NICM
Health Research Institute

YOGA
A therapeutic outline

This therapeutic outline provides an introduction to what yoga is and what it might be used for. The outline has been drafted by experts in the field, however it is not meant to be an exhaustive review of scientific evidence, such as a systematic review or meta-analysis, which is not its purpose. This outline provides a description of the therapy and a brief narrative review of the emerging evidence considered by the researchers at NICM Health Research Institute to be important science being undertaken in yoga.

What is yoga?

Yoga originates from regions of the Indus Valley and the Himalayan Mountains, mostly associated with modern-day India and Pakistan. Rooted in Vedic teachings, yoga forms one of the major philosophical systems (*darsana*) of this cultural tradition, and has been a part of traditional Indian spiritual, philosophical, and psychological practice for more than two thousand years.(1) Various branches of the yoga system have emerged throughout this period, with varying emphases of different aspects of yoga teachings and practices, including physical postures and movement (*asanas*), breathing techniques (*pranayama*), deep relaxation (*nidra*), mindfulness and meditation practices (*dhyana*), as well as cultivation of values (*yamas* and *niyamas*), purpose, meaning, and connection (*isvarapranidhana*), that cultivate physical and mental health, a more calm and focused mind, and ultimately more profound states of conscious awareness and human potential.(2)

In the past 50 years, numerous styles or forms of modern yoga have also emerged. Modern yoga is primarily taught and practised in group classes, with an emphasis on the physical postures and movements. Breathing techniques, relaxation and meditation are sometimes included, to a lesser extent.(2,3) Each style tends to have its own distinct emphasis regarding the relative content and approach for the various techniques and practices, though most are generally regarded as a means to promote physical and mental wellbeing.

Healing and therapeutic applications of yoga techniques (*yoga cikitsa*) have also been important throughout history, generally alongside the health system of Ayurveda. More recently, yoga is being recognised and developed as a complementary therapy, and incorporated into modern integrative medicine in India.(1, 3)

Why people practise yoga

Population-level assessments of participation rates in some form of yoga are not commonly reported. In the United States participation rates in yoga have been systematically surveyed in the 2002, 2007, 2012 and 2017 National Health Interview Survey (NHIS), a nationally representative health surveillance

system. Based on a 12-month recall, reported participation rates in yoga for the three time points were 5.1%, 6.1%, 9.5% and 14.3% respectively.(4-7) The 2012 NHIS found that yoga was practised for general wellness or disease prevention (78.4%), to improve energy (66.1%), or to improve immune function (49.7%), back pain (19.7%), stress (6.4%), and arthritis (6.4%).(8)

There is limited data on how frequently Australians practise some form of yoga, but these appear to be lower than those in the United States. The Australian Bureau of Statistics 2013–14 Multipurpose Household Survey (MPHS) collected data on participation in sport and physical recreation in Australia. It found 1.7% of the population had participated in yoga at least once during the 12-months prior to interview in 2013-14, with women having a higher participation rate than men (3.0% versus 0.4%).(9) This finding is consistent with data collected in the Exercise, Recreation and Sport Survey (ERASS), an annual Australia-wide data collection occurring in the years 2001 to 2010. The average prevalence rate of participation in yoga and Pilates (as a combined data point) between 2001 and 2010 was 3.0% (95% CI 2.9–3.1). The authors noted that participation rates remained relatively stable over the decade.(10). While relatively little is known about participation in yoga by attendance at group classes, and individual, personal or home yoga practise, research has been done in this area on pregnant women in Australia: 12.1% practised yoga at home and attended classes, 8.3% practised yoga at home only and 3.0% attended yoga classes only.(11)

A survey of people who practise yoga in Australia conducted utilising a comprehensive web-based questionnaire in 2005/2006 found that most people who practised yoga started doing so for 'health and fitness' and 'increased flexibility/muscle tone' (both about 71%), and these were also the most common reasons given for continuing yoga practise. Just over half of respondents (58.4%) gave 'reduce stress or anxiety' as a reason for starting yoga, with 80% providing this as a reason for continuing yoga. However, the sample of respondents was non-representative as respondents self-selected to participate.(12)

The 2020 IBIS World report on *Pilates and Yoga Studios in Australia*(13) concluded that yoga has become widely accepted as means of exercise in Australia and participation growth in the five years to 2020 remained strong.

Evidence of effectiveness

The following evidence summary provides an overview of potential clinical areas of benefit from the use of yoga as a therapeutic tool. An overview of reviews was undertaken, including a systematic search of Pubmed/Medline and Cochrane Collaboration publications to end 2020 limited to English language papers. However, this summary is not designed to serve as an exhaustive systematic review of all scientific evidence in the field, but rather provides a brief narrative review of the emerging evidence in key clinical areas as understood by expert researchers in the field.

There is an extensive and growing clinical research literature assessing the effectiveness of yoga-based interventions for various medical conditions, such as cardiovascular disease and risk factors,(14-17) pain and musculoskeletal conditions,(18-21) mental health conditions(21-24), and mental and physical health and quality of life in cancer patients,(25-28) as well as in preventive medicine.(15, 16, 29)

Mental health

There is extensive literature on the mental health benefits of exercise.(30-32) With regard to the efficacy of yoga specifically for mental health conditions, there is growing evidence from over 30 randomised controlled trials (RCTs) for the effectiveness of yoga-based interventions for depression, anxiety and post-traumatic stress disorder.(22-24, 33-44) Reviews of other psychiatric conditions, including schizophrenia, report benefits for improved quality of life.(23, 45-47)

Cardiovascular

Five reviews and several meta-analyses of clinical trials of yoga-based interventions for cardiovascular disease and hypertension have reported moderate to clinically important effects.(15, 17, 48-50) Cramer and colleagues (15) reviewed and analysed 44 RCTs with a total of 3168 participants and reported that relative to usual care or no intervention, yoga-based interventions improved numerous factors associated with cardiovascular disease. Specifically, yoga-based interventions were associated with clinically and statistically significant improvements ($p<0.01$, overall effect across combinations of healthy, non-diabetic high-risk, or type 2 diabetic samples) in both systolic (MD = −5.85 mm Hg) and diastolic blood pressure (MD = −4.12 mm Hg), heart rate (MD = − 6.59 bpm; $p=0.04$), respiratory rate (MD = − 0.93 breaths/ min; $p=0.02$), waist circumference (MD = −1.95 cm), waist/hip ratio (MD = − 0.02), total cholesterol (MD = − 13.09 mg/dl), HDL (MD = 2.94 mg/dl), very-low-density lipoprotein (MD = −5.70 mg/dl), triglycerides (MD = − 20.97 mg/dl), HbA1c (MD = −0.45%) and insulin resistance (HOMA-IR; MD = −0.19). Relative to exercise, yoga-based interventions also showed clinically and statistically significant improvements in blood levels of high-density lipoprotein (MD = 4.24 mg/dl). Effects of yoga-based interventions were comparable or superior to that of guideline-endorsed interventions for managing cardiovascular disease risk such as exercise or psychological interventions.(51, 52)

There is also evidence that regular yoga practice benefits intermittent atrial fibrillation[1] and associated mood disorders and quality of life (QOL) in people with this condition. A small single arm observational study with 52 participants with intermittent atrial fibrillation (49 of whom completed the study) found 3-months of yoga (twice a week for 60-minutes) improved arrhythmia burden, heart rate, blood pressure, anxiety and depression scores, and several domains of QOL.(53)

Musculoskeletal and chronic pain

A systematic review of clinical studies of yoga as an intervention for a range of musculoskeletal conditions analysed 17 studies involving 1626 participants with low back pain, osteoarthritis, rheumatoid arthritis, kyphosis or fibromyalgia.(20) The majority of these studies were rated as good quality. Yoga-based interventions resulted in a clinically significant improvement in functional

[1] Intermittent atrial fibrillation (also known as paroxysmal atrial fibrillation) occurs when a rapid, erratic heart rate begins suddenly and then stops on its own within 7 days; intermittent atrial fibrillation often lasts for less than 24 hours.

outcomes in mild-to-moderate low back pain and fibromyalgia and showed a trend to improvement in kyphosis (excessive outward curvature of the spine). Yoga significantly improved pain in osteoarthritis, rheumatoid arthritis, and mild-to-severe low back pain. The meta-analysis showed a moderate treatment effect for yoga-based interventions for both functional and pain outcomes measured using predominantly valid and reliable questionnaires[2] commonly recommended for use in musculoskeletal conditions. The authors concluded the evidence suggests that yoga-based interventions are an acceptable and safe intervention, which may result in clinically relevant improvements in pain and functional outcomes associated with a range of musculoskeletal conditions.(20)

Three further reviews also found good evidence for yoga as an effective intervention for treating low back pain (19, 54, 55). Cramer and colleagues (2013) analysed 10 RCTs with a total of 967 chronic low back pain patients. There was strong evidence for short-term effects on pain, back-specific disability, and global improvement. There was strong evidence for a long-term effect on pain and moderate evidence for a long-term effect on back-specific disability. Based on the strength of evidence, the authors concluded that yoga-based interventions can be recommended as a therapy to chronic low back pain patients.(19) A more recent Cochrane review which assessed the effects of yoga for treating chronic non-specific low back pain, compared to no specific treatment, a minimal intervention (e.g. education), or another active treatment, with a focus on pain, function, and adverse events included 12 trials and 1080 participants. This review concluded there is low- to moderate-certainty evidence that yoga compared to non-exercise controls results in small to moderate improvements in back-related function at three and six months and that yoga may also be slightly more effective for pain at three and six months. Uncertainty remains as to whether there is any difference between yoga and other exercise for back-related function or pain, or whether yoga added to exercise is more effective than exercise alone. Finally, yoga was not associated with serious adverse events and was found to have the same risk of adverse events as other back-related exercise.(55)

A recent pilot study randomised 27 individuals with Parkinson's disease (PD) to either an 8-week yoga intervention group or to a wait-list control group.(56) The 15 participants in the yoga group experienced improvements in motor function, postural stability, functional gait, and freezing gait, as well as reductions in fall risk. Participants in the wait-list control group (n=12) showed significant improvement in postural stability, but fall risk was not reduced. This study demonstrated that yoga practise can improve balance, gait, and freezing of gait in individuals with PD, and that yoga appears to provide a greater reduction in fall risk and a higher magnitude of impact on functional gait in this group than a wait-list control.

[2] Functional and pain outcomes were assessed using the following: FIQR - Fibromyalgia Impact Questionnaire Revised; FRI - Functional Rating Index; ODI - Oswestry Disability Index; PDI - Pain Disability Index; RDQ - Roland–Morris Disability Questionnaire; SDPIS - Simple Descriptive Pain Intensity Scale; SF-36 - Short Form 36 Health Survey Questionnaire; and a VAS - Visual Analogue Scale.

Cancer

A number of reviews have been completed assessing the effectiveness of yoga practise in cancer patients for the improvement of mental health, quality of life and treatment related side effects such as fatigue and gastrointestinal symptoms. These reviews conclude there is good evidence of the effectiveness of yoga-based interventions for short-term psychological benefits and quality of life in cancer patients, including improvements in treatment related side effects such as fatigue and gastrointestinal symptoms(25-27, 57-62) and recommend that yoga-based interventions can be recommended as an intervention to improve psychological health during breast cancer treatment.(27) A recent network meta-analysis found that yoga was the most effective non-pharmacological intervention for cancer-related fatigue after cancer treatment.(63)

Mechanisms of action

A recent literature review synthesised the current hypotheses and scientific evidence for the underlying mechanisms of yoga-based intervention.(64) Yoga-based interventions appear to have a positive impact on hormone regulation and lowering salivary cortisol levels.(14, 65-67) Lowering cortisol is associated with decreasing perceived stress.(68) Other observed hormone effects include elevating levels of melatonin (which may improve immunity and sleep quality (69, 70) and increasing gamma-amino butyric acid levels, which results in a calming of nervous activity.(71, 72) Regular yoga practice has been postulated to reduce allostatic or overall load in stress response systems such that optimal homeostasis is restored.(73)

Safety of yoga

Yoga has a good safety profile comparable to usual care or exercise. A recent systematic review and meta-analysis published in 2015 found there were no differences in the frequency of intervention-related, non-serious or serious adverse events, and of dropouts due to adverse events when yoga is compared with usual care or exercise.(74) For this reason, yoga is promoted by the National Health Service of the United Kingdom as a safe and effective way to increase physical activity.(75)

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