

Yoga-based exercises as a complementary treatment for physiotherapists – effects and recommendations

SUMMARY/ABSTRACT

To use of body-mind exercises among physiotherapists and other health professionals has increased both in the Nordic countries and worldwide.

Body-mind exercises and specifically yoga-based exercises (YBE) can be described as a form of attention training while moving the body with breath control. It is divided into three important components: body and breathing exercises, and mind control exercises/mindfulness.

Yoga-based exercises can be used to improve and maintain physical functioning, manage stress, improve before quality of life as well as mental health. YBE can be used when strength training, mobility training and balance training are recommended.

The strength of research of YBE is low to moderate depending on symptoms but can be used as a complementary treatment to physiotherapy or to other conventional treatments. This article discusses the mechanisms of YBE, existing recommendations for several medical conditions.

- Yoga based exercises (YBE) include three components: body and breathing exercises and mind control exercises/mindfulness.
- YBE is a body-oriented form of physical activity that improves self-regulation and mastery.
- YBE can be used as a complementary treatment for symptom relief and improve and maintain physical functioning, improve quality of life, stress management and mental health.
- YBE can be used as a complementary treatment for symptom relief and management of pain, for respiratory and cardiovascular diseases, and during/after cancer treatment as well as a form of self-management and body awareness practice.
- World health organization and National Institute of Health in UK and US recommend yoga as a form of strength training.

The interest among physiotherapists to use yoga-based exercises (YBE) has increased during the last decade. Yoga-based physical exercises can be defined in different ways, it is an attention based and multidimensional form of exercise (many physical components are trained). The National Institute of Health (NIH) has published an eHealth book that can serve as a handbook for healthcare professionals of the health effects and use of yoga for different patient groups and ages. It also includes safety aspects and an evaluation of why participants practice YBE [1].



What is yoga-based exercises?

In the literature [2] YBE is described as a body-oriented form of physical activity that improves self-regulation. Table 1 provides an overview of how larger organizations define YBE. The main components include body exercises, breathing exercises, as well as attention and relaxation.

Table 1. Different definitions of yoga-based exercises (YBE).

Organization	Definition
ACSM	A multidimensional form of exercise (physical and mental components) used to improve and maintain physical function and decrease the number of falls in elderly [3]
WHO	A style of physical activity in order to decrease non-communicable diseases and to prevent inactivity and sedentary time [4]
NCCH ^{***}	Physical activity with mental attention.
NCCH ^{***}	Body awareness
NHS ^{**}	Strength training (light to moderate)
ODPH ^{**}	Strength training

ACSM - American College of Sports Medicine, WHO - World Health Organization, ^{***}NCCH - National center for complementary and integrative health (U.S.), ^{**}NHS - National health service (U.K.), ^{**}ODPH - Office of Disease Prevention and Health Promotion (ODPHP) included in U.S. Department of Health and Human Services under the Office of the Assistant Secretary for Health.

Stress management

According to Pascoe et al., YBE (all three components included) can be used for stress management with positive effects on cortisol levels, blood pressure and inflammation markers [47] and often with similar effects to mindfulness based stress reduction. A larger 3-armed online study during the pandemic compared an active control with placebo and seasoned yoga practitioners showed that YBE practitioners had better psychological status and lower stress levels at all time points (baseline, 6-week and 12-week) [48].

Heart rate variability is often used to measure stress and vagal tone in medical conditions as fatigue, burn out and low cardiorespiratory function among others. To achieve a clinically relevant effect on stress reduction and heart rate variability, the minimum dose for heart rate variability to change is 60 min per week [49] and for further improvements 90 minutes. The strength of evidence in general is small to moderate but similar to physical activity.

Cardiovascular effects

These YBE programs [50] that include both mental relaxation and breathing exercises show larger blood pressure reductions (11 systolic/6 diastolic mmHg) [51]. Using YBE (as well as Tai Chi and Pilates) a systematic review of 21 randomized controlled trials report [52] it may be suitable as a form of complementary treatment rehabilitation for post-stroke individuals. Single randomized trials from Sweden report no effects on blood pressure [53, 54].

Physical YBE (hatha yoga – the most common style in Western world) are sometimes performed statically (isometrically) to allow time for reflection while in the pose. A meta-analysis testing isometric contractions report clinically relevant blood pressure reductions (systolic 6-10 mmHg, diastolic 4 mmHg) after YBE and other types of exercises using isometric muscle contractions [50, 55, 56, 57].

Studies of patients with metabolic syndrome have shown a decrease in blood pressure after practicing YBE [58]. Larger long-term studies on YBE on cardiovascular effects are missing, for blood pressure reductions short-term effects are reported with a strength of evidence of low to moderate [59, 50].

Effects on pain and physical function and recommendations

A new Cochrane review [60] compared YBE with other exercise types (physical therapy or stretching) for chronic non-specific low back pain and found no difference in back-specific functional status (moderate evidence), regarding pain and clinical improvements the evidence is unclear. While some other systematic reviews have shown small to moderate improvements in back-related physical function and pain [61] [62, 63] after YBE where all three components were included (body, breath, mind). The effects on pain is conflicting depending on how the analysis has been done by the researchers but some report reduced pain both in short- and medium term while physical function improves both short- and long-term when compared with conventional treatment or education [64]. Some authors conclude that YBE may have similar effects on pain and physical function as physical activity [64].

In Germany YBE are recommended as a complementary treatment or used in combination with other types of physical activity [65]. For subacute chronic low back pain (not in radiating scapula), the American College of Physicians [66-68] recommends YBE as a complementary treatment but in some cases as a first-line option [67].

An overview (596 participants), report less pain and increased physical function using YBE, sometimes with better improvement compared to usual care, however, while compared to stretching unclear effects was found [69].

A review of neck-pain (188 participants) showed some decreased pain [70]. Another review (686 participants) showed less pain intensity and improved function of the neck as well as improvements in QoL and mood [71]. The authors conclude that YBE may work as an alternative treatment during neck-pain and in some cases with similar effects to physical activity.

Regarding osteoarthritis (mostly knee) reviews and meta-analysis and Canadian recommendations states that YBE may be used as a complementary treatment to decrease pain and stiffness in order to improve physical function and QoL [72, 73, 74]. The size of the effect is low, and the studies are heterogeneous regarding osteoarthritis.

During and after cancer treatment

The American Society for Clinical Oncology (ASCO) recommends YBE to reduce anxiety and depression in cancer patients [75]. Short term YBE seems to improve mental health in breast cancer patients during cancer treatment [76], however the strength of evidence is not completely clear if it has similar effects to other types of exercise [77].

During cancer treatment YBE can be used as a form of recovery both during and after cancer treatment. During breast cancer treatment, YBE can improve fatigue as well as cognitive fatigue [78]. Other effects such as an improved QoL [79] and sleep [80] [81] have been reported.

After cancer treatment, YBE seems to reduce cancer-related fatigue, anxiety and pain as well as increase health-related QoL, mental well-being and sleep quality [82] [83].

Health related quality of life and mental health

A compilation of 26 review articles of various chronic medical conditions showed good symptom relief in conditions such as pain, anxiety and depression [84, 85], although sometimes with conflicting results [86, 87, 88]. A review article [89] indicates that non-pharmacological interventions such as physical activity and YBE can reduce the effects of stress and be used as a complementary treatment in patients with depression and anxiety. A smaller review report enhanced health in community dwelling older adults after YBE [90].

A Swedish multicentre study [91] compared the effects of exercise at different intensities on patients diagnosed with mild to moderate depression. Aerobic exercise with moderate to high intensity was

The aim of YBE is to join breath, movements and awareness to body, mind and breath. Attention to proprioception and the inner body (interoception for example heart rate, respiratory rate) are included. Interoception is a central part of embodied practices [5, 7].

Three main components (physical and mental) and aims of yoga-based exercises (all styles of yoga)

- Body exercises – physical exercises both static and dynamic
- Breathing exercises – single exercises of the breathing muscles and/or body movements synchronized with breathing
- Attention/mindfulness/meditation – includes relaxation

In most reviews of YBE (pain, cardiovascular disease and cancer), body exercises are in majority, followed by breathing exercises, meditation and relaxation [8, 9]. The proportion of exercises (body exercises, breathing exercises or mindfulness) differs depending on whether the intervention was carried out in the Western world or Asia. Asian interventions often have longer meditation and relaxation.

Attention to the body and the stream of thoughts are often divided into the neurocognitive perspective (top-down), that is, consciousness and attention, and the neurophysiological (bottom-up) perspective. "Bottom-up" is a form of inward (afferent) vagal stability training [7, 9, 11, 12] and includes information about the body and breathing in order to increase somatosensory inflow/learning. The neurocognitive part (top-down) involves present moment attention on different levels (zooming in and out on different body parts) and focus to the breath and contact points to the ground/wall etc. [7-11]. Yoga-based exercises often improves resiliency, stress management [3, 7, 13-15], self-efficacy [16] and empowerment/mastery [17] [18-20], with the aim of creating long-lasting well-being [18-20] (eudaimonia) [13].

The philosophical definition of YBE involves a system with different approaches to the outside world and oneself regarding lifestyle and using techniques to body and mind in order to achieve self-actualization and meditation [21, 22]. The scope of this article is not describing the philosophy of YBE and can be found elsewhere [21, 22].

What kind of symptoms and patients can use YBE and what type of exercises?

Most commonly YBE can be used by patients who want to increase physical function, improve quality of life (QoL), mental health, reduce stress and risk factors for cardiovascular diseases and to manage and reduce pain [2, 23]. Patient groups that may be recommended to use YBE are described more in detail below.

One typical physical function that is improving with YBE is muscle strength and balance, this is of advantage for the elderly and can reduce the number of falls [24, 25, 26].

The National Institute of Health (NIH) in the United States describes the use of YBE as a form of complementary treatment to improve health [27].

The style of exercises has to be individually adapted with different props as for example, chairs, blocks, straps pillows and wall spaces. The most common exercises are half-moon, cat/cow, bridge, one leg standing positions and sun salutations [28]. They are performed both actively synchronized with breathing cycles or longer holdings isometrically. The recommended frequency and duration [3] of YBE is 20-30 minutes per session and 2-3 times per week (Table 2). Some poses are performed at an intensity of 12-13 on the Borg RPE scale (approximately 3 MET= metabolic equivalents), however for YBE no general intensity level are available [28] (Table 2). In general most studies where the largest effects have been reported has a frequency of 1-2 times/week, 60-90 minutes per session, performed for 8-12 weeks [29]. Effects in the long term are unclear.



Sun salutation sequence is one of the most common dynamic yoga-based exercises.

Compared to other types of physical activity the injury risk is not higher with YBE [30]. Regarding exposure per 1000 hours of exercise, running has 2.5 injuries, tennis 5 and YBE has 1.5 injuries.

Yoga-based exercises as a form of "attention-controlled" strength training

Several larger organizations define YBE as a form of strength training (Table 1), for example in the physical guidelines by WHO [4]. Sun salutations commonly used in most YBE styles and other demanding body weight exercises are classified as light to moderate intensity [28] and can improve muscle strength [26, 31] and balance ability [32, 33].

Obstructive lung diseases (Asthma/COPD)

For asthma patients YBE has moderate effects on QoL and symptom relief [34]. When including breathing exercises into YBE both physical function and lung function has improved in COPD patients [35] [36]. Improved QoL and lower perceived exertion has been reported in participants with obstructive lung disease after YBE [37] but also parameters of self-management and mastery [38, 39, 37, 40-44]. However, another review showed low effect on disease specific QoL in COPD patients [45]. During the pandemic times (covid) the interest for strengthening the breathing muscles has increased, for example the classic unioleil breathing exercises [46]. In YBE it is common to breathe through one nostril using different techniques, to breathe asymmetrically such as extending the exhalations to calm the parasympathetic nervous system.

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compared to YBE (low intensity) as well as to usual care (contact with GP).

All groups showed clinically relevant effects on the degree of depression and with similar effects to conventional medical treatment. The authors discussed the possibility that low-intensity exercise such as YBE may be perceived as more pleasurable and beneficial for patients with mild to moderate depression. However, adherence was low, only 40% participated in at least 12 treatment sessions, which may have affected the outcome of the study.

Individuals with mild to moderate Parkinson's [92] practiced either YBE, strength training or stretching and similar effects were reported on stress and health related QoL.

When to recommend YBE

YBE are recommended to improve overall physical functioning, manage symptoms, improve QoL, mental health and stress management. In the UK and US, YBE is recommended as a form of strength training (Table 1).

Muscle strengthening exercises, mobility and balance exercises included in YBE improves physical functional capacity of the individual. The breath control exercises seem to have a calming effect on the parasympathetic nervous system [93]. In the Swedish medical journal it has been recommended that healthcare professionals may learn from complementary treatment practitioners [94]. WHO has initiated "Traditional Medicine Strategy" and in Sweden an investigation is ongoing and will present the need for training of healthcare professionals in complementary and alternative treatments, since some patients use this type of treatments for symptom relief [94].

Variations of the shoulderhold and hare/bird poses.



More research on YBE is needed and it is of importance for clear reporting [95] when conducting interventions to improve the quality and study designs to prevent heterogeneity. Yoga-based exercises can be recommended to the same extent as physical activity and programs must be individually adapted using the current physical activity guidelines (American College of Medicine) (Table 2).

Table 2. Recommendation of dosage (intensity, frequency, and duration) for Yoga Based Exercises (YBE).

Frequency: 2-3 times/week, 20-30 min/session [3]
Balance ability: 3 hours/week (12 weeks) for elderly 60+ [13, 33, 36, 97, 25]
Mobility: (static or dynamic, all large muscle groups), 2-3 weeks, 60 seconds per exercise (2-4 times/exercise) [3]
Muscle strengthening: 2-3 times/week, 2-3 set, 8-12 repetitions, 8-10 exercises [3]
Intensity for cardiovascular improvements: At least 3 MET (metabolic equivalent) Borg Borg 20 scale, RPE 12-13. Sun salutation (approx. 3.3 MET) [28, 98]
Inflammation: >1000 min, (minimal dose) (cysteine, interleukins, CRP, TNF-alpha) [99]

Summary: The practice of YBE have low to moderate strength of evidence on disease symptoms in a variety of medical conditions, including in the treatment of cancer. Some reported effects are improved health related QoL, symptom management and well-being. Other reported effects after YBE are improved physical function and stress management, less pain and improved mental symptoms. Yoga based exercises can safely be used as a complementary treatment to other conventional treatments to improve health and symptom relief where there is evidence. A Danish version of this article is going to be printed in the danish physiotherapy association.

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Variation of the grasshopper pose.



Forward bends are often calming.



Twisting poses improve mobility and breathing.

