Effects of a Kundalini Yoga programme on cardiorespiratory fitness and health-related quality of life in university students

Efectos de un programa de Kundalini Yoga en la aptitud cardiorrespiratoria y calidad de vida en estudiantes universitarios

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Abstract

Physical inactivity and sedentary behaviour are significant risk factors for diseases such as cardiovascular disease, cancer, and mental health disorders. Kundalini Yoga (KY) is recognised for its potential to improve physical and mental health.

Objective: To evaluate the effects of a 6-week KY program on cardiorespiratory fitness (CRF) and health-related quality of life (HRQoL) in physically inactive university students.

Methodology: A randomised controlled trial with a parallel-group, double-blind design included 26 university students divided into a Yoga group (YG, n=13) and a control group (CG, n=13). The YG completed twelve KY sessions over six weeks (two per week). Assessments included peak oxygen consumption (VO_2peak) and the SF-36 HRQoL questionnaire. A repeated measures analysis assessed the time×group interaction effect with post-hoc analysis (alpha= .05).

Results: Significant improvements were observed in YG for relative (Δ=3.21; *d*=0.66) and absolute (Δ=173.07; *d*=0.40) VO_2peak, and maximal effort test performance (Δ=12.31; *d*=0.34). YG showed significant enhancements in the general health dimension of HRQoL (Δ=20.0), physical function (Δ=5.0), and overall behaviour (Δ=12.9), while CG improved only in physical function (Δ=5.0).

Discussion The findings suggest that KY provides greater improvements in CRF and comparable enhancements in HRQoL compared to other yoga styles, even within a shorter intervention period. KY appears effective as a health-promoting intervention.

Conclusions: Twelve sessions of KY over 6 weeks significantly improved CRF and HRQoL in physically inactive university students. A KY program is recommended for physically inactive individuals who wish to adopt an active lifestyle and improve their CRF and HRQoL.

Keywords

Oxygen consumption; Physical fitness; Student health; Well-being; Yoga.

Resumen

Introducción: La inactividad física y el comportamiento sedentario son factores de riesgo para diversas enfermedades, incluidas las cardiovasculares, el cáncer y los trastornos mentales. El Kundalini Yoga (KY) tiene el potencial de mejorar la salud física y mental.

Objetivo: Evaluar los efectos de un programa de KY de 6 semanas sobre la capacidad cardiorrespiratoria (CRF) y la calidad de vida relacionada con la salud (HRQoL) en estudiantes universitarios inactivos.

Metodología: Ensayo controlado aleatorizado con grupos paralelos y diseño doble ciego. Veintiséis estudiantes fueron divididos en grupo de Yoga (YG, n=13) y grupo control (CG, n=13). El YG realizó doce sesiones de KY en seis semanas. Las mediciones pre y post intervención incluyeron el consumo pico de oxígeno (VO_2peak) y el cuestionario SF-36 de calidad de vida. Se utilizó un análisis del efecto tiempo×grupo (alfa= .05).

Resultados: El YG mostró mejoras significativas en el VO_2peak relativo (Δ=3.21) y absoluto (Δ=173.07), así como en el rendimiento físico (Δ=12.31). También, en HRQoL, se observaron mejoras significativas en la salud general (Δ=20.0), función física (Δ=5.0) y comportamiento general (Δ=12.9) del YG. El CG solo mejoró la función física (Δ=5.0).

Discusión: Los resultados muestran que, en un menor período de intervención, se logaron mayores mejorías en la CRF y similares en HRQoL en comparación con otros estilos de Yoga.

Conclusiones: Doce sesiones de KY en seis semanas mejoraron la CRF y HRQoL en estudiantes universitarios inactivos, sugiriendo que programas de KY pueden ser beneficiosos para promover un estilo de vida activo y mejorar la salud.

Palabras clave

Aptitud física; Bienestar; Consumo de oxígeno; Salud de los estudiantes; Yoga.

Introduction

Physical inactivity and sedentary behaviour are key risk factors for developing various diseases and health disorders in the population (Bull et al., 2020). Increased sedentary time has been associated with adverse effects, including heightened mortality from all causes and cardiovascular diseases, as well as an increased risk of cancer, chronic non-communicable diseases, musculoskeletal disorders, depression, and cognitive impairment (Park et al., 2020; Stamatakis et al., 2019). This trend is particularly concerning as physical inactivity continues to rise globally, with a prevalence of 36% among individuals aged 15 years and older (de Souto Barreto, 2015). The situation is even more alarming in Chile, where the national prevalence of physical inactivity reaches 86.7%, affecting 83.3% of males and 90% of females (Ministerio de Salud de Chile, 2017).

Physical inactivity and sedentary behaviour negatively impact physical and mental health, directly influencing the perception of health-related quality of life (HRQoL) (Urzúa, 2010). These effects are observed across various population groups, including individuals over 15 years of age, university students, and older adults (Concha-Cisternas et al., 2020; Peña Froment & García González, 2018; Saldías-Fernández et al., 2022).

In response, adopting an active lifestyle and maintaining a healthy diet are critical strategies for reducing the risk of musculoskeletal, cardiovascular, and metabolic disorders (Anderson & Durstine, 2019; de Souto Barreto, 2015). These strategies also positively impact HRQoL (Panza et al., 2019; Pérez et al., 2024) and survival rates (Piercy et al., 2018; Zhao et al., 2020). Yoga has emerged as a viable alternative to incorporate into action strategies to promote an active lifestyle. This practice addresses individuals comprehensively, combining body and mind perspectives (Di Mario et al., 2023; Giménez et al., 2020). Yoga has demonstrated benefits across various components of physical fitness and mental health in diverse populations (Erdoğan Yüce & Muz, 2020; Mesa et al., 2023; Patel & Veidlinger, 2023; Singh, 2017). It is recognised for its comparative advantages over other physical activity strategies, including low implementation cost, adaptability for practitioners with or without associated diseases (Walia et al., 2021; Yang et al., 2023), and low health risk (Field, 2016; Giménez et al., 2020). These characteristics make Yoga suitable for initiating physical activity programs in inactive individuals (Haskell et al., 2007), potentially explaining the sustained growth in Yoga practice (Cagas et al., 2023).

Among the oldest Yoga styles is Kundalini Yoga (KY), which incorporates diverse activities and exercises to improve physical fitness and mental health (Brandão et al., 2024). KY sessions often include chanting (mantras), breathing exercises (pranayamas), and physical postures (asanas). KY has consistently demonstrated significant improvements in mental health (Brandão et al., 2024; Sarkissian et al., 2018). However, to date, no evidence exists regarding the effects of a KY program on cardiorespiratory fitness (CRF) and HRQoL in university students, representing a knowledge gap worthy of investigation. This study aimed to evaluate the effects of a 6-week KY program on CRF and HRQoL in physically inactive university students. Based on prior research (Brandão et al., 2024; Erdoğan Yüce & Muz, 2020; Patel & Veidlinger, 2023; Sarkissian et al., 2018), we hypothesise that six weeks of KY practice will significantly improve CRF and HRQoL in this population.

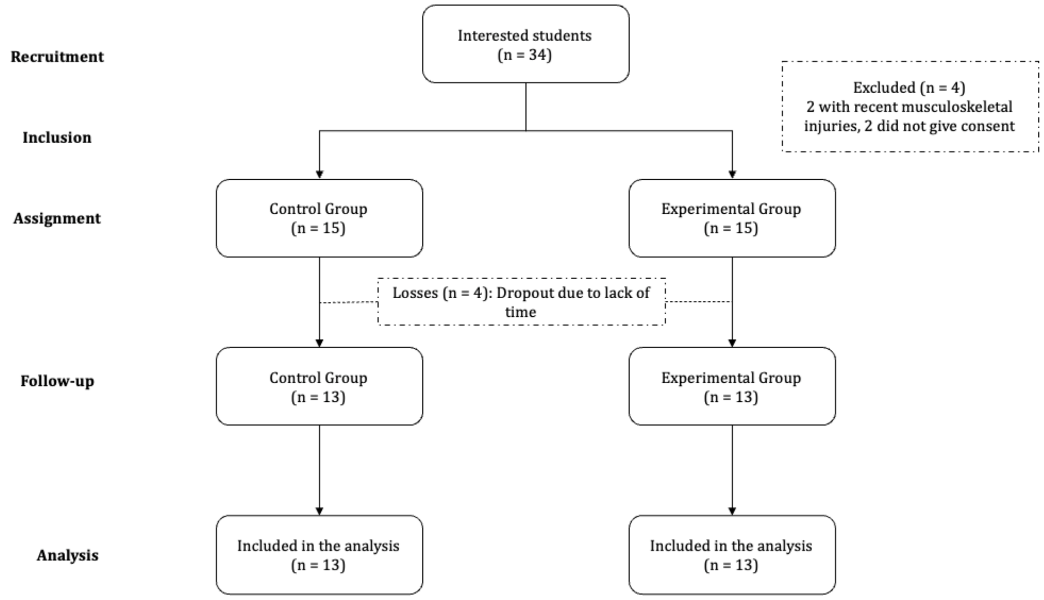
Method

This study utilised a randomised controlled trial design with parallel groups, incorporating repeated measurements and a double-blind protocol (evaluators and participants) for pre- and post-intervention assessments. Participants were selected through a random and proportional sampling system (https://www.randomizer.org) and assigned to one of two groups: (i) the Control Group (CG), which continued their usual daily activities and lifestyle habits, and (ii) the Yoga Group (YG), which participated in a 12-session KY program over six weeks.

The university students included in the study had no musculoskeletal or cardiorespiratory injuries during the intervention and reported no pain prior to assessments or during training sessions. The inclusion criteria are summarised in Figure 1.

All assessments and intervention procedures were conducted at the Faculty of Medicine, Pontifical Catholic University of Chile, adhering to strict safety and confidentiality protocols. CRF and HRQoL pre-and post-intervention evaluations were performed in the Exercise Physiology Laboratory. The KY sessions were held in a gymnasium that provided sufficient space and ensured privacy for the activities.

Figure 1. Flowchart of the study according to CONSORT.



Participants

The sample size calculation determined that the ideal number of participants per group was nine. Based on a previous study (Doijad et al., 2013), the minimum sample size was estimated, considering a mean difference of 3.5 ml/kg/min in peak oxygen consumption, representing the minimum clinically significant difference (Myers et al., 2002). This calculation assumed a standard deviation of 4.38, an alpha level of .05, 90% power, and an expected attrition rate of 15%. The statistical power analysis was performed using GPower software (Version 3.1.9.6, Franz Faul, Universität Kiel, Kiel, Germany).

Inclusion Criteria: Regular university students aged 18–29 years who were physically inactive, defined as not meeting the minimum international recommendations for physical activity (≥150 minutes/week of moderate or vigorous physical activity or achieving an energy expenditure ≥600 MET-min/week) (Bull et al., 2020). Exclusion Criteria: Diagnosed cardiovascular, respiratory, musculoskeletal, or metabolic diseases or conditions preventing participation in a physical activity program, as well as contraindications for performing exercise stress tests (Haskell et al., 2007).

The initial sample consisted of 15 university students per group, proportionally distributed by gender (3 men and 12 women in the YG and CG). Due to time constraints, two participants from each group dropped out during the intervention, resulting in the final groups of 13 participants: 3 men and 10 women in the CG and 2 men and 11 women in the YG. No injuries were reported.

All assessments and intervention procedures adhered to the Declaration of Helsinki and were reviewed and approved by the Scientific Ethics Committee of the Faculty of Medicine, Pontifical Catholic University of Chile (ID 180423003). Informed consent was obtained from all participants before being included in the study.

Procedure

Cardiorespiratory Fitness (CRF)

CRF was assessed by measuring peak oxygen consumption (VO_2peak) and maximal performance during a maximal incremental exercise test (Watts). VO_2peak was measured using an ergospirometer (MasterScreen CPX, Jaeger™, Germany) with a cycle ergometer (CareFusion LE 200CE). Participants were instructed to follow specific pre-test guidelines: (i) abstain from vigorous physical activity within 24 hours before the test, (ii) refrain from alcohol or tobacco use at least 24 hours prior, (iii) avoid coffee or tea consumption at least 6 hours before, (iv) fast for at least 3 hours before testing, and (v) discontinue any non-prescribed medications or drugs at least 48 hours before the test.

The Åstrand maximal incremental protocol was employed, starting at a cadence of 50 revolutions per minute (rpm) with an initial power of 50 watts (W) for females and 100 W for males, increasing by 25 W and 50 W for females and males, respectively, every 2 minutes until voluntary exhaustion (Pescatello, 2014). Participants were encouraged to achieve maximal effort during the test. Key metrics recorded included relative VO_2peak (ml/kg/min), absolute VO_2peak (ml/min), heart rate (bpm), perceived exertion (RPE; Borg Scale, 6-20) (Williams, 2017), and maximal mechanical power. Maximal performance was confirmed if the following criteria were met (Midgley et al., 2007): (i) respiratory exchange ratio (RER) > 1.10, (ii) RPE ≥ 18, and (iii) attainment of age-predicted maximal heart rate, calculated using the Tanaka equation (Tanaka et al., 2001).

Health-Related Quality of Life (HRQoL)

HRQoL was evaluated using the Short Form Health Survey (SF-36) questionnaire, consisting of 36 questions grouped into eight dimensions: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health (Urzúa, 2010). Each dimension is scored on a scale from 0 (worst health state) to 100 (best health state). As recommended, the questionnaire was self-administered in a private and confidential setting (Vilagut et al., 2005).

Intervention

The YG completed a 6-week KY program comprising 12 sessions held on alternate days, each lasting 60 minutes. Sessions were conducted by a Level 2 KY instructor certified by the Kundalini Research Institute and Yoga Alliance, external to the university. The program was designed with three structured phases (Figure 2): (i) warm-up, focusing on low-intensity joint mobility and muscle activation (10 minutes); (ii) the main session, comprising structured KY exercises (Kriyas) (40 minutes); and (iii) a cool-down with meditation and session closure (10 minutes). During the Kriyas, participants were encouraged to engage in moderate to high-intensity exercise (13-14 points on the RPE scale) (Williams, 2017). Exercises targeted large muscle groups, emphasising the extensor, flexor, and rotator muscles of the lower limbs and core, under the instructor's guidance, to achieve the desired intensity.

Figure 1. 12-session Kundalini Yoga intervention program.

Pre - intervention Evaluation	Maximal aerobic power (Ergoespirometry)
	Health-related quality of life

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Session 1	Kriya: Series to balance body sugar level.
	Meditation: Seven wave Sat Nam Meditation.
Session 2	Kriya: 2B Kriya for the second chakra.
	Meditation: Developing a meditative mind.
Session 3	Kriya: For tolerance.
	Meditation: Seven wave Sat Nam Meditation.
Session 4	Kriya: Hast Kriya
	Meditation: Developing a meditative mind.
Session 5	Kriya: Soul-body Kriya for divinity.
	Meditation: The soul body – soul guide.
Session 6	Kriya: Series for the thymus and inmunity.
	Meditation: To cleanse the karma of the arc line
Session 7	Kriya: 2A Kriya for the second chakra, Kriya to adjust the magnetic field.
	Meditation: Projection and protection from the heart.
Session 8	Kriya: Serie to work on the lower back and stay in shape.
	Meditation: Projection and protection from the heart.
Session 9	Kriya: For vitality.
	Meditation: To unlock the heart lock.
Session 10	Kriya: Kundalini series for the heart.
	Meditation: Silent Mul mantra.
Session 11	Kriya: For the sixth chakra.
	Meditation: The soul body – soul guide.
Session 12	Kriya: Soul-body Kriya for divinity.
	Meditation: The soul body – soul guide.

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Post - intervention Evaluation	Maximal aerobic power (Ergoespirometry)
	Health-related quality of life

Fuente: López-Fuenzalida et al. (2025).

Data analysis

Statistical analysis was conducted using STATA software, version 17 (StataCorp LP, College Station, Texas, USA). Data normality was evaluated using the Shapiro-Wilk test. For descriptive statistics, mean and standard deviation were used for normally distributed variables, while median and interquartile range were employed for non-normally distributed variables.

Repeated measures ANOVA was applied to assess the time × group interaction effect for variables meeting the assumptions of variance and covariance equality. The Bonferroni multiple comparison test used post hoc comparisons to identify significant differences between intra-group (pre vs. post) and inter-group (YG vs. CG) variables. The Friedman test was used for variables that did not meet the variance and covariance equality assumptions, followed by the Wilcoxon signed-rank test for post-hoc intra-group comparisons (pre vs. post).

Effect size (ES) for the time×group interaction was calculated using partial eta squared ($\eta\rho^2$), with thresholds of .01, .06, and .14 interpreted as small, moderate, and large effect sizes, respectively (Pallant, 2011). For multiple comparisons, ES was determined using Cohen's d, with small (≥ 0.2), moderate (≥ 0.5), and large (≥ 0.8) effect sizes as reference points (Cohen, 2016). Significance was established at an alpha level of .05.

Results

The participants' baseline characteristics showed no significant differences between the YG and CG in age, body weight, height, waist circumference, or body mass index (Table 1).

Table 1. Baseline characteristics of physically inactive university students.

Variables	CG (n = 13)	YG (n = 13)	Δ means	t	*p*-value
	Mean (SD)	Mean (SD)			
Age (years)	23.07 (4.03)	21.23 (1.59)	1.84	1.54	.14
Body weight (kg)	67.07 (14.92)	64.16 (7.2)	2.91	0.63	.53
Height (cm)	163.46 (8.03)	164.38 (7.44)	0.92	0.30	.77
Waist circumference (cm)	79.61 (15.17)	75.45 (6.31)	4.16	0.91	.37
BMI (kg/m²)	25.07 (5.28)	23.80 (2.76)	1.27	0.77	.45

Note: GC: control group; YG: yoga group; BMI: body mass index; SD: standard deviation; Δ: difference; t: t-value; *p*-value: statistical significance.

Mixed ANOVA did not reveal significant time×group interactions for CRF, including both relative and absolute maximal aerobic power and maximum test performance (Watts) (Table 2). Post-hoc analyses, however, indicated significant improvements in the YG for relative maximal aerobic power (Δ=3.21; p< .001; ES=0.66, moderate effect), absolute maximal aerobic power (Δ=173.07; p< .001; ES=0.40, small effect), and maximum performance during the maximal effort test (Δ=12.31; p< .001; ES=0.34, small effect) (Table 2).

Table 2. Time x group interaction of peak aerobic power and physical performance in a maximal test in physically inactive university students.

Variable	Assessment	Group	Pre	Post	Intragroup Comparison			Intergroup Comparison	
			Mean (SD)	Mean (SD)	Change	*d*	p-value	*ηρ²*	*p*-value
Peak aerobic power	Relative (ml/kg/min)	Yoga	27.08 (5.13)	30.29 (5.57)	3.21	0.66	< .001*	.08	.15
		Control	25.87 (4.24)	25.91 (4.23)	- 0.04	0.01	.98		
	Absolute (ml/min)	Yoga	1736.93 (386.19)	1910.0 (392.91)	173.07	0.40	< .001*	.01	.61
		Control	1742.03 (491.98)	1726.51 (464.75)	15.52	0.04	.98		
Maximum performance	Wmax	Yoga	167.39 (41.05)	180.0 (42.54)	12.31	0.34	< .001*	.09	.15
		Control	149.39 (33.62)	154.31 (31.97)	4.92	0.13	.31		

Table note: Wmax: Maximum power in Watts; SD: standard deviation; Pre: pre-intervention; Post: post-intervention; *p*-value: statistical significance; *: statistically significant difference between pre and post-intervention, p< .05; $\eta\rho^2$: effect size in time x group interaction; d: effect size measured by Cohen's d; $\eta\rho^2$: effect size measured by partial Eta square.

The Friedman test revealed significant time×group interactions in HRQoL for the physical function dimension (Chi^2=9.0; Kendall's W= .35; p< .01) (Table 3). Post-hoc analyses showed significant improvements in the YG for the general health dimension (Δ=20.0; p< .01), while the CG demonstrated significant improvements in the physical function dimension (Δ=5.0; p< .01).

Table 3. Time x group interaction of health-related quality of life in physically inactive university students.

Variable	Group	Pre	Post	Intragroup Comparison		Intergroup Comparison		
		Median (RIQ)	Median (RIQ)	Change	p-value	Chi²	Kendall's W	*p*-value
Physical function	Yoga	90.0 (10.0)	95.0 (10.0)	5.0	< .01*	16.20	.62	< .01*
	Control	90.0 (10.0)	95.0 (10.0)	5.0	.01*			
Bodily pain	Yoga	80.0 (20.0)	100 (20.0)	20.0	.79	1.19	.05	.28
	Control	77.5 (22.5)	80.0 (22.5)	2.5	.48			
Vitality	Yoga	50.0 (15.0)	65.0 (20.0)	15.0	.36	0.17	.01	.68
	Control	50.0 (20.0)	45.0 (25.0)	-5.0	.87			
Social function	Yoga	87.5 (12.5)	87.5 (25.0)	0.0	.67	0.53	.02	.47
	Control	75.0 (12.5)	75.0 (12.5)	0.0	.31			
Emotional role	Yoga	66.7 (33.4)	100 (66.7)	33.3	.12	3.27	.13	.07
	Control	33.3 (0.0)	33.3 (66.7)	0.00	.07			
Mental health	Yoga	72.0 (28.0)	80.0 (8.0)	8.0	.11	0.43	.02	.51
	Control	64.0 (28.0)	60.0 (12.0)	-4.0	.66			
General health	Yoga	50.0 (30.0)	70.0 (20.0)	20.0	< .01*	7.35	.28	< .01*
	Control	55.0 (25.0)	70.0 (40.0)	15.0	.20			
Physical role	Yoga	100 (0.0)	100 (25.0)	0.0	.79	0.00	.00	.99
	Control	100 (0.0)	100 (0.0)	0.0	.99			
Overall	Yoga	69.8 (13.7)	82.7 (16.5)	12.9	.04*	7.54	.29	< .01*
	Control	62.3 (13.7)	73.5 (18.6)	3.8	.06			

Table note: RIQ: interquartile range; Pre: pre-intervention; Post: post-intervention; *p*-value: statistical significance between pre and post-intervention; *: statistically significant difference between pre and post-intervention, p< .05.

Discussion

This study aimed to analyse the effects of a 6-week KY program on CRF and HRQoL in physically inactive university students. The primary outcomes showed that: (i) Multivariate analysis revealed significant improvements in HRQoL dimensions, including physical function, general health, and overall behaviour, favouring the YG; (ii) The YG exhibited significant enhancements in CRF and maximal aerobic power during the incremental test, (iii) Improvements were observed in HRQoL dimensions of physical function, general health, and overall behaviour for the YG, while the CG showed improvements only in physical function, (iv) No significant changes were observed in HRQoL dimensions such as bodily pain, vitality, social functioning, emotional role, mental health, or physical role for either group.

The YG exhibited a significant increase in mean relative maximal aerobic power, absolute values, and maximum performance. These findings align with Lau et al. (2015), who observed significant improvements in maximal aerobic power (p<0.01), with increases of 2.61 and 1.33 ml/kg/min for males and females, respectively, among middle-aged individuals participating in a 12-week Hatha Yoga intervention. Similarly, Bagheri et al. (2014) reported significant gains in maximal aerobic power (mean difference: 2.4 ml/kg/min) in young females (mean age: 26.5 years) following eight weeks of Hatha Yoga practice conducted three times per week, with each session lasting 60 minutes. Our study demonstrated even greater maximal aerobic power improvements than prior studies. These enhanced outcomes may be attributed to differences in training parameters, such as intensity, frequency, duration, and exercise mode. The focus on moderate-to-high intensity (13–14 points on the RPE scale, indicating physical work perceived as "somewhat hard" yet sustainable (Williams, 2017)) and the emphasis on exercises engaging large muscle groups likely contributed to more significant cardiorespiratory stress. This targeted approach may have enhanced the physiological adaptations underpinning improvements in CRF, as previously suggested in the literature (Medicine, 2017).

When comparing our training parameters with previous studies, notable differences emerge in training frequency, session intensity, and session modalities. For example, in the study by Lau et al. (2015), the intervention protocol involved a training frequency of one session per week (12 sessions). While the study mentioned the yoga exercises performed, it did not provide details about the sequence of these exercises per session or the expected target intensity for each participant. Similarly, Bagheri et al. (2014) implemented an intervention with a frequency of three weekly sessions (24 sessions) featuring progressive intensities ranging from 55% to 75% heart rate reserve. However, the study did not specify the characteristics of the physical exercises included in the protocol.

Our study highlights the improvement in CRF achieved within a short 6-week period in the YG, which is notable, as similar or even smaller changes in CRF (determined by maximal aerobic power) have been reported in studies with more extended intervention periods. For example, Mittal et al. (2023) subjected university students (yoga group: n=53, age: 19.43 ± 2.62 years; control group: n=46, age: 19.54 ± 2.59 years) to a 6-month yoga program consisting of daily sessions lasting one hour each. This intervention resulted in increases in maximal aerobic power of 2.66 ml/kg/min and 3.04 ml/kg/min for males (pre: 41.86 ± 6.16; post: 44.52 ± 6.21) and females (pre: 26.95 ± 4.94; post: 29.99 ± 4.94), respectively.

Meanwhile, Udhan et al. (2018) reported more minor changes in maximal aerobic power following a 6-month yoga intervention in a group of 200 healthy adults (120 males and 80 females) with a mean age of 39.05 ± 0.95 years, achieving an increase of 6.30 ml/kg/min. However, it is essential to note the methodological differences with our study, as Udhan et al. (2018) did not include a CG, and maximal aerobic power was estimated using an indirect protocol (3-minute step test).

The categorisation of our participants as "physically inactive" (Haskell et al., 2007) could explain their low pre-intervention CRF performance. This is favourable for improvements in this parameter, as initial physical fitness levels significantly influence the changes achievable through physical activity programs (Kasper, 2019). Previous studies that categorised participants as physically inactive or sedentary consistently reported similar pre-intervention maximal aerobic power values to those observed in our study for young females (28.7 ± 2.02 ml/kg/min) (Bagheri, 2014). Comparable results were reported by Mittal et al. (2023), with pre-intervention values in the experimental group of 26.95 ± 4.94 ml/kg/min for females and 41.86 ± 6.16 ml/kg/min for males and in the CG of 17.08 ± 2.40 ml/kg/min for females and 27.95 ± 5.24 ml/kg/min for males.

The relevance of this variable underscores the practical importance of the improvement in CRF observed in the YG. CRF predicts population survival—independent of all-cause mortality (Strasser & Burtscher, 2018)—and is a prognostic and diagnostic assessment tool across various pathologies (deJong, 2011). Given these considerations, increasing CRF becomes a fundamental goal in designing and implementing physical activity programs that improve health and promote an active lifestyle within the population (Milanović et al., 2015).

This objective has previously been achieved through other training modalities, such as moderate-intensity continuous training (Milanović et al., 2015) and high-intensity interval training (Knowles et al., 2015). However, it is essential to note that the evidence regarding the effects of Yoga on CRF remains inconclusive. The current body of research is characterised by low methodological quality and high heterogeneity, attributed to factors such as small sample sizes, indirect methods of CRF measurement, and variations in intervention program durations. These limitations have led to mixed findings, with studies reporting increased and decreased CRF (Mooventhan & Nivethitha, 2020; Tyagi & Cohen, 2013).

Regarding changes in HRQoL, our study observed favourable improvements in the YG, particularly in physical function, general health, and overall behaviour. In contrast, the CG showed significant improvements only in physical function. These findings align with those of Brandão et al. (2024), who evaluated the effects of six weekly online KY sessions over six weeks on mental health in university students (experimental group: n=28; mean age: 21.46 ± 4.6 years; 24 females and 4 males). While no significant changes were reported in depression, anxiety, or stress components, the KY group showed significant improvements ($p < .05$) in self-compassion, emotion regulation, and spiritual well-being—dimensions not addressed in our study. Conversely, Lindahl et al. (2016) conducted a seven-week intervention with older adults (n=8; mean age: 66.5 ± 0.3 years) involving two weekly sessions of Hatha Yoga and reported significant improvements in the mental component of HRQoL (8.8%; $p = .029$).

Similarly, Elstad et al. (2020) documented favourable changes in reducing stress and sleep problems in a group of Ashtanga Vinyasa Yoga practitioners (n=100; mean age: 25.63 ± 4.11 years; 86 females and 14 males) following a 12-week program with two sessions per week. Differences between our findings and those of previous studies can be attributed to methodological variations, such as differences in Yoga styles, participant age ranges, the absence of control groups (Lindahl et al., 2016), the number of Yoga sessions, and the instruments used to assess mental health and its dimensions. Our study implemented two weekly sessions, each lasting 60 minutes, at moderate-to-high intensity, consistently maintained and encouraged by the KY instructor. This intensity level, rated at 13 to 14 points on the RPE scale (indicating moderately hard effort that participants can sustain) (Williams, 2017), and the use of kriyas focusing on large muscle groups in the core trunk and lower limbs likely promoted greater cardiorespiratory stress, facilitating improvements in CRF (Medicine, 2017).

Based on our study's results, along with the absence of dropouts associated with musculoskeletal injuries—a finding consistent with studies analysing the effects of Yoga practice in workplace settings (Pravalika et al., 2022) and sports (Tripathy & Nayak, 2022), which attribute improvements in musculoskeletal function to increased muscle strength and flexibility (Tripathy & Nayak, 2022)—we emphasise the role of KY as a physical activity strategy to improve CRF in a physically inactive population.

The research hypothesis is supported: Six weeks of KY practice significantly improves CRF and HRQoL in physically inactive university students.

Some limitations of this study include (i) the need to include a larger number of male participants to enable sex-specific analyses of the results, (ii) the lack of evaluation of other physical aspects, such as maximal strength, body composition, postural balance, and coordination, and (iii) the absence of assessments of physiological parameters, such as heart rate variability, aerobic-anaerobic transition, and blood pressure, among others. The strengths of this study include (i) blinding of evaluators and participants, (ii) randomisation of the sample, (iii) precise dosing of KY sessions in terms of frequency, duration, volume, intensity, and density, and (iv) the absence of dropouts associated with musculoskeletal injuries.

Conclusions

Twelve sessions of KY, conducted twice weekly, demonstrate beneficial effects on CRF and the general health and overall behaviour dimensions of HRQoL in physically inactive university students. These findings support the recommendation to implement such programs for physically inactive individuals seeking to adopt an active lifestyle and improve their CRF and HRQoL.

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