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Preventive Remedial Yoga Program (PRAYOGA): A Mind-Body Medicine Program Incorporating Patanjali Rishi's Ashtanga Yoga

A Brief Clinical Study of its Application in Distress due to Chronic Pain

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ABSTRACT: ***PRAYOGA is a therapeutic program based on the Ashtanga Yoga of Patanjali Rishi described in the Patanjali Yoga Sutra. The program was developed by the author and being used in his clinical practice for several years. This article describes this program briefly. This program has been developed as a Mind-Body Medicine intervention for reducing distress and suffering due to chronic stress caused by chronic pain and other conditions. The program has been named as PRAYOGA, which is used as an acronym for 'Preventive Remedial Yoga Program' and 'Progressive Reconditioning Algorithm to Yield Optimum Gain in Action'. The evidence-based basis of the program in contemporary Mind-Body Medicine (MBM) is reviewed. The program curriculum is briefly described. A small clinical quantitative open study in a clinical population of patients experiencing distress due to chronic pain conditions where the PRAYOGA program was used as an intervention has been presented. Limitations are discussed, recommendations are enumerated and conclusion and future scope for research are presented.***

Index Terms: Patanjali, Ashtanga Yoga, Yoga Sutra, Mind-Body Medicine, Chronic Pain

INTRODUCTION

"*Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body, thought and action, restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change*". - *Shri Narendra Modi, Prime Minister of India and Yoga Practitioner, speaking at the 69th session of the United Nations General Assembly*

PRAYOGA is a Mind-Body Medicine (MBM) program developed by the author. He has been using it in his clinical practice for several years. PRAYOGA is an acronym for 'Preventive Remedial Yoga Program' which means that it incorporates preventive care principles in order to bring about remediation through a yoga based approach. PRAYOGA also stands for 'Progressive Reconditioning Algorithm to Yield Optimum Gain in Action' which indicates an algorithmic or step by step rehabilitation program of progressively reconditioning the aberrantly conditioned mind-body system due to default conditioning as a result of chronic stress due to any disorder so as to regain an optimum level of functionality or activity. It is also used to indicate that it is based on 'Patanjali Rishi's Ashtanga Yoga'. "*Prayoga*" is a Sanskrit term which means 'practice' or 'application'. It also means 'research' or 'experiment'. PRAYOGA therefore encompasses a holistic preventive and proactive means of personal remedial learning, practice and self-exploration based on Patanjali Rishi's Ashtanga Yoga to progressively recondition one's mind-body system by applying scientifically proven research based mind-body medicine techniques to empower oneself, regain confidence, build resilience, improve self-efficacy and achieve greater health and wellbeing. [7]

I. PATANJALI RISHI'S ASHTANGA YOGA

PRAYOGA is based on the ***Ashtanga Yoga*** of Patanjali Rishi. Ashtanga Yoga is described in the Yoga Sutra authored by Rishi or Sage Patanjali. The Patanjali Yoga Sutra is the classical treatise on Yoga including its principles, practice and philosophy. The concept of yoga itself can be traced to the Vedas dating back to circa 10,000 bce. Archaeological evidence of artefacts have been unearthed from the excavations of the ancient Indus Valley Civilization depicting human figures in yogic postures suggesting the prevalence of yoga practice from very ancient times. Patanjali Yoga Sutra is in the Sanskrit language. It is a highly regarded and respected text not only by traditional followers and students of Indian philosophy but also modern scholars and practitioners of yoga. Not much is known about Patanjali Rishi. He is sometimes referred to as Goniputra or Son of Gonika (the name of his mother) born in

the Indian Sub-continent during the Vedic period. Some legends attribute Patanjali as a divine incarnation. He is considered as an Avatar of Adishesha or the thousand-headed serpent God on which Vishnu is depicted as resting in *yoga nidra* or yogic sleep posture contemplating creation. Rishi Patanjali is more generally considered as a wise sage who contributed greatly to yoga, medicine and grammar. He is considered as a compiler and composer of the Yoga Sutra, organizing the science and art of Yoga that was already known and prevalent during that time. The generally accepted time of Patanjali is between 500 and 250 bce. Some sources pre-date this to 1500 bce and some post-date it to 100 ce. [19]

The Yoga Sutra approaches the phenomenology of suffering by means of philosophical enquiry and with a scientific rational approach. The work is in Sanskrit prose form consisting of brief statements or aphorisms. *Sutra* means thread in Sanskrit. It also means essence or formula. *Sutra* prose tradition developed to preserve and teach the concepts at a time when writing had not developed. Each *Sutra* contains the core definitions and concepts and hence is very brief and precise. The *sutras* rendered whole scriptures to be learnt by heart and memorised. This facilitated preserving and teaching or passing on of the knowledge and skills through the *guru-shishya Parampara* or the Master-teacher and Disciple tradition of the ancient Vedic *Gurukula* education system. [16][19]

Patanjali Yoga Sutra comprises of 196 *sutras* or aphorisms and divided into four chapters or *padas* or paths or steps: (1) The first step is the path of absorption or equanimity or *samaadhi pada* (2) The second step is the path of diligent or disciplined practice or *saadhana pada* (3) The third step is the path of self-empowerment or attainments or *vibuthi pada*, and (4) The fourth step is the path of self-realization or true wisdom or absolute freedom from suffering or *kaivalya pada*. The *ashtanga yoga* forms part of the second chapter or *saadhana pada*. *Ashtanga* means eight limbs or parts. According to the Yoga Sutra the seven levels of Ashtanga Yoga when practiced diligently empowers the practitioner with the eighth level of an awareness of discriminating wisdom leading to a balanced state of equanimity. This state of equanimity or *samadhi* leads to *kaivalya* or true freedom from suffering. Ashtanga Yoga comprises of eight parts: (1) *yama* or ethical observances, further divided into five: (i) *ahimsa* (refraining from violence), (ii) *satya* (refraining from falsehood), (iii) *asteya* (refraining from covetousness), (iv) *brahmacharya* (refraining from craving and lusting) and (v) *apiragraha* (refraining from greed and possessiveness) (2) *niyama* or hygienic disciplines, further divided into five: (i) *soucha* (cleanliness of body and mind), (ii) *santosha* (contentedness), (iii) *tapah* (austerity and hard-work), (iv) *swadhyaya* (self-study for self-empowerment) and (v) *ishwarapranidhana* (complete surrender to and trust in a higher reality or absolute consciousness) (3) *asana* or physical culture and adaptability training (4) *pranayama* or vital energy and breath regulation training (5) *pratyahara* or sensory regulation training (6) *dharana* or focussed attention training (7) *dhyana* or meditation and (8) *samadhi* or absorptive state of equanimity. [3][16][19]

PRAYOGA is a therapeutic program that has tried to extrapolate evidence-based clinical therapeutic concepts and practices established in contemporary mind-body medical psychotherapeutic practice onto the Ashtanga Yoga practice for practical clinical application in preventive medicine in the cultural context of yoga as a living tradition and heritage of India from ancient times.

MIND-BODY MEDICINE

Mind-Body Medicine (MBM) is a recent area of clinical medicine that applies to interactions between the body, behavioural factors, emotions, cognitive processes, social factors and spirituality and the ways in which they affect health and wellbeing. There is an emphasis on self-knowledge and self-care and are considered as important capacities that can be enhanced through specific processes and practices. It is based on the premise that one's thinking and behaviour can have a significant impact on one's life, physical and mental health and the capacity to recover from ill-health, injury or trauma, and social and occupational functioning. In Mind-Body Medicine there is a paradigm shift from a biological model of health to a bio-psycho-social-spiritual model of health. Mind-Body Medicine is not seen as a replacement of conventional medical treatment but as a vitally important compliment to it. MBM has become an important stream of study and therapeutics in several universities and teaching hospitals both in the West and the East. [1][2]

MBM now has good and robust research evidence which is growing. Mind-Body Medicine approach incorporates proactive lifestyle changes. Lifestyle changes can be transformative and can act at very deep levels both physically and mentally. Research has conclusively demonstrated that Mind-Body Medicine (MBM) practices that are lifestyle modification programs have shown to affect the parasympathetic vagal pathways in the autonomic nervous system bringing balance in the body-mind system through regulation of psychological, neurological and endocrine processes. They act on the Hypothalamic-Pituitary-Adrenal (HPA) Axis reducing the stress response. They produce positive neuroplastic changes in the brain that can have transformative impact on one's thinking, attitude and emotional health. They reduce the activation of pro-inflammatory cytokine production thus reducing the chronic stress mechanism and improve immune function. They influence genetic mechanisms positively. They facilitate the "turning-on" of disease preventing genes and "turning-off"

of the disease promoting genes. Preventive medicine research on the genetics of lifestyle medicine has demonstrated that at the genetic level there is enhanced functioning of the telomerase enzyme which is responsible for the lengthening of telomeres in the chromosomes. Telomeres are present at the ends of the chromosomes. The length of the telomere is directly proportional to health and aging. The studies demonstrate changes in chronic diseases like diabetes, hypertension, obesity, ischemic heart disease, cancer, etc. with improved telomere length being activated almost immediately on incorporating lifestyle changes with positive outcomes on health and healing of the condition. Lifestyle changes are an integral part of Ashtanga Yoga practice of Patanjali Yoga Sutra. [9][12][18]

One important component of mind-body medicine lifestyle intervention includes dietary changes. The recommended and scientifically examined and proven diet is a predominantly vegetarian diet that is low in refined carbohydrate, low in fat, low salt, high fibre and natural diet. This diet can reduce risk of chronic non-communicable diseases and even heal chronic inflammation, detoxify tissues and rejuvenate the cells. This diet is close to the yoga concept of *satvic* diet. *Satvic* diet is recommended as a health giving or healing diet in yoga and Ayurveda. The yogic diet is described as a part of the three-fold diet. The second type of diet is *rajasic*, which is intermediate and can be stimulating and recommended in moderation but to be avoided during illness. The third form is called *tamasic*, which is unhealthy and may be toxic and is a diet to be totally avoided under all circumstances. Yoga recommends *yukta ahara* or mindful eating. Mindful eating is paying attention to what we eat so that we chose the right health giving food, pay attention to where we eat, and how we eat in terms of our state of mind while eating, eating slowly and consciously so that the food is digested and assimilated in a way that is energy enhancing and healing. In MBM, mindful eating is part of mindfulness based therapies and has proved effective in several conditions like cardiovascular diseases, metabolic diseases, autoimmune diseases, endocrine disorders, inflammatory conditions, obesity, depression, eating disorders, etc. [6][8][18]

MBM physical techniques include physical culture in the form of movement therapies, stretching and flexibility training, breathing exercises, and mental techniques including auto-hypnosis, guided imagery and mindfulness meditation. These aspects also form part of Patanjali's Ashtanga Yoga of *asana* (postural adaptability training), *pranayama* (vital or breath control training), *pratyahara* (sensory regulation training), *dharana* (focused attention training), and *dhyana* (meditation). [4]

There is a surge in interest in Mindfulness Meditation which has been adopted in the West from Buddhist *vipassana* practice. This can be further traced back to the *dhyana* practice of yoga. In fact the practice of Japanese *Zen* is derived from the Chinese *Chan* which is an adaptation of the Sanskrit *dhyana* or *dhyan*. Mindfulness meditation is the technique or process of cultivating non-judgemental awareness of experiences from moment to moment. It is training the attention and awareness to be in the present. Beneficial effects of mindfulness meditation has been scientifically proven in several physical and mental conditions. The concept of mindfulness runs throughout the Yoga Sutra of Patanjali. Mindfulness exerts its effects through several components of cognitive neuropsychological functioning. These are: (1) Attentional Regulation (2) Body Awareness (3) Emotional Regulation and (4) Perspective Change on self. In mindfulness there is a reappraisal of feelings, exposure, extinction and reconsolidation of affect. Structural and functional neuroimaging studies provide empirical evidence supporting the neurocognitive mechanisms of mindfulness. The practice of mindfulness based techniques has shown to produce neuroplastic changes in the anterior cingulate cortex, insula, temporo-parietal junction, frontal-limbic connection network and the structures associated with the default mode network. The four mechanisms are observed to act synergistically thus establishing an enhanced process of self-regulation in the practitioner. [4][11][15]

Other mind-body techniques derived from established psycho-physiological principles are self-hypnosis, body scan, guided imagery, cognitive behaviour therapy (CBT), biofeedback, Tai Chi and Qi Gong, and Western adaptations of Hatha Yoga. Auto-hypnosis uses techniques of post-hypnotic auto-suggestion to make oneself feel relaxed and enter into a hypnotic trance state and a strong positive post-hypnotic suggestion is then self-administered whereby the patient is able to feel confident at reducing negative responses after the session. Body-scan involves guided moving of attention to sensations systematically and mindfully scanning the body from toes to head with an accepting, non-reactive and non-judgemental attitude. In guided imagery the imagination is guided to associate with positive and neutral objects engaging with all sensory modalities of vision, hearing, taste, smell and tactile sensitivity. This pleasant scenario so vividly imagined helps activate the parasympathetic nervous system and vagal activation bringing about relaxation and healing response. Techniques of body-scan, guided imagery and auto-hypnosis can be comparable to the *pratyahara* or sensory regulation of Ashtanga Yoga practice. Tai Chi, Qi Gong and Hatha Yoga are movement and adaptability practices that are described as *asana* practice in Ashtanga Yoga. The other therapeutic mind-body work in positive psychology that are gaining evidence in healthcare are self-compassion and compassion training, gratitude and attitude training and prayer which also form part of *yama* and *niyama*. [12][18]

Mind-Body Medicine studies using biofeedback involving measuring and providing feedback of physiological states to the

practitioner have used devices measuring Heart Rate Variability (HRV) and Cardiac Coherence or physiological coherence as measures of the activation of parasympathetic nervous system, and improved vagal tone thus bringing balance in the autonomic nervous system. These are simple measures that can be recorded through non-invasive and harmless devices placed on finger tips or ear lobes. Improved health and wellbeing and positive emotions are reported in practitioners of mind-body techniques who demonstrate higher HRV and high Cardiac Coherence. The other devices used are those measuring Galvanic Skin Response (GSR), simple Electromyogram (EMG) and single channel Electroencephalogram (EEG). These are simple clinical devices that can be used in everyday clinical practice to measure and also be used in therapeutic intervention to promote positive emotions and spirituality through mind-body techniques. In advanced research more sophisticated devices are used including multi-channel EEG and Functional Magnetic Resonance Imaging (fMRI) [2]

Research in Mind-body Medicine based interventions are increasingly bringing together the researchers in cognitive psychology, neurophysiology, psychiatry, neurology, molecular neurobiology, philosophy, yoga and several other disciplines. Contemplative neuroscience is the new and emerging field that studies systematically, using sophisticated technology, the effects of ancient contemplative traditions of yoga and related practices dating back to thousands of years especially prevalent in the East and more specifically originating from India. It uses several scientific methods and computer based instrumentation to observe and record activities particularly in the brain and the nervous system in people engaging in specific contemplative practices which have their roots in traditional yoga. These practices have been proven to produce positive and beneficial health effects on not only the mind but also the body. This provides evidence-based scientific basis for the traditional spiritual techniques of yoga that have been recommended by the ancient sages and yogis as essential for attaining higher states of consciousness, freedom from suffering and self-actualization. [11][15]

II. TRANSFORMATIVE HEALTHCARE

The integrative paradigm of health care is transformative care which is holistic and person-centred care which takes into consideration physical, mental, social and spiritual factors. The Vulnerability Diathesis Stress Model of disease puts forth that an individual may be born with certain predispositions or genetic vulnerability to certain diseases but it is not necessary that the disease expresses itself. When there are increased risk factors and contributing factors that increase the stress burden on the person or exceeds the capacity of the person to bear stress, also called resilience, then the disease manifests itself and produces symptoms and signs. [14][18]

Figure 1: Vulnerability Diathesis Stress Model (Illustrated by author)

The Vulnerability Diathesis Stress Model is explained with the analogy of a bucket (Figure 1). The volume of the bucket is the individual vulnerability and capacity to bear the burden of stress in an individual's mind-body system. The water flowing from the tap are the various stressors and risk increasing factors – physical, mental, social and environmental. The bucket has a finite capacity to accommodate the water flowing into it. Similarly the mind-body system has a finite capacity to accommodate the stress. When the capacity of the bucket is exceeded the water overflows. Similarly as long as the capacity of the mind-body system to withstand or counter stress exists disease does not manifest itself and there are no symptoms and signs of disease. Once the vulnerability threshold is exceeded and the capacity to accommodate is overwhelmed, then the disease pathology is manifested and physical and mental symptoms and signs begin to be expressed. [15]

All mind-body medicine practices focus on preventive care or enhancing the resilience of the person or improving the capacity to bear stress so as to reduce the burden of stress on the whole person so that the vulnerability diathesis threshold is not exceeded. Transformative care focuses on such practices that reduce risk factors of diseases and enhance the protective factors (Figure 2). [15]

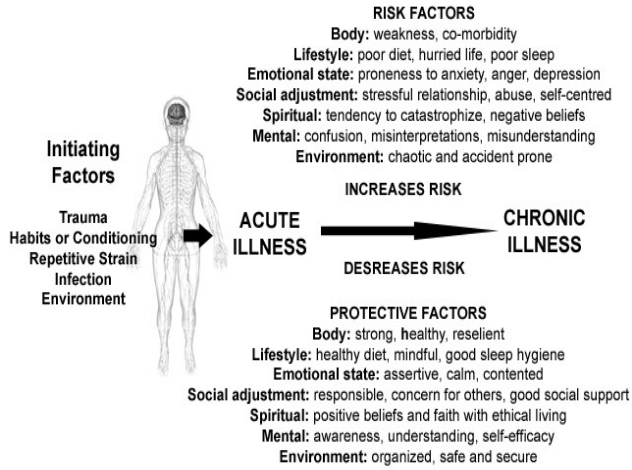

Figure 2: The Transformative Care Model of Health (Illustrated by author)

Yoga as a mind-body practice can enhance the protective factors and reduce the risk factors of disease process and thus can be curative and also preventive leading to improved health, wellbeing and quality of life. Transformative care is indeed possible through the practice of A*shtanga Yoga* of Patanjali which can be seen to address aspects of body, lifestyle, emotional state, social adjustment, spirituality, mental disposition and environment holistically. [14][18]

III. MIND-BODY MEDICINE AND SCIENCE OF SPIRITUALITY

There is now an increasing acceptance of spirituality in medical science. The neuroscientific correlates of spirituality is considered to be the same as positive emotions. Positive emotions are a set of selfless and altruistic traits which promote inclusion, warmth and nurture and brings people together. These emotions also facilitate health, wellbeing and enhanced quality of life. The commonly considered positive emotions are hope, joy, trust, gratitude, compassion, forgiveness, love and awe. These feelings allow one to transcend and connect to something that is larger than oneself and of a positive and divine nature. [10][11]

Studies in Mind-Body Medicine especially with meditation practice, have demonstrated that people who practice the techniques regularly report better health, improved wellbeing, and a feeling of sacredness. In several studies, though most people had chosen religious symbols as an object of meditation there were several who had chosen neutral or non-religious sounds or images who also reported the feeling of sacredness. The underlying neural substrates for spirituality and positive emotions are in the limbic system and prefrontal cortical connections wherein an integration, cohesion and balance is observed through advanced neuroimaging and neuropsychological testing. The commonly used meditation techniques to cultivate positivity are Self-Awareness Meditation, Focussed Attention Meditation, Mindfulness Meditation, and Loving-Kindness Meditation. These techniques can be traced to principles and practices described in the Ashtanga Yoga of Patanjali. [10][11]

EVIDENCE-BASE FOR PRAYOGA IN MIND-BODY MEDICINE RESEARCH

Research in medical science and especially in medical neuroscience has shown that to gain optimum health and wellness it is necessary to gradually and progressively recondition the body and mind so as to train oneself into making balanced choices in our overall action including diet, lifestyle, activities and ways of thinking and being. Due to aberrant conditioning as a result of the fast-paced, disorganised, pressured lifestyle and motives, there is a tendency to narrowed choices that give immediate gratification and pleasure or an escape-route. But these choices are usually reactive and not proactive contributing to a vicious cycle of stress and distress. [5][15]

PRAYOGA as Mind-Body Medicine is an empowering program that emphasises that it is within our power and capacity to proactively 'retrain' and 'recondition' ourselves by gaining knowledge and understanding, and by practicing health giving habits both physically and mentally to enhance our resilience, self-efficacy and attitude that naturally lead to wellness and wellbeing. [15]

The PRAYOGA program is well grounded in the evidence-base of mind-body medicine. It provides the knowledge and skills based on the premise that conscious and mindful awareness, physical and mental efforts and practices can train the mind and body and so change the brain through positive neuroplasticity, influencing the psycho-neuro-immuno-endocrine system complex to be activated and sustained through a virtuous cycle of healing and restoring homeostasis in the mind-body system. [15]

CURRICULUM OF PRAYOGA

The following is a brief description of the components of the PRAYOGA program used as intervention in a clinical setting. Following on the Patanjali Rishi's Ashtanga Yoga principles and practice the PRAYOGA program has eight components bearing the names of the eight limbs or parts of Ashtanga Yoga.

I. Yama (Ethical Observances): This involves education and discussion focusing on the following aspects:
   (i) Ahimsa: Compassion or ways of cultivating compassion towards oneself and others.

(ii) Satya: Being realistic in what can be achieved, being honest with oneself and accept oneself and one's present situation as such.
(iii) Astheya: Not rob oneself of common-sense and cheat oneself by indulging in avoidance behaviours.
(iv) Brahmacharya: Being mindful and focussed on the present and with awareness proactively address temptations, cravings and impulses.
(v) Aparigraha: Focussing on one's effort for its own sake and not in the unrealistic hope of profiting from it or in the hope of acquiring something.

II. Niyama (Hygienic Disciplines): Discussion and education session on the following aspects and proactive resolve to incorporate changes into one's daily life:
(i) Soucha (Hygiene): Education and discussion on the following:
1) Physical hygiene through basic cleanliness and preventive health practices.
2) Adequate outdoor activity and exposure to sunlight as the main source of Vitamin D and its importance in preventive and therapeutic health.
3) Hydrotherapy, bath and self-massage for health
4) Evidence-based balanced diet and healthy nutrition incorporating yogic principles.
5) Mental hygiene, its importance and practice.
6) Sleep hygiene
(ii) Santosha (Contentment): Developing an attitude of acceptance of one's situation fully as a means of understanding and proactively engaging in their own recovery and rehabilitation.
(iii) Tapah (Mindful Effort):
1) Focusing on and working towards a realistic goal
2) Learning skills to handle procrastination
3) Enhance motivation
4) Organization and planning
5) Hands on work in the session, assignments scheduling and self-monitoring as a way to steady progression and achieving success in their wellness goals
(iv) Swadhyaya (Self-Study): Taking personal ownership of one's condition and gaining as much knowledge and understanding as necessary in order to empower oneself and take full charge of one's own recovery and rehabilitation.
(v) Ishwarapranidhana (Trust in one's innate and natural power to heal): This involves facilitating the patient to consciously make a paradigm shift from helplessness and hopelessness to empowerment, self-confidence and realistic hope through cognitive restructuring.

All the above aspects are presented with evidence-based references and the patient is encouraged through home-work to study references provided of published articles, discussion and clarification in the follow-up sessions.

III. Asana or physical culture and adaptability training through demonstration, teaching and practice of simple and appropriate yoga asana exercises and slow movement exercises adapted from Hatha Yoga and oriental martial arts routines.

IV. Pranayama or Breath Training that include simple diaphragmatic deep breathing exercises.

V. Pratyahara or Sensory Regulation Training that includes Body Scan Exercise and Guided Imagery.

VI. Dharana or Training in Focused Attention.

VII. Dhyana or Meditation based on the technique of Mindfulness Meditation, Transcendental Meditation and Compassion Meditation.

VIII. Samadhana (modified; cf. samadhi in the Patanjali Yoga Sutra, *samadhana* in Sanskrit means solution or remedy or care or restoring normalcy): This comprises of elements of Cognitive Behavioural Therapy (CBT) and Mindfulness Based Stress Reduction (MBSR) and adapted by the author as Mindfulness Based Cognitive Behavioural Therapy (MBCBT) (Reported elsewhere)[22]. It also includes introductory discussion on basic yoga psychology and philosophy as applicable to understanding pain and suffering, and health and well-being.

It is made clear to the patients that the "PRAYOGA" program is not offered as a cure for any disease. It is an empowering system of mind-body self-care practices grounded in science to help reduce distress and suffering and in rehabilitation. It is a procedure for bringing awareness, clarity and common sense into the present moment of one's condition and the great potential of one's own body and mind for transformation by enhancing resilience to stress, capacity to face adversities, illness and pain with the wisdom and healing potential that each of us is endowed with.

The curriculum of PRAYOGA in practice, can be completed in four sessions, each session lasting one hour or more. The author has conducted the sessions flexibly on four separate days at weekly intervals or less as per the convenience and need of the learner. The therapy or intervention method is flexible and mostly practical combining didactic teaching, discussion, use of audio visual aids and practical demonstrations and teaching of techniques, home-work exercises and skills practice in the sessions.

PRAYOGA combines the knowledge of medicine, neuropsychology and techniques derived from Indian spiritual tradition of Patanjali Rishi's Ashtanga Yoga. It provides a

guide to develop the disciplines and skills necessary to recondition the body-mind so as to help one adapt healthy lifestyle, reduce risk factors for disease conditions and effectively self-manage persistent and troublesome symptoms. It involves self-learning and practicing certain skills and applying those skills appropriately to gain control and is a body-mind fitness and stamina building system. It requires effort and regular practice. The benefits are only as good as the effort. It is emphasised that skills are best learnt under expert guidance and supervision. [15]

When used therapeutically, PRAYOGA is an integrated holistic therapeutic intervention and follows a full assessment of the physical and mental status. On-going assessments are done at each contact before commencement of the session and at follow-ups. Follow-up sessions are used to reinforce and consolidate the principles and practice. There have been no reported adverse effects of the program.

IV. CHRONIC PAIN

Pain is a protective mechanism that is necessary for survival. Pain is a reaction or a response to damage or threat to the integrity of the organism. It activates the healing process to restore integrity. Pain can therefore be considered as a normal phenomenon. Chronic or persistent pain is abnormal pain. The abnormal pain persists for a long time much beyond the time by which healing is expected to be complete. Chronic pain produces chronic distress. Distress is a neuropsychological phenomenon with brain mechanisms and psychological processes underlying the suffering. [13][21]

Chronic pain is established in the peripheral and central neuronal circuits due to negative neuroplasticity. Due to abnormal over-sensitization and deconditioning of the neuropsychological mechanism, a vicious cycle gets established perpetuating the distress. Due to an abnormality, pain signals are generated spontaneously from over-sensitized regions and circuitry in the brain which are not controlled by inhibitory mechanisms and balances in the brain. [13][21]

Distress is prolonged due to effect on the limbic system modulated HPA Axis sensitivity and neuropsychological stress response. Apart from bodily symptoms of fatigue, tension, heaviness, tightness, tingling, low energy levels and decreasing activities, etc. psychological symptoms also occur like excessive anxiety, worry, depression, mental tension, disturbed sleep, disturbance of appetite, irritability, poor concentration, decreased motivation, etc. These together contribute to the chronic distress and suffering. [13][14]

Management of chronic pain and associated chronic distress requires a combined physical and psychological approach. Normal or usual ways of managing this pain are ineffective. Medications can be quite ineffective by themselves. The patient has to understand the nature of the distress and develop ways of self-management which can reduce distress and optimize social and occupational functioning. The clinician can empower the patient through education and teaching of techniques derived from Mind Body Medicine (MBM) which PRAYOGA incorporates. [14][17][21]

Table 1: Subject Characteristics

V. PRAYOGA IN CHRONIC DISTRESS DUE TO CHRONIC PAIN: A BRIEF CLINICAL STUDY

The PRAYOGA program as described above, was offered to patients attending a neuropsychiatric clinic conducted by the author. The PRAYOGA is a further modification and refinement of a Mind-Body Medicine Program that the author was using to treat chronic pain conditions based on Cognitive Behaviour Therapy (CBT) and Mindfulness, called Mindfulness Based Cognitive Behaviour Therapy (MBCBT). [22]

After the initial assessment of the patient in the first contact, and baseline recording of the subjective distress, the concept of PRAYOGA was discussed with the patient along with education about chronic pain and concept of distress. Subsequent sessions included education and skills training based on the PRAYOGA curriculum.

The PRAYOGA program consisted of three to four sessions, each session lasting for about an hour or longer. Follow-up sessions were to assess progress, record subjective distress and reinforce the continued application and practice of the knowledge and skills.

VI. OBJECTIVE AND PURPOSE

The objective of this study was to highlight the clinical outcome of using PRAYOGA in an out-patient clinical setting for the treatment of chronic distress resulting from chronic pain and associated conditions. The purpose was to determine the effectiveness of PRAYOGA as an evidence-based Mind-Body Medicine (MBM) intervention based on the Ashtanga Yoga principles derived from Patanjali Yoga Sutra, in clinical practice.

VII. DESIGN AND METHOD

This very brief study was an open clinical observational study with mixed semi-quantitative and qualitative aspects.

SUBJECT CHARACTERISTICS

The sample was a convenience sample of twenty patients attending a private out-patient clinic conducted by the author.

The patients were referred by other medical professionals as they were deemed to have a strong psychological component in their presentation of chronic pain.

All were suffering from chronic pain and also had prominent symptoms for a diagnosis of a psychiatric condition. Twelve of the patients were professionals working in the Information Technology industry, two were graduate students, three were post-graduate students, two were home makers and one was a retired engineer and writer.

No	Patient Initials	Sex M/F	Age Yrs	Diagnosis	Duration of the condition
01	LK	M	31	Fibromyalgia + Chronic Stress	2 years
02	ST	F	25	Headache + Dysthymia	2 years
03	GS	F	20	Fibromyalgia + Chronic Stress	2 years
04	BN	M	26	Repetitive Strain Injury + Generalized Anxiety	3 years
05	RP	M	30	Fibromyalgia + Obsessive Anxiety	3 years
06	ND	F	25	Fibromyalgia + Dysthymia + Hypothyroidism	4 years
07	PM	M	34	Fibromyalgia + Generalized Anxiety	5 years
08	TR	M	30	Repetitive Strain Injury + Generalized Anxiety	5 years
09	LL	F	41	Neck Pain + Headache + Chronic Stress + Hypothyroidism	6 years
10	SR	M	62	Fibromyalgia + Dysthymia + Hypothyroidism	10 years
11	MM	M	35	Fibromyalgia + Chronic Stress	4 years
12	NP	F	44	Headache + Low Backache + Dysthymia	3 years
13	SS	F	39	Low Backache + Dysthymia	5 years
14	GM	M	22	Fibromyalgia + Generalized Anxiety	2 years
15	SSn	M	38	Repetitive Strain Injury + Dysthymia	2 years
16	MH	F	30	Repetitive Strain Injury + Dysthymia	5 years
17	AA	M	43	Thoracic Outlet Syndrome + Generalized Anxiety	2 years
18	AK	F	30	Headache + Fibromyalgia + Dysthymia	6 years
19	JP	M	21	Neck Pain + Headache + Dysthymia	2 years
20	SM	F	35	Fibromyalgia + Obsessive Compulsive Anxiety	6 years

Among the patients, nine were female and eleven male. The age range was between 20 years and 60 years. The duration of the chronic pain ranged between about 2 years to about 10 years. The diagnosis was a chronic pain condition in the musculoskeletal system. All had additional symptoms to consider a working psychiatric diagnosis (diagnosis was clinical and no psychiatric classificatory system like DSM-5 or ICD-10 was used). (Table 1)

MEASUREMENT

The subjects were asked to rate their subjective distress resulting from their condition using a simple visual scale created by the author for routine clinical use based on the Faces Pain Scale (Figure 3). [23]

Figure 3: Subjective Distress Scale (created and Illustrated by the author)

The patients rated their subjective distress on the scale and the baseline ratings were the scores before the commencement of the PRAYOGA program on the first assessment. Subjective distress was recorded again after four weeks, after 12 weeks and at the end of 24 weeks follow-ups respectively. Follow-up assessment was mostly face to face or via telephone or e-mail. Table 2 shows the scores at baseline and on subsequent follow-ups at the ends of week 4, week 12 and week 24 respectively.

Table 2: Patients' Ratings on the Subjective Distress Scale

No.	Patient Initials	PRAYOGA sessions attended	Distress Scale Scores			
			Baseline	4 Weeks Follow-up	12 Weeks Follow-up	24 Weeks Follow-up
01.	LK	3	8	7	4	1
02.	ST	4	8	6	6	3
03.	GS	4	8	6	6	3
04.	BN	3	8	5	4	2
05.	RP	4	9	7	6	3
06.	ND	4	8	4	4	4
07.	PM	4	7	3	3	2
08.	TR	4	8	5	3	3
09.	LL	4	8	5	6	4
10.	SR	4	8	5	5	3
11.	MM	3	7	5	4	2
12.	NP	4	7	4	4	2
13.	SS	3	8	6	3	3
14.	GM	4	9	7	5	2
15.	SSn	4	6	4	2	2
16.	MH	3	7	5	3	3
17.	AA	4	8	7	5	3
18.	AK	4	8	6	3	2
19.	JP	4	9	7	5	4
20.	SM	4	8	6	2	2

VIII. ANALYSIS AND RESULTS

The twenty patients were available for follow-up either through face to face consultation, telephone or e-mail. Feedback was taken, and the ratings of subjective distress were recorded. They were also provided counselling to reinforce the concept of self-management of their condition during the follow-up contacts. Some patients continued to receive intermittent physiotherapy elsewhere. Some continued to take pain medications for a while but had discontinued the

regular use of medications by six months using them only on a PRN basis or for short periods of few days intermittently. None of them were prescribed any psychiatric medication. Many were taking nutritional supplements of Multiple Vitamins and Omega-3 Fatty Acids prescribed by a physician.

Of the three patients who had hypothyroidism and had been prescribed thyroid supplement, two patients had reduced the dose to the minimum (Levothyroxine 25 micrograms/day) and one had been advised to discontinue the medication. The positive aspects reported by the patients were: being better informed about their condition, being in control of their pain, being better able to manage stress, greater awareness, better concentration, able to pace themselves, reduced tension, improvements in mood, thinking and decision making.

Quantitative data analysis was done using the SPSS statistical package (developed by IBM, USA). The changes in the means of the ratings on the subjective distress scale indicated significant improvements over time. The percentage reductions in the mean scores at the ends of weeks 4, 12, and 24 were 31%, 47% and 66% respectively. These are highly significant. The One-Way Analysis of Variance (ANOVA) for correlated samples showed a p value < 0.0001. The Tukey Honest Significant Difference (HSD) test which compared all possible pairs of means also showed significance with p values < 0.01. (Figure 4, Tables 3, 4, 5 and 6)

Table 3: Change of Subjective Distress Scores

Time of Assessment	Mean	% Reduction of Mean Distress Score
At First Visit (Baseline)	7.9	-
At 04 Weeks	5.5	~31%
At 12 Weeks	4.2	~47%
At 24 Weeks	2.7	~66%

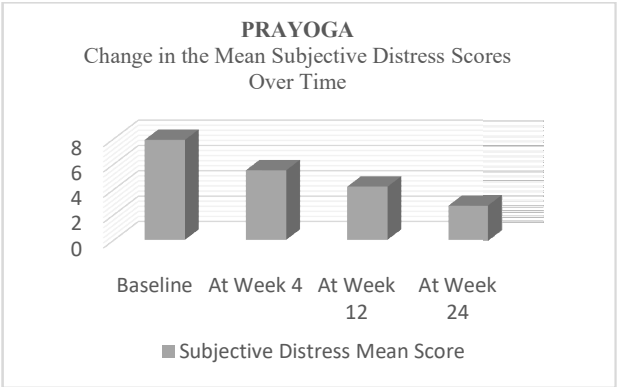

Figure 4: Change in the Mean Subjective Distress Scores over time

Table 4: Data Summary for Calculation of One-Way ANOVA

	Sample 1	Sample 2	Sample 3	Sample 4	Total
N	20	20	20	20	80
ΣX	157	110	83	53	403
Mean	7.85	5.5	4.15	2.65	5.0375
ΣX^2	1243	632	377	153	2405
Variance	0.5553	1.4211	1.7132	0.6605	4.7454
Std. Devitn	0.7452	1.1921	1.3089	0.8127	2.1784
Std. Error	0.1666	0.2666	0.2927	0.1817	0.2436

Table 5: One-Way ANOVA for Correlated Samples

Standard Weighted Means Analysis					
ANOVA Summary Correlated Samples k = 4					
Source	SS (Sum of Squares)	Df (degree of freedom)	MS (Mean Square)	F (F-Statistic)	P (Probability)
Treatment (between groups)	292.2375	3	97.4125	148.02	< 0.0001
Error	37.5125	57	0.6581	Applicable only to correlated-samples ANOVA	
Ss (Subjects)	45.1375	19			
Total	374.8875	79			

Table 6: Tukey Honest Significant Difference (HSD) Test

Tukey HSD Test HSD (0.05) = 0.68; HSD (0.01) = 0.84 M1 vs M2 P < 0.01 M1 vs M3 P < 0.01 M1 vs M4 P < 0.01 M2 vs M3 P < 0.01 M2 vs M4 P < 0.01 M3 vs M4 P < 0.01	M1 = Baseline Mean, M2 = Week 4 Mean, M3 = Week 12 Mean, M4 = Week 24 Mean HSD = the absolute (unsigned) difference between any two sample means required for significance at the designated level. HSD (0.05) for the .05 level; HSD (0.01) for the .01 level.

IX. DISCUSSION

Pain is a normal physiological phenomenon serving the useful purpose of protection. When the pain is abnormal as a result of negative or aberrant neuroplasticity, it is pathological and brings about over-sensitization and deconditioning of the mind-body system leading to prolonged distress. The PRAYOGA program incorporating Mind-Body Medicine is demonstrated to bring about greater awareness into one's mind-body system. It trains the individual to recondition his/her mind-body system thus reducing the over-sensitivity and perhaps enhancing the capacity for pain tolerance. This allows the patient suffering from prolonged distress to get a deeper understanding of the process of distress and the pain mechanisms. They learn techniques of self-management. There is a paradigm shift in their understanding of their condition. Thus they become mindful and feel more in control of the pain and so also their lives leading to wellbeing and better quality of life.

The program clarifies and emphasises that patients are provided realistic hope in that they may not be able to get rid of the pain entirely but they can definitely weaken its effect and control over the body-mind system and so their life. The changes achieved are sustained over a period. Clinically the observation is that some patients may require booster or refresher sessions to remind, refresh and reorient them but by

and large once they have the insight and are empowered they are able to self-manage their condition effectively.

X. LIMITATIONS

This is a small clinic based informal study. The sample size is very small. It lacks the rigor of a double blind randomized controlled study which is the gold standard of clinical studies. It would have also been useful to have formally measured Activities of Daily Living (ADL), General Assessment of Functioning (GAF), Mood testing and the quality of life (QoL) through standardized scales which were not done in this study.

Distress is a human emotional and a mental concept and hence very subjective. Feelings can fluctuate considerably. Subjective self-reports may not be very accurate and may be biased. Mind does not follow liner dynamics as in physics and therefore any attempt to measure any phenomenon of consciousness is only arbitrary and has a subjective quality as each conscious experience of an individual is unique to the situation and the individual experiencing it.

XI. RECOMMENDATIONS

It would be helpful to do further studies involving larger sample sizes. Ideally a double blind randomized controlled trial would make the evidence more robust. Longer term cohort studies could be undertaken to look at the longer term benefits and also to see if the health gains are sustained over a long period. Public health studies could be undertaken to test the program as a preventive medicine intervention. The studies can be extended to specific chronic non-communicable disease conditions and chronic mental disorders. From a clinical point of view, the program can be considered effective and a valuable addition to the tools of mind-body medicine for the therapeutic management of chronic distress due to physical and associated mental conditions as a result of chronic pain in the cultural context of India where yoga is traditionally based.

XII. CONCLUSION

There is a gradual change in the current approach to management of chronic pain in particular and medical disorders in general. The biological model though can be very useful especially in acute situations has proved to be inadequate in chronic medical conditions such as chronic pain. The transformative care approach to healthcare takes a broader view based on a bio-psycho-socio-spiritual model. Better outcomes are achieved using a multidisciplinary approach with the coming together of different expertise and also traditions. This requires a shift in the paradigm of healthcare and change in the mind-set of patients and professionals. [15] [18]

This is a brief clinical report to highlight the possibilities and potentials of Mind-Body Medicine informed program called PRAYOGA based on knowledge and wisdom of the ancient and traditional practice of yoga as expounded in the Yoga Sutras of Patanjali. The PRAYOGA program is a novel adaptation of the tenets of the Ashtanga Yoga of Patanjali which forms the core of the practice of yoga into evidence-based and practical Mind-Body Medicine (MBM) intervention for suffering in the form of subjective distress due to chronic pain conditions. PRAYOGA is a comprehensive program based on traditional yoga that can be used at all three levels of Preventive Medicine concerning chronic conditions with lifestyle risk factors, namely: (1) Health Education and Specific Protection (2) Early Diagnosis and Treatment (3) Disability Limitation and Rehabilitation. [24]

DECLARATION

I declare that this is my original work and I am the sole author. I have not received any support financial or otherwise from any source. Due diligence has been taken not to reveal identity of any individual or entity in any way that may compromise on confidentiality. There is no potential conflict of interest with respect to the research or authorship of this work.

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