

Role of Yoga Training on Muscle Strength and Endurance in Adolescent Age Group.

Ashwathy VT¹, Lokesh BN², Vineeth VT³

1. Dr. Ashwathy V T., Department of Physiology, Jagadguru Jayadeva Murugarajendra Medical College, Davangere, Karnataka, India.
Email: ashwathy.vt@gmail.com
2. Dr. Lokesh BN, MD., Department of Pharmacology, All India Institute of Medical Sciences, New Delhi 110029, India.
3. Dr. Vineeth V Thundukattil, MDS. Director & Head of Orthodontics, Cheddi Jaggan Dental Center, Ministry of Health, Georgetown, Guyana.

Abstract:

Objectives: The current research evaluated the effect of six months yoga training on muscle strength and endurance.

Materials and methods: This was a cross sectional study involving 80 school going boys. Based on yoga training they were equally recruited into two groups- yoga trained and yoga untrained. Hand Grip Strength (HGS) and Hand Grip Endurance (HGE) were measured using a handgrip dynamometer.

Results: HGS and HGE were significantly improved in Yoga trained boys compared yoga untrained boys [$(30 \pm 5.1$ Vs 16.8 ± 4.5 , $p \leq 0.000$) and $(17.03 \pm 3.23$ Vs 11.68 ± 3.28 , $p \leq 0.000$)] respectively.

Conclusion: Yoga training for six months improves muscle strength and endurance.

Keywords: Yoga; Handgrip strength; Handgrip Endurance; Handgrip dynamometer.

INTRODUCTION

Yoga is psychosomatic discipline for achieving harmony and union between our body and mind (Rocha KK et al., 2012). Yoga is the ancient system of personal development encompassing body, mind and spirit. Yogic lifestyle, diet, attitudes and other practices assist to reinforce one's mind and body to cultivate positive health. Many research studies documented its preventive and therapeutic role in the population (Ornish D, 2009, Khalsa, 2004). Handgrip strength used as an indicator for muscle function It is an objective and clinical physiological test used in many situation to determine work capacity (Gilbert JC et al., 1983).

Some of researcher observed that three months of yoga practice improves the hand grip strength in a physical education teaching population but this population is more likely to show increased muscle strength due to their experience (Telles S., et al 1993). Studies have revealed that yoga practice improves hand grip strength and endurance in healthy volunteer, hypertensive and rheumatoid arthritis (Tran MD et al., 2001, Dash M et al., 2001). Despite of



evolving research, clinical studies and systematic reviews on the effects of yoga as a preventive and therapeutic strategy. But still there is lack of strong evidence to recommend yoga as preventive and therapeutic tool in a population. This present study aimed to evaluate the role of yoga training on handgrip strength and endurance in adolescent age group.

Materials and methods:

Study Subjects

The present study was conducted in department of physiology, Jagadguru Jayadeva Murugarajendra Medical College, Davangere. 40 students who underwent yoga training in Sri Amrutha Vidyalaya, Davangere were motivated and recruited in the study. 40 students who did not undergo yoga training were randomly selected from other schools.

Inclusion criteria

- 1) Students of age group 11-15 yrs.
- 2) Study group which involves children who are trained in yoga for a period of six months
- 3) Control group involves children who are not trained in yoga.

Exclusion criteria

- 1) Students with sports training.
- 2) Students with a history of diseases such as Diabetes, Tuberculosis, epilepsy, asthma, cardiovascular disease Hearing and visual impairment.
- 3) Students with a history of surgery

Study Design

This present cross sectional study conducted from February 2013 to May 2014 with eighty subjects in the study. Subjects were equally recruited into yoga trained and untrained groups based on their yoga training for a period of six months. Study was approved by ethics committee. Protocol

was explained to the students and parents before their recruitment and a written informed consent was taken from the students, parents/Guardians and School Authority too. Study group having 40 children gone through yoga training for a minimum period of six months regularly for one hour and five days a week under a qualified instructor.

The yoga training involves warm up exercises, prayer, asanas, pranayama, meditation and shavasana. Procedure was explained to every subject in detail in their language before undertaking the test. Instruction to the student was given in their local languages and consent was taken before doing the test. Baseline parameters like height, weight and BMI were noted.

Isometric hand grip strength

The Hand Grip Dynamometer (HGD) used in our study is the spring Hand Grip type from the makers of Inco Labs, Patiala, India. Hand Grip. The manufacturer before delivery has accurately calibrated it. Dynamometer was appropriately calibrated from time to time by the set of instructions and recommendations in the manual.

a. Recording of Hand Grip Strength (HGS)

The subject squeezes a pressure-recording device that is HGD gripping in their dominant hand either the Right hand or Left hand and HGS was recorded. Three trials with the dominant hand were allowed, with a brief pause of 10 sec between each trial to avoid excessive fatigue.

HGS is defined as the maximum force generated by the subject during the three trials by Hand grip dynamometer. The small muscle group of the hand was tested for grip strength. HGS were recorded in kilogram and tabulated in the proforma for each subject. The test was performed in sitting posture.

b. Endurance time for 30% of Isometric Handgrip (HGE)

Subjects were given rest for five minutes. Later they were asked to perform isometric handgrip exercise at 30% of their maximal voluntary contraction (HGS) with their dominant hand to the point of fatigue and the time was noted.

Statistical Analysis:

The results presented as mean and standard deviation. Mean differences of yoga trained and untrained school children was compared using unpaired t test. Statistical analysis was carried by using the SPSS package 16th version.

1. p-value more than 0.05 was taken as not statistically significant
2. p-value less than 0.05 was taken as statistically significant
3. p-value less than 0.001 was taken as highly statistically significant

Results

The total of eighty subjects were recruited in the study. Baseline parameters of subjects are well balanced across the group. Significant difference was observed between yoga trained and yoga untrained with respect to hand grip strength (30 ± 5.1 Vs 16.8 ± 4.5 , $p \leq 0.000$). The hand grip endurance was significantly higher in yoga trained group compared to untrained group (17.03 ± 3.23 Vs 11.68 ± 3.28 , $p \leq 0.000$). (Table1) (Figure 1).

Discussion:

Researchers were exploring yoga with growing interest for its role in prevention and therapeutic application for various conditions (Khalsa S, 2004). Many research studies suggest that practice of yoga for better health and improvement in musculoskeletal, mental health and overall health (Birdee GS, 2008). The Present study showed statistically significant increase in handgrip strength for yoga trained group when compared to yoga untrained group. Also hand grip endurance showed statistically significant increase in yoga trained when compared to untrained group. Our study was consistent with the studies by Garfinkel M S et al., 1998, Madanmohan, Jatiya et al., 2003, Madanmohan, et al., 1992. in the past. On the other hand Dash and Telles., 1999. have concluded that yoga training produces an increase in motor speed for repetitive finger movements, but not in strength or endurance. The present study shows that, the isometric contraction during yoga postures lead to significant increase in muscle strength, muscle endurance time which can be attributed to increase in blood flow during yogic exercises.

Conclusion and Recommendation:

Our study showed that yoga training for a minimum period of six month increases HGS and HGE. Yoga will have huge impact in improving physiological functions, performance of students and overall health. Hence yoga can be included in school activities.

Tables

| Variables | Yoga trained group N=40 | | Yoga untrained (N=40) | | Statistical Analysis unpaired t test df=78 |
|--------------------|----------------------------|---------------|--------------------------|---------------|--|
| | Mean | Std Deviation | Mean | Std Deviation | |
| IGH max | 30 | 5.1 | 16.8 | 4.5 | 12.27, $p<0.000$ |
| Endurance time 33% | 17.03 | 3.23 | 11.68 | 3.28 | 7.34, $p<0.000$ |

Table 1. Effect of isometric handgrip exercise in yoga trained and yoga untrained group

Figures

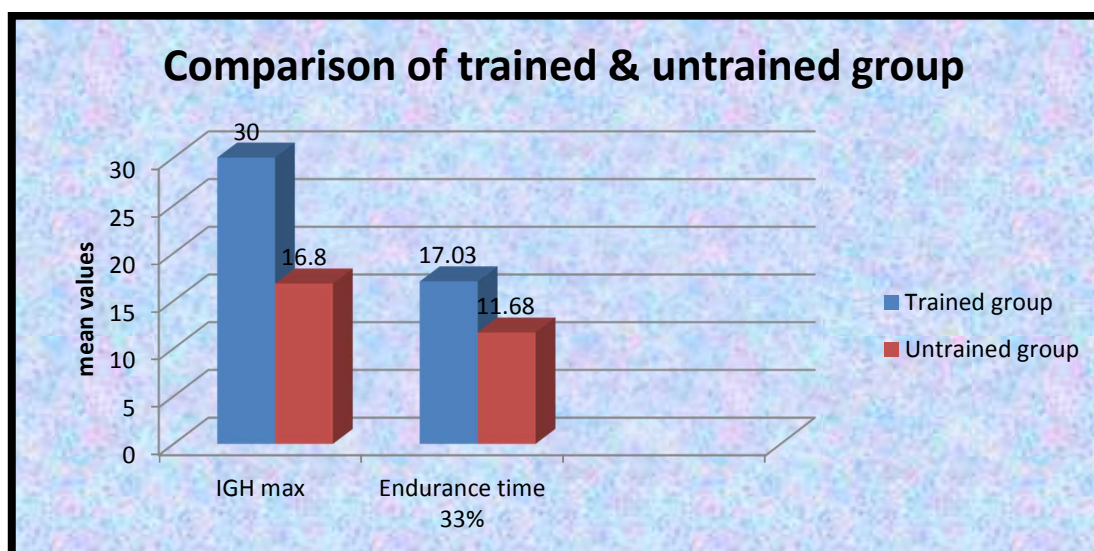


Figure 1. Effect of isometric handgrip exercise in yoga trained and yoga untrained group

References:

- [1] Rocha KK, Ribeiro AM, Rocha KC, Sousa MB, Albuquerque FS, Ribeiro S, Silva RH. 2012. Improvement in physiological and psychological parameters after 6 months of yoga

practice. *Conscious Cogn.*,21(2):843-50.

- [2] Ornish, D. (2009). Intensive life style changes and health reform. *The Lancet Oncology*,10, 198–99.
- [3] Khalsa S. (2004). Yoga as a therapeutic intervention. *Indian J Physiol Pharmacol*,48 (3),269–85.



- [4] Gilbert JC, Knowlton RG. (1983). Simple method to determine sincerity of effort during a maximal isometric test of grip strength. *Am J Phys Med*, 62(3), 135–44.
- [5] Telles S, Nagarathna R, Nagendra HR, Desiraju T.(1993). Physiological changes in sports teachers following 3 months of training in yoga. *Indian J Med Sci* ,47(10),235-238.
- [6] Tran MD, Holly RG, Lashbrook J, Amsterdam EA.(2001). Effects of Hatha Yoga Practice on the Health-Related Aspects of Physical Fitness. *Prev Cardiol.* ,4(4),165-170.
- [7] Dash M, Telles S.(2001). Improvement in hand grip strength in normal volunteers and rheumatoid arthritis patients following yoga training. *Indian J PhysiolPharmacol*,45(3),355-60.
- [8] Birdee GS.(2008).Characteristics of Yoga Users: Results of a National Survey. *J Gen Intern Med*.
- [9] Garfinkel MS, Sigal A, Warren A, Katz, Allan DA, Reshetar A, Schumacher R. (1998). Yoga based intervention for carpal tunnel syndrome, a randomized trial,280,1601-1603.
- [10] Mandanmohan, Jatiya L, Udupa K, Bhavanani AB.(2003). Effect of yoga training on handgrip, respiratory pressures and pulmonary function. *Indian J Physiol Pharmacol* ,47,387-392.
- [11] Madanmohan, Thombre DP, Balakumar B, Nambinarayanan TK, ThakurS, Krishnamurthy N, Chandrabose A. (1992).Effect of yoga training on reaction time, respiratory endurance and muscle strength. *Indian J Physiol Pharmacol*,36,229-233.
- [12] Dash M, Telles S. (1999). Yoga training and motor speed based on a finger tapping task. *Indian J Physiol Pharmacol*, 43, 458–462.