

Effects of hatha yoga on well-being in healthy adults in Shiraz, Islamic Republic of Iran

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آثار ممارسة رياضة الهاتثا يوغا على معافاة البالغين الأصحاء، في مدينة شيراز الإيرانية
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الخلاصة: أُجري العديد من الدراسات على اليوغا وتأثيراتها على وظائف الجسم، ولكن أولي اهتمام قليل، من قِبَل ممارسي اليوغا، للتقييم الذاتي لمدى التحسُّن في الصحة البدنية والنفسية والمعافاة. وقد صُمِّمت هذه الدراسة لهذا الغرض، واعتمدت على استخدام استبيان SF-36 لتلقي إجابات من 107 متطوعين ممن انتظموا في دروس اليوغا لمدة ستة أشهر (44 منهم من الذكور و63 من الإناث، متوسط أعمارهم 34 عاماً، بانحراف معياري مقداره 7). وقد استكمل المتطوعون الاستبيان قبل ممارسة اليوغا وبعد ممارستها. ولوحظ تحسُّن يُعتدُّ به إحصائياً في أحراز جميع البنود الصحية. ولم تكن الفروق بحسب العمر، والجنس، ومستوى التعليم فارقاً يُعتدُّ بها إحصائياً. وخلصت الدراسة إلى أن اليوغا يمكنها أن تحسِّن الصحة البدنية والنفسية، وأن تعزِّز العافية والمعافاة.

ABSTRACT There have been many studies on yoga and its effects on physical function, but less attention has been paid to self assessment of improvement in physical and mental health and well-being by yoga practitioners. This study was designed with that purpose using the SF-36 questionnaire in 107 volunteers [44 males and 63 females, mean age 34 (standard deviation 7) years] who attended yoga classes for 6 months. They completed the questionnaire before and after the yoga practice. There was significant improvement in scores for all health items. The differences according to age, sex and education level were not significant. It is concluded that yoga can improve physical and mental health, and promotes well-being.

Effets du *hâta yoga* sur le bien-être d'adultes en bonne santé à Chiraz en République islamique d'Iran

RÉSUMÉ Nombreuses ont été les études consacrées au yoga et à ses effets sur la fonction physique, mais rares sont celles qui s'intéressent à l'autoévaluation par des pratiquants du yoga de l'amélioration de la santé physique et mentale induite par celui-ci. Cette étude avait pour objectif d'appliquer le questionnaire abrégé SF-36 (SF pour *short form*) à 107 volontaires [44 hommes, 63 femmes ; âge moyen : 34 ans (écart type : 7 ans)] ayant assisté à des cours de yoga pendant 6 mois. Le questionnaire a été servi par les participants avant et après cette période. Les scores ont attesté d'une amélioration significative pour chacun des items relatifs à l'état de santé. Les différences liées à l'âge, au sexe et au degré d'instruction se sont avérées non significatives. Les auteurs concluent que le yoga peut améliorer la santé tant physique que mentale et augmenter la sensation de bien-être.

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Introduction

Complementary and alternative medicine (CAM) is a group of diverse medical and health care systems, therapies and products that are not presently considered to be part of conventional medicine. The American public's use of CAM increased substantially during the 1990s. In 2004, 62% of American adults had used CAM. Yoga is one of the most common methods used as a mind-body therapy [1].

Yoga is a Sanskrit word which means "the unity of body and mind". It is a combination of breathing exercises, physical postures, and meditation, and has been practised in eastern traditional medicine for over 5000 years. In the philosophical doctrine of yoga, hatha yoga is the physical training part, combining postural exercise (*asana*), voluntary control of breathing (*pranayama*) and relaxation and meditation (*shavasana*) [1,2].

Although yoga is historically a spiritual discipline, it has also been used clinically and for therapeutic intervention. The number of publications on its clinical application has greatly increased over the past 3 decades [3]. In the literature there are more than 800 articles that indicate extended studies on the benefits of yoga: almost all focus on specific medical problems such as the efficacy of yoga in randomized, controlled clinical trials on a wide variety of conditions such as multiple sclerosis [4], bronchial asthma [5], irritable bowel syndrome [6], lymphoma [7], mild depression [8], and osteoarthritis [9]. There have also been reviews on the effect of hatha yoga on musculoskeletal and cardiopulmonary function [10], rehabilitation after myocardial infarction [11] and menopausal symptoms [12]. The effectiveness of yoga has also been studied for HIV/AIDS [13], cancer patients [14,15], mood in psychiatric inpatients [16] and diabetes [17]. The effect of the yoga lifestyle

on reducing risk factors of cardiovascular and ischaemic heart disease have also been investigated [18,19].

Even though there have been numerous studies on yoga and disease, there have been few in healthy adults. In the Islamic Republic of Iran, no study, either in people with a medical condition or in healthy people, is available. We therefore carried out this before and after comparison study in healthy volunteers in Shiraz with the purpose of determining the effects of the practice of yoga on well-being.

Methods

Participants for the study group were recruited via general advertising in local, wide-circulation newspapers by the Yoga Society, which is the only formal centre for mind-body training in Shiraz. Healthy volunteers having no medical or psychological problems who were interested in practising yoga attended the new training courses. After explanation of the study, 112 people agreed to participate. There were no refusals to participate.

Participants were asked to enrol in the course and complete a questionnaire prepared using the Farsi version of the SF-36 questionnaire [20], for which validity and reliability were already confirmed [21]. Questions were scored 1–5 (poor–excellent condition).

The study questionnaire was in 2 parts, the first collected demographic data (age, sex and level of education) and the second asked participants to assess quality of life and well-being according to the SF-36 health assessment instrument [20,22].

This questionnaire measures 8 domains of health-related quality of life and contains 2 summary measures (physical health and mental health), each divided into 4 scales. The scoring of the physical com-

ponent summary is divided into: physical functioning, role-physical, bodily pain and general health. The scoring of the mental component summary is divided into: vitality, social functioning, role-emotional and mental health [20].

For the yoga training courses, the 112 participants were divided into men's and women's sections each having 3 classes of about 20 individuals.

The study was carried out in the Yoga Society at Shiraz University. The study groups were trained in hatha yoga by 2 instructors (1 man and 1 woman) for 6 months. Each class consisted of 10 minutes breathing exercises (*pranayama*), 15 minutes slow suppleness, 50 minutes yoga positions (*asana*) and 15–20 minutes meditation and relaxation (*shavasana* and *yoga nidra*).

The questionnaires were completed again by participants at the end of the course. Scoring was the same as above.

Data were analysed using a paired *t*-test, one-way analysis of variance and *SPSS*, version 10. $P < 0.05$ was considered statistically significant.

Results

A total of 112 healthy individuals volunteered to attend the yoga classes and 107 of them (44 men and 63 women) cooperated until the end of the study and submitted the questionnaire before and after the courses (mean attendance rate 95.5%).

The maximum age was 55 years and the minimum 18 years, mean 33.0 (standard deviation 7.0) years (data was missing for 3 participants).

Out of 106 individuals who had mentioned their education (data missing for 1), 16 (15.1%) had not completed high school, 53 (50%) had high school diploma and 37 (34.9%) had university education.

We found improvement in all 8 components of the SF-36 after practising yoga for 6 months and the difference was statistically significant ($P < 0.001$) (Table 1) and also in the summary scores for both mental and physical components.

Comparing the results by sex, the only statistically significant difference was for physical functioning (Table 2). Improvement in role-emotional and vitality were more marked in the females, but the difference was not statistically significant.

To assess whether there was any difference between younger and older participants, we divided them into 4 age groups: < 25 years, 26 (24.3%) participants; 25–34 years, 43 (40.2%) participants; 35–44 years, 27 (25.2%) participants; and > 44 years, 16 (14.9%) participants. Most frequent age group was 25–34 years. When comparing by age group, there was a statistically significant difference in general health, bodily pain and mental components before and after practising yoga. For the other items, the differences were not statistically significant (Table 3).

The only item where the difference was statistically significant according to education level was mental health scale (Table 4).

Discussion

Although there have been many studies about the efficacy of yoga, almost all have been about a specific disease or condition. We found only 1 study similar to ours evaluating the effect of yoga on well-being in healthy people. Lee examined health before and after yoga as a mind–body training using the SF-36 questionnaire. Improvement was reported in all domains, particularly mental health [22].

Other studies have indicated the changes which occurred after yoga practice: the posi-

Table 1 Effect of 6 months yoga practice on physical and mental health in healthy volunteers in Shiraz

Variable		No. paired comparisons ^a	Mean score ^b	SEM	Difference
<i>Physical component</i>					
Physical functioning	Before	102	26.67	0.37	1.91
	After		28.58	0.22	
Role-physical	Before	103	13.76	0.38	2.41
	After		16.17	0.28	
Bodily pain	Before	106	8.30	0.21	1.55
	After		9.85	0.14	
General health	Before	107	18.41	0.45	2.25
	After		20.66	0.34	
Summary	Before	97	67.35	1.15	7.89
	After		75.24	0.78	
<i>Mental component</i>					
Vitality	Before	105	12.24	0.34	2.76
	After		14.91	0.22	
Social functioning	Before	105	6.95	0.19	1.26
	After		8.21	0.13	
Role-emotional	Before	106	9.08	0.29	2.67
	After		11.75	0.19	
Mental health	Before	103	15.30	0.42	3.64
	After		18.94	0.25	
Summary	Before	99	34.49	1.13	19.17
	After		53.66	0.68	

^aNumbers vary because not all participants answered all of the questions both before and after the yoga course.

^bMean health-related well-being score calculated using the Iranian version of the SF-36 [21].

P < 0.001.

SEM = standard error of the mean.

tive effects of yoga on depression, anxiety, mood, stress-related disorders and chronic insomnia have been documented [23,24].

Practising *pranayama*, the breathing technique of yoga, has been shown to have a positive effect on pulmonary function. In one study on 60 healthy young females, significant increase was demonstrated in forced vital capacity, forced expiratory volume in 1 section and peak expiratory flow rate [25]. Cardiac function in normal young volunteers has been studied in a randomized controlled trial in 24 schoolchildren, which was designed to determine whether *pranayama*

had any effect on ventricular performance by measuring systolic time intervals and cardiac autonomic function tests. After 3 months training, parasympathetic activity increased and sympathetic activity decreased [26,27]. A study on 30 healthy young men also demonstrated improvement in oxidative status and the antioxidant pathological processes [28]. Furthermore, observation of *pranayama* indicated that this breathing technique induces dramatic shifts in all hemodynamic variables and the authors have postulated that this effect may

Table 2 Comparison of mean differences in scores before and after 6 months yoga practice for physical and mental health in healthy male and female volunteers in Shiraz

Summary measures	Males (n = 44)		Females (n = 63)		P
	Mean ^a	SEM	Mean ^a	SEM	
<i>Physical component</i>					
Physical functioning	1.12	0.25	2.49	0.36	0.05
Role-physical	2.71	0.37	2.22	0.29	0.31
Bodily pain	1.46	0.19	1.62	0.16	0.54
General health	1.93	0.52	2.48	0.40	0.40
Summary	7.05	0.89	8.45	0.81	0.26
<i>Mental component</i>					
Vitality	2.21	0.31	2.99	0.34	0.12
Social functioning	1.12	0.19	1.35	0.15	0.33
Role-emotional	2.95	0.28	2.45	0.25	0.19
Mental health	3.31	2.91	3.87	0.37	0.34
Summary	9.12	0.01	10.86	0.93	0.21

^aMean difference.

SEM = standard error of the mean.

be the basis for the purported yogic health claim [29].

Shavasana, the relaxation part of yoga practices, has been shown to enhance the ability to withstand stress [30,31]. Changes

in brain waves and blood serum cortisol during yoga exercise have been studied and increase in alpha waves and decrease in cortisol level reported [32]. *In vivo* evidence has been provided for regulation of

Table 3 Comparison of mean difference in scores according to age before and after 6 months yoga practice for physical and mental health in healthy volunteers in Shiraz

Variable	Age (years)								P
	< 25		25-34		35-44		> 44		
	Mean ^a	SEM							
<i>Physical component</i>									
Physical functioning	2.08	0.65	1.18	0.28	2.96	0.56	1.93	0.58	0.0593
Role-physical	1.74	0.47	2.11	0.33	3.36	0.51	2.86	0.66	0.0658
Bodily pain	1.00	0.27	1.58	0.18	1.96	0.25	1.86	0.33	0.042
General health	0.71	0.72	2.73	0.49	2.04	0.51	4.10	1.03	0.0134
Summary	5.65	1.05	7.11	0.84	10.48	1.33	10.17	2.28	0.0189
<i>Mental component</i>									
Vitality	1.92	0.46	2.74	0.43	3.04	0.44	2.87	0.65	0.3998
Social functioning	1.21	0.31	1.48	0.15	1.13	0.30	1.00	0.28	0.5454
Role-emotional	2.50	0.46	2.93	0.28	2.24	0.35	2.67	0.55	0.5629
Mental health	2.46	0.61	3.93	0.43	3.96	0.61	4.54	0.85	0.1231
Summary	8.08	1.61	10.95	0.98	10.86	1.49	9.75	1.95	0.4020

^aMean difference.

SEM = standard error of the mean.

Table 4 Comparison of mean difference in scores before and after 6 months yoga practice for physical and mental health in healthy volunteers according to level of education in Shiraz

Variable	Education level						P
	Under high school		High school		University degree		
	Mean ^a	SEM	Mean ^a	SEM	Mean ^a	SEM	
<i>Physical component</i>							
Physical functioning	1.07	0.64	2.37	0.37	1.65	0.35	0.1339
Role-physical	2.40	0.66	2.42	0.32	2.41	0.40	0.9998
Bodily pain	1.10	0.39	1.74	0.18	1.47	0.16	0.1536
General health	1.88	1.02	2.75	0.52	1.76	0.32	0.3286
Summary	6.60	1.65	9.02	0.88	6.63	0.92	0.1490
<i>Mental component</i>							
Vitality	1.88	0.56	2.84	0.37	2.78	0.39	0.3743
Social functioning	1.13	0.38	1.23	0.16	1.33	0.20	0.8427
Role-emotional	1.80	0.46	2.94	0.29	2.59	0.28	0.1260
Mental health	2.00	0.81	3.86	0.40	4.11	0.45	0.0414
Summary	6.87	2.12	10.67	0.96	10.89	1.08	0.1305

^aMean difference.

SEM = standard error of the mean.

conscious states at a synaptic level by yoga *nidra* meditation [33].

A study on the effects of hatha yoga practice on cardio-respiratory performance, psychological profile and melatonin secretion after 3 months showed improvement in these profiles and increase in plasma melatonin, indicating that yoga could be used as a psychophysiological stimulus to increase endogenous secretion of melatonin, which in turn might be responsible for improved sense of well-being [34].

The state of the mind and that of the body are intimately related. If the mind is relaxed the muscles in the body will also be relaxed. Stress produces a state of physical and mental tension. Yoga physical postures and breathing exercises improve muscle strength, flexibility, blood circulation and oxygen uptake, as well as hormone function. In addition the relaxation induced by meditation helps to stabilize the autonomic

nervous system with a tendency towards parasympathetic dominance. The physiological benefits which follow help the yoga practitioner become more resilient to stressful conditions [35].

These results might be the explanation for our own findings, i.e. significant improvement in all health indicators after yoga practice. In this study most changes occurred in the domain of general physical and general mental health. Although no statistically significant difference was apparent between males and females except in physical functioning, the improvements for role emotional and vitality were more marked in females. This would need further investigation to determine the nature of the association.

The findings according to age show significant difference of improvement in body pain, general health and total physical health and we found more effectiveness

among older participants. This may be because older people by and large have more background physical problems.

There was no significant improvement in health-related well-being by level of education. This is in accord with the findings of Lee after 3 months mind-body practices [22].

The limitations of this study include the fact that our study group was healthy adult volunteers who were interested in yoga, and they were probably of relatively high socioeconomic status. In addition, there was no control group.

Improvement in well-being in this study may have been a result of the social contact concomitant to attending classes, especially for the vitality component for females, who often have fewer opportunities for social activities than men.

Overall, according to our findings and those of a number of other studies, it appears that the prevention mechanism of

yoga acts at 3 levels, and increases the compatibility of psychological, neurological, immunological and recognition systems in humans [1–3].

The authors conclude from this quasi-experimental trial that quality of life, which is a result of well-being related to physical, emotional, mental health and social functioning, can be improved by the practice of yoga as a set of physical, spiritual, psychological and social intervention methods, and recommend a randomized controlled trial.

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