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EFFECTS OF 6-WEEK ROPE MALLAKHAMB TRAINING ON SPEED OF MOVEMENT, VITAL CAPACITY AND PEAK EXPIRATORY FLOW RATE

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ABSTRACT
BAL, B.S.; KAUR, P.J.; SINGH, D. Effects of 6-week rope mallakhamb training on speed of movement, vital capacity and peak expiratory flow rate. Brazilian Journal of Biomotricity. v. 6, n. 1, p. 25-32, 2012. Yoga is traditionally believed to have beneficial effects on physical and emotional health. The empirical evidence accumulated over the last several decades supports the yoga-related benefits for physical health. Thus the aim of this study was to determine the effects of 6-week rope mallakhamb training on speed of movement, vital capacity and peak expiratory flow rate. The research population included 30 inter college girls (Mean ± SD: age 21.33 ± 1.43 years, height 1.67 ± 0.036m, body mass 62.50 ± 3.55 kg) of Guru Nanak Dev University, Amritsar, Punjab.They were purposively assigned into rope mallakhamb (M) and control (C) groups, n = 15 each. The M group was subjected to 6- week training consisting of various asanas (i.e., Bajrang pakad, Padamasana, Dhanurasana, Needle, Nidrasana, Paschimottanasana, AAri and Simple cross) the control group participated in the routine yoga mallakhamb training not containing the asanas mentioned. The level of p≤0.05 was considered significant. The 6-week rope mallakhamb training brought about significant improvement in speed of movement (t = 3.45), vital capacity (t = 2.98) and peak expiratory flow rate (t = 1.82) in Group (M) as compared with the control one. The 6-week rope mallakhamb training had significant effect on speed of movement, vital capacity and peak expiratory flow rate. Thus, such mallakhamb training may be recommended to improve speed of movement, vital capacity and peak expiratory flow rate may contribute to enhance concentration based performance and voluntary control of breathing.

Key words: Rope mallakhamb, speed of movement, vital capacity, peak expiratory flow rate.

INTRODUCTION

The word yoga is derived from the Sanskrit root Yuj, which means to join or to yoke. In philosophical terms, yoga refers to the union of the individual self with the universal self (HADI, 2007). India has a rich tradition of yogic practices. The origins of yoga seem to go back several thousand years. The story seems to begin around 1,500 BCE or even earlier. In the Indus Valley in Pakistan, work on the archaeological sites of Mohenjo Daro and Harrappa has uncovered the remains of a very sophisticated society.

Now-a-days yoga, the ancient practice of postures, breathing and meditation is gaining a lot of attention from healthcare professionals. With increasing scientific research in yoga, its therapeutic aspects are also being explored. It is based on ancient theories, observations and principles of the mind-body connections. Substantial research has been conducted to look at the health benefits of yoga – yoga postures (asanas), yoga breathing (pranayama) and meditation (MALHOTRA & SINGH, 2002).

Over the last several decades, investigators have begun to subject these beliefs to empirical scrutiny. Most of the published studies on yoga were conducted in India, although a growing number of trials have been conducted in the United States and other western countries. The effects of yoga have been explored in a number of patient populations, including individuals with asthma, cardiac conditions, arthritis, kyphosis, multiple sclerosis, epilepsy, headache, depression, diabetes, pain disorders, gastrointestinal disorders, and addictions (among others),as well as in healthy individuals. There is also evidence that yoga practice improves muscle strength and endurance, flexibility and cardiopulmonary endurance (JAYASINGHE, 2004). In a preliminary trial with stroke survivors, subjects who adhered to the yoga programme experienced the most benefits in terms of mobility and balance (BASTILLE & GILL, 2004). Further, a randomised trial demonstrated that an 11-week programme of yoga practiced for at least one hour daily was as effective in controlling hypertension as traditional hypertensive medications (IYENGAR & RAZAZAN, 2001).

Asanas can be performed also in air with the use of appropriate equipment. The art of mallakhamb is one of the most ancient ones in physical culture. Malla (man) and khamba (pole) come together to create a dynamic and rigorous display of yoga-like poses. The origin of this sport may be traced back to the myths and legends of hanuman, lord of monkeys. For a long time, mallakhamb was viewed as an exercise for wrestlers. In fact, some of the earliest exponents of this art were wrestlers. However, today mallakhamb is seen in India as a sport in itself. There are three ways in which mallakhamb may be performed – on a fixed pole, hanging pole or rope. Three decades ago, pole mallakhamb gave way to the rope mallakhamb. This is closest to the legendary Indian rope tricks and requires alertness, focus and balance. There were many studies on yoga and its effects on physical function (GARFINKEL.ET AL., 1994) but with the phenomenal and ever increasing popularity of rope mallakhamb in the past few years there is a surprising lack of research in this specific area. This prompted us to undertake this study with the aim to assess the effects of 6-week rope mallakhamb training on speed of movement, vital capacity and peak expiratory flow rate.

MATERIAL AND METHODS

Sample

The researcher utilized the experimental method on a sample of 30 inter college girls (Mean ± SD: age 21.33 ± 1.43 years, height 1.67 ± 0.036m, body mass 62.50 ± 3.55 kg) of Guru Nanak Dev University, Amritsar, Punjab. The study was approved by the Ethics Committee of Directorate of Sport in Guru Nanak Dev University, Amritsar, India. All

participants were informed about the study aim and methodology as well as about the possibility of immediate acceptance at any time of the experimentation. Subjects agreed to the above conditions in writing. They were purposively assigned into rope mallakhamb (M) and control (C) groups, n = 15 each. The M group was subjected to 6- week training consisting of various asanas (i.e., Bajrang pakad, Padamasana, Dhanurasana, Needle, Nidrasana, Paschimottanasana, AAri and Simple cross) the control group participated in the routine yoga mallakhamb training not containing the asanas mentioned.

Table 1. Subjects' Demographics.

Variable	**Group**	
	Training Group (N=12)	Control group (N=12)
	Mean ± SD	Mean ± SD
Age (years)	21.41 ±1.78	21.25 ±1.05
Body mass (kg)	62.83 ± 3.09	62.16 ± 4.06
Body height (m)	1.67± 0.042	1.67±0.029

N; sample size, SD; standard deviation, m; meters, kg; kilograms

METHODOLOGY

The mallakhamb group underwent 6-week rope mallakhamb training program 45 min a day. The training consisted of a variety of yogic asanas: Bajrang pakad, Padamasana, Dhanurasana, Needle, Nidrasana, Paschimottanasana, AAri and Simple cross.

Figure 1. (A) Bajrang pakad ; (B) Padamasana ; (C) Dhanurasana ; (D) Needle ; (E) Nidrasana ; (F) Paschimottanasana ; (G) Aari ; (H) Simple cross.

The Nelson's speed of movement test was used to measure the combined reaction and movement speed of hands. The Nelson's test consists of stopping a rod-shaped timer upon a command. In the starting position, the palms are on the table 30 cm apart (Fig. 2A) and upon command "ready" the subject claps hands gliding them on the table (Fig. 2B)

thus stopping the timer. The procedure is repeated 20 times, 5 lowest and 5 highest results being discarded.

Figure 2 - Illustration of the Nelson's speed of movement test: A – Starting position; B – End position.

Expiratory peak flow (PEF) is the maximum flow generated during expiration performed with maximal force and started after a full inspiration. The subject is to stand up and it is ensured that the indicator is at the bottom of the meter (zero). The subject is then asked to take a deep breath in, filling the lungs completely and place the mouthpiece in the mouth; lightly bite with the teeth and close the lips on it. The subject is asked to keep the tongue away from the mouthpiece and blast the air out as hard and as fast as possible in a single blow. The best of three readings is used as the recorded value of the peak expiratory flow rate.

Figure 3 - Illustration of the expiratory peak flow (PEF) of test: A – Starting position; B – End position.

Vital capacity was measured in liters by using dry spirometer. The subject was asked to breathe normally through the mouthpiece of spirometer. It was made sure that the nose clips were on. Subjects filled their lung as much as possible. As soon as the subjects had their lungs fully inflated, they bellowed all the air out as fast as they can. Then mouthpieces were removed. Nose clips were taken off. The best of 3 Vital capacity (VC) maneuvers were taken.

Figure 4 - Illustration of the vital capacity of test: A – Starting position; B –End position.

STATISTICAL ANALYSIS

SPSS statistical software (version 16.0) was used to analyze. Student's t-test for independent data was used to assess the between-group differences and for dependent data to assess the Post-Pre differences. The level of $p \leq 0.05$ was considered significant.

RESULTS

The results of 6-week rope mallakhamb training on speed of movement, vital capacity and peak expiratory flow rate.

Table 2. Mean values (±SD) speed of movement, vital capacity and peak flow rate in mallakhamb and control groups (n = 15 each) before (pre) and after (post) 8 weeks of training.

GROUP	VARIABLE	PRE-TEST	POST-TEST	T-VALUE	P-VALUE
	Speed of Movement				
Mallakhamb		2.03±0.23	1.65±0.39	3.45*	P = 0.0032
Control		2.07±0.33	1.74±0.59	1.75	P = 0.1084
Mallakhamb	**Vital Capacity**	3.27±0.27	3.46±0.31	2.98*	P = 0.0112
Control		3.28±0.24	3.25±0.43	0.68	P = 0.5468
Mallakhamb	**Peak Flow Rate**	534.00±88.74	570.93±70.63	1.82*	P = 0.0855
Control		498.26±81.25	467.40±28.67	0.73	P = 0.4522

Table-2 shows that the mean of speed of movement of pre-test of mallakhamb group and post-test of mallakhamb group was 2.03 and 1.65 respectively, whereas the mean of speed of movement of pre test of control group and post test of control group was 2.07 and 1.74. The t value in case of mallakhamb group was 3.45 and for control group it was 1.75. The critical value of t at 95% probability level in training group is much lower (1.76) than the observed value of t (3.45). The data does suggest that the differences between pre-test and post test of speed of movement in Mallakhamb group are significant. The mean of vital capacity of pre-test of mallakhamb group and post-test of mallakhamb group was 3.27 and 3.46 respectively, whereas the mean of mallakhamb group of pre-test of control and post-test of control group was 3.28 and 3.25. The t value in case of mallakhamb group was 2.98 and for control group it was 0.68. The critical value of t at 95% probability level in training group is much lower (1.76) than the observed value of t

(2.98). The data does suggest that the differences between pre-test and post test of vital capacity in mallakhamb group are significant. Whereas the mean of Peak Flow Rate of pre-test of mallakhamb group and post-test of mallakhamb group was 534.00 and 570.93 respectively, whereas the mean of mallakhamb group of pre-test of control and post-test of control group was 498.26 and 467.40. The t value in case of mallakhamb group was 1.82 and for control group it was 0.73. The critical value of t at 95% probability level in training group is much lower (1.76) than the observed value of t (1.82).The data does suggest that the differences between pre-test and post test of Peak Flow Rate in mallakhamb group are significant.

DISCUSSION

Yoga asanas are psychophysical practices to culture body and mind. Yogic techniques produce consistent physiological changes and have sound scientific basis (CHHINA 1974; UDUPA & SINGH 1972). Yogic techniques are known to improve one's overall performance and work capacity. Yogic practices can be used as psychophysiologic stimuli to increase endogenous secretion of melatonin, which in turn, might be responsible for improved sense of well-being (HARINATH .ET AL. 2004).

Training to yoga respiration selectively increases the respiratory sensation, perhaps through its persistent conditioning of the breathing pattern (FLORENCE. ET AL. 2005). Perhaps one of the most powerful tools in yogic practices is the use of the breath to bring our consciousness back in tune with the divine cosmic breath. This cosmic breath is the rhythm of life itself. Yoga, a method of learning that aims to attain the unity of mind, body, and spirit through exercise, breathing and meditation that employs means like rope mallakhamb training, may be expected to positively influence many physiological functions including respiration and kinesthetic perception (LYENGAR 1975; NAYAR & MATHUR 1975).

The results of this study showed that rope mallakhamb training lasting 6 weeks significantly improved on speed of movement, vital capacity and peak expiratory flow rate. Our findings are supported by (TELLLES. ET AL. 1993) reported that after only 10 days of practicing asanas significantly improved static motor performance (eye-hand co-ordination). Hatha-yoga exercises provided regular functioning of principal bodily functions thus fostering a psychophysical balance; moreover, transcendental meditation increased aerobic metabolism, counteracting anaerobic metabolism which was related to mental distress (LERNER, 1975) we also reported earlier that yoga training of longer duration improved respiratory pressures, HGS and HGE (MADANMOHAN. ET AL. 2003; MADANMOHAN. ET AL. 1992) which are simple and accurate indices of strength of the respiratory muscles (BLACK. ET AL. 1969). It is clear from our data that rope mallakhamb training had significant effect on vital capacity and peak expiratory flow as compared to the control group.

CONCLUSIONS

Summing up, the 6-week rope mallakhamb training may be recommended to improve speed of movement, vital capacity and peak expiratory flow rate may contribute to enhance concentration based performance and voluntary control of breathing.

PRACTICAL APPLICATIONS

a) The findings of the study will help to understand the benefits of rope mallakhamb training had significant effect on speed of movement, vital capacity and peak expiratory

flow rate.

b) The present manuscript will also be useful feedback for one and all concerned with these mallakhamb players.

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Blood pressure, heart rate, and spirometry parameters including forced vital capacity (FVC), peak expiratory flow rate (PEF), and peak inspiratory flow (PIF) were determined one day before, and after the supplementation period. Participants underwent a treadmill-based exercise test with metabolic gas analysis and ventilation measurement using the Bruce protocol. Results.Â The effect of supplementation with oral peppermint extract was also studied on the perceived lower leg muscular pain and blood lactate levels one hour before a 400-m running test [12]. In this study, the peppermint had a significant effect on the blood lactate level, but not on the muscle pain. Besides, the combination of peppermint oil and ethanol [13] reported to have a significant analgesic effect. PEFR, peak expiratory flow rate; FEV1, forced expiratory volume in one second; FVC, forced vital capacity; HRmax, maximum heart rate. Episodes of wheeze were reported in only one study.16 Although the number of episodes of wheeze was 7.5 days less in the training group, this difference was not significant (p = 0.3).Â Haas F, Pasierski S, Levine N, et al. Effect of aerobic training on forced expiratory airflow in exercising asthmatic humans. J Appl Physiol1987;63:1230â€“5. OpenUrl Abstract/FREE Full Text.