desire to know truth	<i>Mumukshutva</i> – burning desire for
		liberation
5	Direct perception	Pratyaksha – direct perception
6	Correct knowledge or cognition	Pramana – accurate knowledge
7	Reliable testimony from previous	Vedas, Agamas, Upanishads, Parampara
	experimental work	
8	Verification and repeatability of the	Sadhana – individual experience to realise
	phenomena	the reality of the teachings

Although knowledge in yoga has been orally transferred from Master to student for centuries, there should be acknowledged the key written sources about yoga: *Upanishads* (especially the *Katha-Upanishad*, *Shvetashvatara-Upanishad and Maitrayaniya-Upanishad*), the *Yoga Sutras* of Patanjali and the *Bhagavad Gita*.

Katha Upanishad, one of the first written works on yoga, mentions the yoga vidya (science of yoga) and yoga vidhi (the technological knowledge) of yoga. The pure science of yoga is adhyatma vidya (science of human being in depth) while the technology or applied science (rules of yoga practice) that is, the technology of unification or integration, is called yoga vidhi, pariprasna (enquiry or dialogue) as a pre requisite to higher knowledge as enunciated in the Bhagavad Gita (IV.34).

The Yoga Sutras of Patanjali display a scientific attitude towards the acquisition of pramana (true knowledge). True knowledge can be acquired (Patanjali, Yoga Darshan I: 7) by direct perception (pratyaksha), rational inference (anumana) and from reliable testimony (agama). This use of the intellect (buddhi) endowed with discernment (viveka) is typical of all yoga traditions and their teachings. The Bhagavad Gita, often referred to as the Yoga Shastra, shows the exchange between Arjuna and Yogeshwar Krishna to be of a genuine spirit of enquiry and a keen desire for truth, as one would expect from a modern scientist and his guide.

The *Shiva Samhita* (V.26-30) lists the characters of a fully qualified disciple (*Sishya*) as follows: "Endowed with great energy and enthusiasm, intelligent, heroic, learned in the scriptures, free from delusion..." Aren't these very same qualities required by a true scientist (a seeker of true knowledge)?

Tools and technology of yoga (yoga vidhi)

In yoga, mind has many levels: *mudha* (dull and inert mind), *kshipta* (distracted mind), *vikshipta* (partially distracted mind), *ekagrata* (concentrated mind) and *niruddha* (controlled mind).

When we come to the mind processes our attention is drawn by the perception of the mental patterns as the whirl (*chitta-vritti*) which is five folded and consists of: *pramana* (conception), *viparyaya* (misconception), *vikalpa* (imagination), *nidra* (sleep) and *smrithi* (memory).

"Yoga is the stilling of the whirlpools of the mind (yogash chittavritti nirodhah - I: 2). Once this is achieved, the yogis rest in their essential self (tada drishtu swarupevasthanam - I: 3). The method to achieve this state is through dedicated and determined practice and dispassion (abyasa vairagyabhyam tannirodhah - I: 12, Patanjali - Yoga Darshana).

The yogi views his being as a manifestation of the divine and realizes that he is not only the physical existence but also has four other levels of existence including the energy body, the mental body, the body of wisdom and the body of eternal cosmic bliss. This concept is known as the *Pancha Kosha*.

The yogi follows a systematic practice (*Abyasa*) of the eight fold practice consisting of the moral restraints (*Yama*), ethical observances (*Niyama*), firm and comfortable postures (*Asana*), expansion of the vital life force (*Pranayama*), control of the senses (*Pratyahara*), contemplative concentration (*Dharana*) leading into meditation (*Dhyana*) and the state of cosmic consciousness (*Samadhi*).

Yoga means disciplined and dedicated practice (*Abyasa*), dispassion (*Vairagya*) and perspicacity (*Viveka*). Yoga practitioner attempts to unite (*Yuj*) his individual self (*Jivatma*) with the universal self (*Paramatma*).

Views on yoga-vidya by eminent yogis and scientists

"Long before physicists discovered that matter is energy vibrating at a certain rate, the yogis of India had treated this body-mind as a playful manifestation of the ultimate power (*Shakti*), the dynamic aspect of reality. They realized that to discover the true self, one had to harness attention because the energy of the body-mind follows attention. An example of this process is the measurable increase of blood flow to our fingers and toes that occurs when we concentrate on them. The yogis are very careful about where they place their attention, for the mind creates patterns of energy, causing habits of thought and behavior that can contribute or can be detrimental to the pursuit of genuine happiness". (Feuerstein, 1996)

Integration of yoga and modern medicine

Today we are faced with numerous debilitating chronic illnesses related to aging, environment, and hedonistic lifestyle, such as cancer, diabetes, osteoporosis, cardiovascular diseases, AIDS. Modern medical advancements provide the rationale for the integration of various traditional healing techniques including yoga to promote healing, health, and longevity. The antiquity of yoga can complement the modern medicine.

At first glance, allopathic medicine and yoga may seem to be totally incompatible. Practitioners of either system are often found at loggerheads with one another in typical modern one-upmanship. It is much easier to build a bridge between Yoga and Ayurveda as both share many similarities of concepts such as the Trigunas, Tridoshas, Chakras (energy centers) and Nadis (energy channels). They also share the understanding that a healthy balance between body, mind and soul leads to total health. Diet and behavior are given importance in both systems and the ultimate goal of both is the attainment of Samadhi (unity).

There are many meeting points for the construction of a healthy bridge between yoga and modern medicine. Both modern medicine and yoga understand the need for total health. Even the Word Health Organization has recently added a new dimension to the modern understanding of health by including spiritual health in its definition of the "state of health". Modern medicine has the ultimate aim of producing a state of optimum physical and mental health thus ultimately leading to the optimum well being of the individual. Yoga also aims at the attainment of mental and physical well being though the methodology does differ. While modern medicine has a lot to offer humankind in its treatment and management of acute illness, accidents and communicable diseases, yoga has a lot to offer in terms of preventive, promotive and rehabilitative methods in

addition to many management methods to tackle modern illnesses. While modern science looks outward for the cause of all ills, the yogi searches the depth of his own self.

The potential and manifest integration of yoga and modern medical science can be discussed as follows:

Anatomy and Physiology: The study of anatomy and physiology is a great meeting point for modern medicine and Yoga. Yoga therapists and practitioners can benefit from the intricate and detailed 'break-down study' of modern medicine where the body is broken down into many systems, then into many organs, many tissues and finally into billions of cells. On the other hand the yogic holistic view of the *Pancha Kosha* (the five sheathed existence) can help modern doctors realize that we are not just, 'one-body' organisms but have four more bodies that are equally important. We have, not only the physical body but also an energy body, a mental body, a body of wisdom and a body of eternal bliss. An understanding of the psychic anatomy and physiology of *Nadis*, *Chakras* and *Bindus* when coupled with the practical understanding of the details of the physical body can inspire real knowledge of the self in all health care personnel.

Prevention of disease: Modern medicine points the importance of prevention, but the role of preventive medicine is still very limited. The yogic lifestyle that includes the *Yama* and *Niyama* can help prevent many modern diseases. Cleanliness that is taught through *Saucha* can help prevent and limit the spread of contagious and infectious diseases. Mental peace and right attitudes of yoga such as *Pratipaksha Bhavanam* (taking the opposite view), *Samatvam* (equanimity of mind) and *Vairagya* (dispassionate detachment) can help prevent many of the psychosomatic ailments running wild in the modern world. If these yogic values as well as practices of *Asanas*, *Pranayamas*, *Kriyas* and *Dhyana* are inculcated in the modern human race, we can prevent many diseases that abound today.

Promotion of health: Yoga is an excellent tool for promotion of health. The practice of yoga leads to the efficient functioning of the body with homeostasis through improved functioning of the psycho-immuno-neuro-endocrine system. A balanced equilibrium between the sympathetic and parasympathetic wings of the autonomic nervous system leads to a dynamic state of health.

The World Health Organization (WHO) defines health as a state of complete physical, mental, and social well being and not merely absence of disease or infirmity. WHO has also in recent times suggested a fourth dimension of spiritual health but has fallen short of defining it without confusing it with religion. From a yogic perspective it is heartening that the WHO definition gives importance to 'well being' that is a vital aspect of 'being' healthy as well as 'feeling' healthy. There is no use in a doctor telling patients that all their investigations are 'normal' when the patients themselves are not feeling 'well'. This qualitative aspect of health is something that yoga have considered important for thousands of years. The definition of asana given in the *Yoga Sutra* as *sthira sukham* implies this state of steady well being at all levels of existence (*sthira sukham asanam* - Yoga Darshan II:46, Patanjali).

Patanjali also tells us that through the practice of asana we can attain a state that is beyond dualities leading to a calm and serene state of well being (tato dvandva anabhighata - Yoga Darshan II: 48, Patanjali). Yoga aims at enabling the individual to attain and maintain a dynamic sukha sthanam that may be defined as a dynamic sense of physical, mental and spiritual well being. The Bhagavad Gita defines yoga as samatvam meaning thereby that yoga is equanimity at all levels (yogasthah kurukarmani sangam tyaktva dhananjaya siddiyasidhyoh samobutva samatvam yoga uchyate – Bhagavad Gita II: 48). This may be also understood as a perfect state of health wherein physical homeostasis and mental equanimity occur in a balanced and healthy harmony. One of the main lacunae of the WHO definition lies in the use of the term 'state' that implies health is something to be achieved 'once and for all' with no need for care about it thereafter. If health is to be understood as a 'state', then it must be understood as a dynamic state that varies from day-to-day and often from minute-to-minute. It is often actually more challenging to maintain this dynamic state of health than to even attain it in the first place.

Management of diseases and disorders: Yoga doesn't negate the use of drugs and other methods of modern medicine. No yoga therapist should try to treat an acute myocardial infarction or an unconscious accident victim

by yoga techniques alone. A symbiotic relationship between the techniques of modern medicine and yoga can help the patient more than a dogmatic refusal to see the 'other side'. Yoga has a lot to offer in terms of psychosomatic disorders and in stress related disorders such as diabetes, asthma, irritable bowel syndrome, epilepsy, hypertension, back pain and other functional disorders. Yoga can help reduce and in some cases eliminate drug dosage and dependence in patients suffering from diabetes mellitus, hypertension, epilepsy, anxiety, bronchial asthma, constipation, dyspepsia, insomnia, arthritis, sinusitis and dermatological disorders.

Asanas are probably the best tool to disrupt any learned patterns of wrong muscular efforts (Brena, 1972). Pranayama and Pratyahara are extremely efficient techniques to divert the individual's attention from the objects of the outer environment, to increase every person's energy potentials and 'interiorize' them, to achieve control of one's inner functioning.

Yoga therapists must work in tandem with medical doctors when they are treating patients who have been on allopathic treatment. There are many instances where the patient stops medical treatment thinking that it is no more necessary as they have started yoga. Unwanted reactions could be easily avoided by tandem consultations of yoga therapist and medical specialist. Many modern doctors tend to recommend the patient to take up yoga and relaxation techniques and forget to mention to the yoga therapist what they actually want the patients to do. Most allopathic medications need to be tapered off in a progressive manner rather than being stopped suddenly. We often find this mistake in regard to corticosteroids as well as cardiac medications where sudden stoppage can be harmful. We must remember Plato's words when he said, "The treatment of the part shouldn't be attempted without a treatment of the entirety," meaning that the treatment of the body without treating the mind and soul would be a useless.

Rehabilitation: Yoga as a form of physical therapy has a lot to offer patients of physical and mental handicaps. Many of the practices of physiotherapy and other physical therapies have a lot in common with yoga practices. Combination of yoga and physical therapies can benefit patients with learning disabilities. Musculoskeletal problems can be treated by the combination to improve function as well as range of movement, strength and endurance abilities. Balance and dexterity can also be improved by the combination therapy. Yoga practice can help those recovering from accidents and physical traumas to get back on their feet faster and with better functional ability. Yoga also has a lot to offer those suffering from drug and substance abuse in assisting them to get back to a normal life. Yoga helps develop their self-control and will power and also gives them a new philosophy of living. This is vital as otherwise they will lapse into their old negative habits.

Healthy diet: This is a place that modern medicine and yoga can help give a patient as well as normal person the proper holistic values of a proper diet. Modern research shows us the benefits of the 'break-down' study of foods on the basis of their physical and chemical properties. This is important for person to know how much of each constituent of food is to be taken in the proper quantity. Yoga can help a person to learn the right attitude towards food as well as understand concepts based on the *Trigunas* and *Tridoshas* for better health. Yoga teaches us that the cause of most disease is through under (*Ajjeranatvam*), over (*Atijeeranatvam*) or wrong (*Kujeeranatvam*) digestion. Yoga also teaches us about the approach to food, the types of food as well as the importance of timings and moderation in diet. A combination of the modern aspects of diet with a dose of yogic thought can help the right diet. Yoga emphasizes the importance of not only eating the right type of food but also the right amount and with the right attitude. Importance of not eating alone, as well as preparation and serving of food with love are brought out in the yogic scheme of right living. *Guna* (inherent nature) of food is taken into consideration to attain and maintain good health. Modern science of diet can learn a lot from this ancient concept of classification of food according to inherent nature as it is a totally neglected aspect of modern diet.

"He who eats after the previous meal has been digested, needs not any medicine." (marunthuena vaendaavaam yaakkaikku arundiyathu atrathu poatri unnin - Tirukkural 942). He also says that life in the body becomes a pleasure if we eat food to digestive measure (attraal alavuarinthu unga aghduudambu pettraan nedithu uikkum aaru - Tirukkural 943).

Relaxation: Modern medicine understands importance of relaxation for healthy living. The problem is that, though the doctor tells the patient to relax, they don't tell them how to do so and maybe in fact they don't know the answer themselves. *Hatha Yoga* and *Jnana Yoga* relaxation practices help relax the body and mind. Relaxation is a key element of any yoga therapy regimen and must not be forgotten at any cost. *Shavasana* has been reported to help a lot in hypertensive patients and practices such as *Savitri Pranayama*, *Chandra Pranayama*, *Kaya Kriya*, *Yoga Nidra*, *Anuloma Viloma Prakriyas* and *Marmanasthanam Kriya* are also available to the person requiring this state of complete relaxation. It is important to remember that relaxation on its own is less effective than relaxation that follows *Asanas* (postures), i.e. active physical exertion.

Coping skills: Yoga has a lot to offer those who are unable to cope with death and dying as well as those suffering from incurable diseases. The yoga philosophy of living sees death as an inevitable aspect of life that cannot be wished away. Those who are taking care of the dying as well as those taking care of patients of incurable diseases and major disabilities are under an extreme amount of stress and yoga practice as well as its philosophy helps them gain the inner strength necessary to do their duty. Yoga can help break the vicious spiral of pain-drug dosage-pain and by doing so help reduce the drug dosage in patients suffering chronic pain. It has been reported that yoga helps improve the quality of life in patients suffering from cancer and also helps them cope better with the effects of treatment. It relaxes them and helps them sleep better.

Expenditure: Modern medicine is often criticized for the cost involved in its methods of treatment. Yoga offers an inexpensive method of health that can be added to the medical armory when required. Yoga only requires the patient's own effort (will) and really doesn't need any paraphernalia. Of course the modern yoga industry would rather have us believe that we need tons of yoga equipment to start yoga. Reduction in drug dosage and avoidance of unnecessary surgeries in many cases can also help reduce the spiraling cost of medicare.

Process of aging: Aging is inevitable and yoga can help us to age gracefully. Modern medicine tries to help retard aging and help people look better by costly surgical methods that are only an external covering over the underlying aging process. Healthy diet, regular exercise, avoidance of negative habits and cultivation of the positive habits and a healthy lifestyle can help us to age with dignity. Yoga can also help our 'silver citizens' retain their mental ability and prevent degenerative disorders. Physical accidents such as falls can be minimized and many an artificial hip, knee or shoulder replacement surgery can be avoided.

Psychotherapy: In the field of psychotherapy and psychoanalysis we can find a lot of ancient yogic concepts being reiterated time and again. Many modern psychotherapeutic concepts such as identification, projection, and transference are similar to concepts in yoga psychology. Yoga psychology integrates diverse principles within a single body. "Chakras represent a real effort to give a symbolic theory of the psyche" (Jung, 1999). His 'centre of personality' concept based on dream analysis is very similar to the yogic concept of a central psychic or spiritual personality. He also correlated chakras to the archetypes that abound in the collective unconscious. Yoga helps the psychotherapist in training self awareness, and in the self regulation of body, diet, breath, emotions, habit patterns, values, will, unconscious pressures and drives. It also helps in understanding the archetypal processes and to a transient being. Yoga offers an integrated method rather than one that is found in isolation in many different therapies. The theory of Kleshas is an excellent model for psychotherapy while emotional therapies of yoga include Swadhyaya, Pranayama, Pratyahara, Dharana, Dhyana and Bhajans. Development of proper psychological attitudes is inculcated via the concepts of Vairagya, Chitta Prasadanam as well as Patanjali's advise on adopting the attitudes of Maitri, Karuna, Mudita and Upekshanam towards the happy, the suffering, the good and the evil minded persons. Both yoga and psychoanalysis share common ground in understanding that symptoms of the disease are often product of the thoughts patters of the patients. While all psychoanalysts must undergo psychoanalysis themselves, it is taught in yoga that one must first undergo a deep Sadhana, before attempting to guide others on the path. While psychoanalysis searches the unconscious, yoga attempts to understand and explore the super conscious.

Lifestyle changes: Yoga places great importance on a proper and healthy lifestyle whose main components are *Achar* (healthy activities on a regular basis), *Vichar* (right thoughts and attitude towards life), *Ahar* (healthy, nourishing diet) and *Vihar* (proper recreational activities to relax body and mind). Yoga helps patients take their

health in their own hands. They learn to make an effort and change their life style for the better so that their health can improve. Life style modification is the buzzword in modern medical circles and yoga can play a vital role in this regard. Yogic diet, *Asanas, Pranayamas, Mudras, Kriyas* and relaxation are an important aspect of lifestyle modification. To live a healthy life it is important to do healthy things and follow a healthy lifestyle.

Women's health: Healthy mothers give birth to healthy babies and a healthy start has a great future ahead. Yoga in combination with modern medicine has a lot to contribute to the health status of womankind. Puberty and menopause become easier transitions with the help of yoga. Pubertal changes have been relatively smoother in yoga practitioners than their counterparts who don't practice yoga. The *Oli Mudras* as practiced in the yoga tradition have great potential in this regard and also the *Swara Yoga* have a lot of exciting possibilities. Once conception occurs, yoga helps the young mother to prepare herself physically and mentally for the upcoming childbirth. Yoga helps open the joints of the pelvis and hip as well as strengthen the abdominal muscles for childbirth. Later, simple *Pranayamas* and relaxation techniques help the new mother relax and enjoy the new experience of her life. Post partum introduction of simple practices along with breathing, relaxation and a lot of crawling helps her come back to normal earlier and this can be used in all maternity hospitals along with allopathic management. Yoga practices can also help reduce the drug dosage in medical problems that often complicate a normal pregnancy.

Research: Scientific researches in the field of yoga have a vital significance for verification of the importance of yoga and development of medicine, but the other sciences, as well.

Yoga gives frames for the new understanding and new approach to perception of the human health.

Many researches of the yoga practice benefits are not adequately methodologically constructed, and yoga practice of the patients doesn't have support in yoga standards. The higher aspects of yoga are still not in the researchable realm of modern science, but it doesn't mean that it will not be. Therefore, it is important to research new methodological instruments for measuring different phenomena that influence human existence and development.

Conclusion

Though the interest for *Yoga Vidya* in the west is growing day by day and more and more people are turning towards yoga, this is not the same in India. Lack of proper infrastructure and absence of a proper systematized approach in the propagation of yoga are still drawbacks for wider implementation. The youngsters are being drawn away from the tradition and culture and blindly ape the hedonistic lifestyle from the western movies.

Yoga practice influences change in the way of thinking. Therefore, it is important to give the youth proper and systematic training in yoga.

The aims of human existence are not health and happiness, but *Samadhi* (unity). Preoccupation with search for happiness and health makes us forget the essential question: what is the sense of our existence. Yoga is the best way for us to regain our birthrights and attain the goal of our human existence – and health and happiness then become natural fruits of that achievement.

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