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RESEARCH ARTICLE

Effects of Manohra Dance, the Cultural Heritage of UNESCO, on Physical Performance in Children

Tatpicha PONGSIRI[1], Mantira PHONGAMPAI[1], Natthawee SRIKET[1], Phudis SRIKET[1], Krit SRIRUNGRANGCHAI[1], Tichar SUNGWORAKAN[2], Noppadol MANEEDANG[2] and Nongnapas CHAROENPANİCH[3*]

[1]Thailand National Sports University Trang Campus, Faculty of Sports and Health Science / Thailand
[2]Thailand National Sports University Chumphon Campus, Faculty of Sports and Health Science /Thailand
[3]Chulalongkorn University, Faculty of Sports Science / Thailand
*Corresponding author: nongnapas.c@chula.ac.th

Abstract
The characteristics of Manohra dance are delicate because of the high physical performance specific posture, which can communicate the meaning. The purpose of this study is to study the effects of exercise with Manohra dance on physical performance, which were postural balance, muscle strength, and flexibility. Twenty-four female students aged 12-13 years old were included in the training program. They were randomly divided into two groups, experimental and control groups, twelve in each group. All subjects were trained with a strength and flexibility program as circuit training, only the experimental group was additionally trained with eight specific postures of the Manohra dance. All subjects were performed 3 times a week for 8 weeks continuously. The study involved three testing sessions pre-training, after 4-weeks and 8-weeks intervention. Compared between groups by using an independent t-test, significant at $p<0.05$. The results of experimental group showed higher significant difference in postural balance in all directions during the performance of YBT ($p<0.05$; YBT 1 $p=0.044$, YBT 2 $p=0.004$ and YBT 3 $p=0.017$) and flexibility ($p<0.05$; $p=0.047$) than the control group at week 8th. While there was no significant difference between groups of leg muscle strength ($p>0.05$). As a result, it was determined that the Manohra dance shows advantages, which are charming, conservation, and good for health, it can be suggested to use the Manohra dance posture in a training program to improve postural balance and flexibility in children.

Keywords
Manohra, Traditional Dance, Physical performance

INTRODUCTION

Manohra or Nora dance is the traditional local dance in the South of Thailand that comprises dancing, singing, drama, and ritual. (Kuroda, 2020; Nikhonrat and Thongkum, 2021). Nowadays, Manohra dance is presented as a traditional dance as a representative of Thai culture, especially in the South of Thailand. Most young local children practiced Manohra as a recreational dance to develop their performance skills (Kvam, 2015).

The Thai government submitted the formal application of Manohra for Intangible Cultural Heritage (ICH) listings of UNESCO in March 2020, with expectations that Manohra will be put on the ICH representative list in 2021 (Kamlangkuea and Yussayotha, 2023). The listing of Manohra will help promote this unique art form and knowledge to share with the world as a part of the heritage of humanity. The characteristics of Manohra dance are delicate using body movement to communicate the meaning of the dancing's postures (Horstmann, 2004; Horstmann, 2011;

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Horstmann, 2012). The choreography of the Manohra dance varies by location but it is generally composed of 8 main postures, such as Thep Phanom, Yektha, Sot Soi, Peang Lhai, Pha-la, Khao Kwai, Kinnorn, and Kru (Nikhonrat and Thongkum, 2021). Each main posture of the Manohra dance is performed by different bases of support, which are single-leg, double-leg, or kneeling support. During dancing, the dancers bend their knees to lower their center of gravity to enhance their balance, while moving the upper part of the body, which is a very complicated posture (Carter et al., 2018; Zawadka et al., 2018). The dancer's leg muscles play an important role in stabilizing the body. Most legs' muscles work in nearly isometric contraction as postural muscles, simultaneously some muscles work for moving in a small range of motion. Additionally, the trunk's muscles also contract in an isometric contraction, on the other hand, some Manohra dancing postures show over the range of motion, which is the charming of this dancing style (Carter et al., 2018; Mattiussi et al., 2021; Orlandi et al., 2020). The dancers should use whole muscles to work together to keep the specific posture by appeal stems from their sophisticated motions (Sato et al., 2015). Therefore, to dance with Manohra posture, the dancer should have high physical performance and should be trained (Bolek and Bojar, 2021).

Based on the postural analysis, Manohra's postures are notable in stability posture. All dancers should have a highly balanced performance because they should stabilize their posture to be stable while performing the Manohra posture. In addition, muscle strength is one of the strong factors in stability performance (Kuroda, 2020; Vlasic et al., 2017). Moreover, some postures of Manohra move with over range of motion to show more talent movement, which can suggest that postural balance, muscle strength, and flexibility become the most important roles in Manohra dancing quality. Therefore, if training with Manohra's posture, the postural balance, muscle strength, and flexibility should be improved. Moreover, there was less international research about the effects of Manohra dance on physical performance. Therefore, this study wanted to study the effects of Manohra dance on physical performance, which were postural balance, muscle strength, and flexibility.

MATERIALS AND METHODS

Participants

The sample size was calculated using a power (1−β) of 80%, an alpha (α) of 0.05, and an effect size (ES) of 0.32, based on a previous study (Dos et al., 2021) and was performed by using G*Power 3.1.9.2 statistical program. A minimum of 18 subjects was suggested to be sufficient. To prevent a possible, dropout (20%), a total of 24 subjects (n=12/group) was required.

A criterion sampling method was used to determine the sample group. Twenty-four females aged between 12-13 years old from middle school (Grade 1) of Yantakhaorattachanupatham School, in Yan Ta Khao District, Trang, Thailand, who had never practiced Manohra dance before and who had a right leg dominant were recruited for the study. This study followed ethical standards and received approval from The Institute of Physical Education Research Ethics Committee for Research Involving Human Projects, Thailand [COA No. 019/2021, Date of Approval: 29 March 2021]. Participants provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures.

The subjects who met inclusion criteria and agreed to participate in the study were asked to sign a written informed consent and the legal guardians must be informed about the study and provide informed consent for their child's participation. The subjects were excluded if a history of balance disorder and had less than 90 % of their participation in a training program or refused to continue the study.

This study uses a single-blinded randomized controlled trial design. The study involved three testing sessions pre-training (pretest), after 4-weeks (posttest-1), and 8-weeks (posttest-2) intervention under the supervision of a researcher. The data were collected from April to July 2021. This study was conducted in the exercise room at Yantakhaorattachanupatham School, Trang province, Thailand.

Data Collection

Based on biomechanical analysis, this study chose eight main postures of the Manohra dance,

which were Thep Phanom, Yektha, Sot Soi, Peang Lhai, Phala, Khao Kwai, Kinnorn and Kru (Fig. 1). All posture was not too difficult to imitate, based on double-legs, single-leg and kneeling postural balance, moreover, most leg muscles work together with dynamic stretching the muscles while keeping and changing the posture.

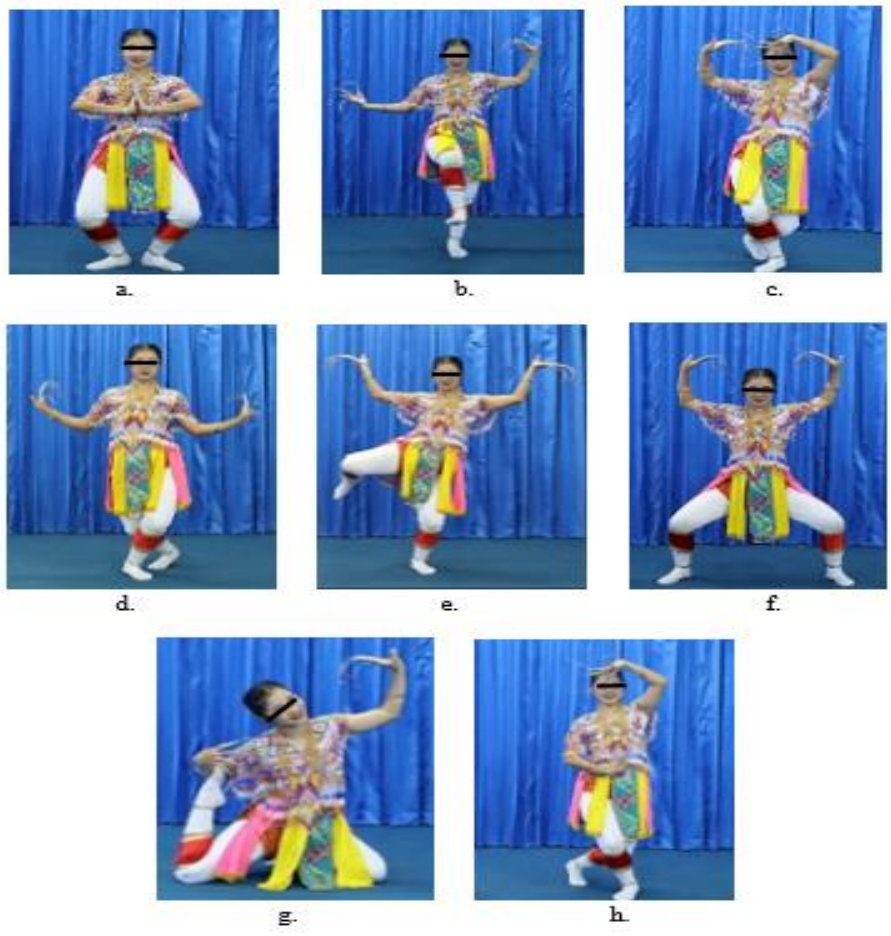

Figure 1. Manohra dance posture: a. Thep Phanom, b. Yektha, c. Sot Soi, d. Peang Lhai, e. Phala, f. Khao Kwai, g. Kinnorn, and h. Kru

Then, the purposes, experimental procedures, risks, and benefits of the study were clearly explained to the subjects. The random sampling and intervention program is under the supervision of a researcher. All dependent variables including postural balance, leg muscle strength, and flexibility were measured before, after week 4^{th,} and after week 8th intervention. The sequence of tests starts with the Y balance test, the leg muscle strength test, and then the sit and reach test. Each subject was allowed to rest 5 minutes before starting the next test.

The training program, all subjects began with 5 minutes warm-up (aerobic activity and dynamic stretching exercise), followed by strength and flexibility training program organized as circuit training consisted of wall squat (hold this position for 30 seconds; 30 s.), single leg squat (hold this position for 30 seconds and then switch sides; 30 s./side), plank (30 s.), legs lunge (30 s./side), side plank (30 s./side), and side lunge (30 s./side), 3 sets with 3 minutes rest between sets and 30 s. between exercises. The research assistant who has an approved strength training certification experience with kids and strength training was the instructor leading the control group to the strength and flexibility training program. After 10 minutes of strength and flexibility training the subjects in the experimental group performed training with a specific posture of Manohra dance sessions with 8 postures consisting of Thep Phanom, Yektha, Sot Soi, Peang Lhai, Phala, Khao Kwai, Kinnorn and Kru by maintain each posture for 1.30 minutes, repeat 3 times, with 2 minutes rest between posture. The total time of Manohra dance training sessions is 45 minutes. The professional Manohra

dancer led the experimental group to exercise with Manohra's posture, and the researcher helped to control the quality of each subject's movement. The training program of both groups was performed 3 times a week for 8 weeks continuously.

Measurement of postural balance

Y balance test (YBT)

The objective of this test is to maintain a stable base of support during a single limb stance on one leg (right-leg stance) while reaching as far as possible with a contralateral leg in three different directions. The directions are anterior (A), posterolateral (PL), and posteromedial (PM) (Plisky et al., 2009). The subjects have performed three successful reaches with the right foot in three directions with 1-minute rest intervals. The average distance in each direction (cm) was recorded and normalized in terms of leg length as a result of the YBT.

Measurement of leg muscle strength

Back and Leg dynamometer (TKK 5402, TAKEI Scientific Instruments Lo, Ltd., Japan)

This device measures strength at one specific point in the range of motion and has high test-retest reliability (r=0.80). Lower extremity muscle strength was recorded in a standing position while both knees were bent at an angle of 135°. The subjects' hands held a handlebar which was placed on the thighs. The chain length was adjusted according to the above position. Using pronated grips, subjects were asked to slowly straighten their legs up to their maximal level without using back or shoulder muscles. The test was performed 3 times with 1 min rest intervals; the highest value was selected and recorded (Eyuboglu et al., 2019). To standardize the influence of the total body weight, we calculated the leg strength (kg) per body weight (kg) (Miyatake et al., 2004).

Measurement of flexibility

Sit and Reach test (SR)

The SR was used to evaluate hamstring and lower back flexibility. The Baseline® (Cooper Institute / YMCA, AAHPERD) device was used for evaluation. The subjects were asked to place their heels on the device while in the long sitting position with their trunk flexed at 90°. After the subjects' arm lengths were determined on the device, they were asked to reach forward as far as they could by pushing the measuring device with their fingertips without bending their knees. The measurement was performed three times. The average of the results was recorded as the result of the SR test. Then, the relative value of the height was calculated by proportioning this value to the height (Castro et al., 2009).

Data Analysis

The data were evaluated statistically using the SPSS (Statistical Package for the Social Sciences) 21.0 package program. The Kolmogorov-Smirnov test was used to determine the conformity of the data to the normal distribution. Since the data were normally distributed, the relationship between variables was determined by the independent t-test was used to compare the mean and standard deviation of variables to show differences between groups. The significance level was accepted as $p<0.05$.

RESULTS

The comparison of mean and standard deviation of postural balance, leg muscle strength, and flexibility between the experimental group and control group. All variables were collected at pre-training, week 4th and 8th of a training program. The results are shown in Table 1-4 below.

Table 1. Baseline characteristics of the participants.

	Group	
	$\bar{x}$±SD Experimental Group **(**n=12**)**	$\bar{x}$±SD Control Group (n=12)
Age (years)	12.17±0.39	12.18±0.40
Weight (kg)	47.52±10.97	45.05±8.87
Height (cm)	151.42±4.98	153.27±3.69
Leg length (cm)	60.28±2.79	61.29±3.87
Resting Heart Rate (bpm)	97.42±11.27	97.27±11.11

Table 2. Y Balance test score of postural balance per leg length (Plisky et al., 2009) (n=12/group)

	Period	Group	Reach distance as a % of leg length	
			$\bar{x}$±SD	p-value
YBT 1 (cm)	pre-training	experimental groups	95.7 ± 3.4	0.067
		control group	93.5 ± 3.2	
	week 4 th	experimental groups	98.6 ± 4.5	0.053
		control group	96.6 ± 3.2	
	week 8 th	experimental groups	101.0 ± 5.0	**0.044***
		control group	95.0 ± 4.0	
YBT 2 (cm)	pre-training	experimental groups	96.7 ± 2.6	0.066
		control group	95.6 ± 2.1	
	week 4 th	experimental groups	97.3 ± 6.3	0.053
		control group	96.3 ± 5.2	
	week 8 th	experimental groups	89.6 ± 5.2	**0.004***
		control group	82.6 ± 3.2	
YBT 3 (cm)	pre-training	experimental groups	96.2 ± 3.6	0.541
		control group	95.2 ± 7.6	
	week 4 th	experimental groups	93.7 ± 7.8	0.059
		control group	92.8 ± 7.7	
	week 8 th	experimental groups	100.3 ± 6.5	**0.017***
		control group	95.3 ± 5.5	

*p < 0.05; YBT 1: Anterior; YBT 2: Posterolateral; YBT 3: Posteromedial

The results in Table 2 show that at pre-training and week 4th, there are no significant differences between the experimental group and the control group (p>0.05). On the other hand, at week 8th there was a significant main effect for composite scores and reaching distance in all directions during the performance of YBT (p<0.05; YBT 1 p=0.044, YBT 2 p=0.004 and YBT 3 p=0.017).

The results in Table 3 show that there are no significant differences in leg muscle strength between the experimental group and the control group at pre-training, week 4th, and week 8th (p>0.05).

Table 3. Leg muscle strength per body weight (Miyatake et al., 2004) (n=12/group)

Period	Group	$\bar{x}$	SD	t	p-value
pre-training	experimental group	0.96	0.39	0.738	0.469
	control group	1.09	0.48		
week 4 th	experimental group	1.04	0.26	0.588	0.564
	control group	1.14	0.48		
week 8 th	experimental group	1.38	0.47	-0.382	0.706
	control group	1.30	0.58		

Table 4. Flexibility per body height (Castro et al., 2009) (n=12/group)

Period	Group	$\bar{x}$	SD	t	p-value
pre-training (cm)	experimental groups	3.71	6.97	1.434	0.507
	control group	5.47	5.74		
week 4 th (cm)	experimental groups	8.18	7.92	-0.775	0.446
	control group	5.98	5.82		
week 8 th (cm)	experimental groups	12.43	6.08	-1.862	**0.047***
	control group	7.48	6.94		

*p < 0.05

The results in Table 4 show that at pre-training and week 4th, there are no significant differences between the experimental group and the control group (p>0.05). On the other hand, at week 8th the mean flexibility of the experimental group was significantly higher than the control group (p<0.05; p=0.047).

DISCUSSION

Although Manohra dance is the beautiful art and cultural dancing of South of Thailand. The unique dancing movement of the Manohra dance shows the high physical performance of the dancer. From the basis of postural analysis, the Manohra dance shows an outstanding balanced posture. Most dancing movements should lower down the body during dancing with the Manohra posture. Especially with the eight selected postures in this study, Thep Phanom, Yektha, Sot Soi, Peang Lhai, Phala, Khao Kwai, Kinnorn, and Kru, which are double-legs, single-leg, and kneeling postures during dancing by moving the upper body and both extremities. These Manohra postures need high perseverance to control the correct posture. Conform to this study's results, showed a significant improvement in the postural balance of YBT in all directions at week 8th of the experimental group more than the control group (Table 2). Moreover, because of the complicated posture of Manohra, each subject shows a hard effort to pose by using all systems, which are proprioception, vestibular, and visual systems, to work together during the dance (Fatma et al., 2010). During dancing with the Manohra posture, the dancers should use all leg muscles to work together to control the postural balance for appeal stems when moving the upper arm in the Manohra pattern (Carter et al., 2018). Therefore, the experimental group shows an improvement in postural balance significantly higher than the control group.

However, the results did not show a significant difference in leg muscle strength between both groups. Although most postures should low down the body during a dance, the level of low down may not be enough to induce proper load to leg muscles Jones and Ledford (2012) suggested that the proper intensity, may should be 1.5-2.5 times per body weight. Moreover, the complicated posture of the Manohra dance may be the cause of inadequate load to enhance the leg muscle's strength. The squat posture is part of Manohra's posture, the level of low down in the squat induces different loads for leg muscles (Roelants et al., 2006). The characteristics of each subject, who had never practiced Manohra dance before participating in this study, may become the limitation of the study. Each subject, who had been never trained with this style, may not be posed with the collected posture, which is a complicated posture of Manorah dance (Scupin, 2013). Therefore, the inadequate low down the body when training may be the reasonable cause that shows no significant increase in leg muscle strength.

In addition, the flexibility improvement of the experimental group showed significant differences at week 8th. That may be suggested that the beauty and charm of the Manohra dance are the delicate movements during dance. The over range of motion (ROM) of the trunk and both arms make it more beautiful and charming, which presents the unique traditional Thai culture. The movement patterns during the Manohra dance look like dynamic stretching of the trunk and upper arm that may lead to an increase in flexibility performance in the experimental group. Moreover, the alternated movement of the Manohra dance may enhance flexibility by facilitating the

neuromuscular system, such as the reciprocal innervation technique. The reciprocal innervation is based on the general motor control that sends the motor impulses to activate target muscles, at the same time, this neuron sends another motor impulse to inhibit the opposite side of the target muscles (Holm et al., 2004). Therefore, during the Manohra dance, the dancer usually moves alternate patterns between back and forth, which can promote reciprocal innervation and lead to the relaxation of the muscles. Muscle relaxation leads to good flexibility that will increase the range of motion and increase the flexibility of the tissue as well (Milosevic et al., 2019; Van, 2006).

From these results, it may be suggested that the Manohra dance is not only beautiful, charming, and unique for traditional South of Thailand, but also useful for improving physical performance, especially postural balance, and flexibility. Although the result does not show significant improvement in leg muscle strength, the leg muscle strength of the experimental group showed higher improvement than the control group. It may be suggested that postural balance and flexibility may need less time to train than muscle strength (Kloubec, 2010; Wicke et al., 2014). Additionally, the level of squat intensity during dance may be not enough to induce muscle strength. However, Manohra dance still shows advantages for most dancers, which are beautiful, charming, fun, conservation, and good for health, which can be suggested to use in a training program.

Conclusions

From the results, the experimental group showed higher postural balance and flexibility significantly than the control group, these can be concluded that Manohra dance not only be the unique for traditional South of Thailand, but also be advantage for improving postural balance and flexibility. Moreover, the improvement can show significantly in 8 weeks of training in female children aged between 12-13 years old. However, it may not be reaching the proper intensity for improving leg muscle strength significantly. Therefore, the training program should be either extend the time of the program or increase the intensity during exercise with Manohra posture.

Conflict of interest

The authors declare no conflict of interest. No financial support was received.

Ethics Statement

The Institute of Physical Education Research Ethics Committee for Research Involving Human Projects, Thailand approved the study protocol (29-3-2021). Informed consent from the parents and assent from the children were obtained before children were included in the study.

Author Contributions

Study Design, TP, MP, NS, PS and KS; Data Collection, TP, MP, NS, PS and KS; Statistical Analysis, TP, MP and NC; Data Interpretation, TP, MP, TS and NM; Manuscript Preparation, TP and NC; Literature Search, TP, MP, NS, PS, KS, TS and NM. All authors have read and agreed to the published version of the manuscript.

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