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FULL LENGTH ARTICLE

Movement Analysis of Philippine Folk Dance Itik-itik

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Abstract: The purpose of the study was to describe and analyze the dance movements of the Philippine folk dance Itik-itik. The researchers adopted the movement analysis method similar to that of Mackenzie that involves the (1) description of the actual movements which occur at the joints involved; (2) the plane in which the movement occurs; and (3) the muscles produ cing the movement (agonist & antagonist). In addition, similar to the study of Martin and Miller, the researchers also had done a mechanical analysis on the lever type involved in the execution of the dance movement in terms of force, axis, and resistance. Results revealed that the prominent dance steps in the Philippine local dance Itik-itik are the (1) running, (2) cross step, slide close, slide close step, (3) heel, close-ball, close arm, (4) step, slide-close, slide, (5) arms extension/flexion, and (6) flapping of the arms. The joints involved are the shoulder and hip muscle which are ball and socket type of joints; and elbow, knee and ankle which are hinge joints. The major muscles involved in the dance for the lower body include the quadriceps, hamstring muscle group, adductor muscle group, calves and gluts. While for the upper body muscles involved are the pectoralis major, latissimus dorsi, deltoid, trapezius, biceps, and triceps muscles. The type of lever used in performing the dance comprise majority of 1st class and 3rd class levers. By knowing the muscles involved in the dance the dance teacher may be able to devise activities to gradually prepare the prime mover muscles before the actual execution for injury prevention. Thus, the movements in the dance may improve the health and skill related fitness of the performers.

Key words: Itik-itik, folk dance, Philippines, movement analysis, mechanical

1. Introduction

Philippine folk dances help keep the people connected to their ancestry and preserve the cultural unity of the people. The people have been doing folk dances for hundreds of years to keep tradition alive and pass it on to the next generation. One dance indigenous to the Philippines is the Itik-itik dance, which is a mimetic folkdance in the Philippines. It originated in Cantilan, Surigao Del Sur. It was discovered in this town by National Artist for Dance Francisca Reyes-Aquino. Originating from a dance called “sibay” and performed to

the tune of Dejado, the story was told that an expert young dancer named Cayetana at a barrio of Cantilan during a baptismal party had become so carried away with the rhythm that she began to improvise short, choppy steps similar to ducks and then splash water on their backs. The people around who saw Cayetana dance liked it so much they all imitated her. The dance has since been called Itik-Itik from the word Itik, which means duck which is commonly perform by ladies. The dance immediately became popular in the province for stage performances and ballroom dance in social gatherings. There are many variations of Itik-Itik steps from which the dancers make their selection and combination [1]. Figure 1 shows a variation of traditional costume worn in dancing Itik-itik.

Figure1. Itik itik dancer in traditional dress

Many Philippine folk dances have been studied and developed which featured history, socio-cultural context and the movement notation [1]. However, only few research studies have been carried out to explore on the muscles involved and mechanical principle in the execution of the movement [2, 3]. By analyzing the musculoskeletal components in performing the dance teachers may be able to design activities to prepare the dancers more on the correct execution and prevent injuries.

Analysis of movement can be done without the use of expensive equipment by visual observation of the involved joints and muscles [2, 3]. The purpose of the study, therefore, is to analyze the dance movements of the Philippine folk dance Itik-itik in terms of the joints, muscles involved and mechanical principles in the execution of movement to identify the health and skill related fitness benefits of the dance.

2. Methods

This study was conducted adopting the method used in analyzing other Philippine folk dances [2, 3]. This study described and analyzed the movements of Philippine folk dance Itik-itik through visual observation of the dance following the guidelines of Mackenzie that involves the (1) description of the actual movements which occur at the joints involved; (2) the plane in which the movement occurs; and (3) the muscles producing the movement (agonist & antagonist) [3, 4]. In addition, the researchers also had done a mechanical analysis on the lever type involved in the execution of the dance movement in terms of force, axis, and resistance [3].

3. Results and discussion

The 4 prominent movements observed in the Philippine folk dance *Itik-itik* are the (1) running, (2) cross step, slide close, slide close step (3) heel, close-ball, close, (4) step, slide-close, slide, close, and (5) arm swing (6) flapping of the arms. The biomechanical analysis and tables are provided in this section. *Figure 1-3* shows illustration of some of the movements of Itik-itik

3.1 Analysis of running

Table 1. Biomechanical analysis of running.

Joint	Type	Movement Allowed	Plane of Movement	Agonist	Antagonist	Type of Lever
Hip	Ball and socket	Flexion	Sagittal	Iliopsoas	Gluteus Maximus	3rd class
		Extension	Sagittal	Gluteus Maximus	Iliopsoas	(AFR)
Knee	Hinge	Flexion	Sagittal	Hamstring	Quadriceps	1st class
		Extension	Sagittal	Quadriceps	Hamstring	(FAR)
Ankle &	Hinge	Plantar Flexion	Sagittal	Gastrocnemius/ Soleus	Tibialis Anterior	2nd class (ARF)
Metarso-phalangeal joint		Dorsi Flexion	Sagittal	Tibialis Anterior	Gastrocnemius/ Soleus	

Table 1 shows the biomechanical analysis of running. As shown in the table, the major joints involved in jogging are the hip, knee and ankle. The hip joint is a ball and socket type of joint which allows flexion and extension movements which take place in the sagittal plane. The active muscles are the iliopsoas (agonist for flexion; antagonist for extension) and gluteus maximus (agonist for extension; antagonist for flexion) [4]. The hip joint and muscle action in jogging is under the 3rd class lever (Axis-hip joint; Force-iliopsoas and gluteus maximus; Resistance-foot strike).

The knee is a hinge joint type allowing flexion and extension movements which take place in the sagittal plane. The muscles involved in the movement are the hamstring muscle group (agonist for flexion; antagonist for extension) and the quadriceps muscle group (agonist for extension; antagonist for flexion) [4]. The knee joint and muscle action in jogging is under the 1st class lever (Force-hamstring/quadriceps; Axis-knee; Resistance-foot strike).

For the ankle, the movements allowed are plantar flexion and dorsi flexion which take place in the sagittal plane [4]. The active muscles are the gastrocnemius/soleus (agonist for plantar flexion; antagonist for dorsi flexion) and tibialis anterior (agonist for dorsi flexion; antagonist for plantar flexion). The ankle joint and muscle action for jogging is categorized as 2nd class lever (Axis-ankle; Resistance-body weight; Force-gastrocnemius/soleus).

3.2 Analysis of (a)cross step, slide close, slide close step, (b) heel, close-ball, close, and (c) step, slide-close, slide, close

Table 2. Biomechanical analysis of (a) cross step, slide close, slide close step, (b) heel, close-ball, close, (c) step, slide-close, slide, close.

Joint	Type	Movement Allowed	Plane of Movement	Agonist	Antagonist	Type of Lever
Hip	Ball and socket	Flexion	Sagittal	Iliopsoas	Gluteus Maximus	3rd class
		Extension		Gluteus Maximus	Iliopsoas	
		Abduction	Frontal	Gluteus Medius/ Gluteus Minimus	Adductor Muscle Group	3rd class
		Adduction		Adductor Muscle Group	Gluteus Medius/ Gluteus Minimus	
Knee	Hinge	Flexion	Sagittal	Hamstring	Quadriceps	1stclass (FAR)
		Extension		Quadriceps	Hamstring	
Ankle & Metarso-phalangeal joint	Hinge	Plantar Flexion	Sagittal	Gastrocnemius/ Soleus	Tibialis Anterior	2nd class (ARF)
		Dorsi Flexion		Tibialis Anterior	Gastrocnemius/ Soleus	

Table 2 shows the biomechanical analysis of (a) cross step, slide close, slide close step, (b) heel, close-ball, close, and (c) step, slide-close, slide, close, which have similar movement patterns. As shown in the table, the major joints involved in the cross step, slide close, slide close step are the hip, knee, ankle and metarso-phalangeal joint.

The hip joint is a ball and socket type of joint which allows flexion and extension which take place in the sagittal plane while and adduction and abduction movements take place in the frontal plane. For the flexion and extension movements, the active muscles are the iliopsoas (agonist for flexion; antagonist for extension) and gluteus maximus (agonist for extension; antagonist for flexion) [3, 4]. The hip joint and muscle action in jogging is under the 3rd class lever (Axis-hip joint; Force-iliopsoas and gluteus maximus; Resistance-foot strike).

For the abduction and adduction movement of the hip on the sliding movement, the active muscles are adductor muscle group of the hip (agonist for adduction; antagonist for abduction) and gluteus medius and gluteus minimus (agonist for abduction; antagonist for adduction) [3, 4]. The hip joint and muscle action in cross step, slide close, slide close step is under the 3rd class lever (Axis – hip; Force –

Adductor longus and gluteus medius; Resistance-foot strike).

The knee is a hinge joint type allowing flexion and extension movements which take place in the sagittal plane. The muscles involved bicep femoris, semi-membranosus and semi-tendinosis (agonist for flexion; antagonist for extension) and the vastus intermedius and vastus medialis (agonist extension; antagonist for flexion) [3, 4].

The knee joint and muscle action in cross step, slide close, slide close step is under the 3rd class lever (Axis-knee; Force-Bicep femoris; Resistance- foot stike).

For the ankle and metarso-phalangeal joints, the movements allowed are plantar flexion and dorsi flexion which take place in the sagittal plane. The active muscles are the gastrocnemius/soleus (agonist for plantar flexion; antagonist for dorsi flexion) and tibialis anterior (agonist for dorsi flexion; antagonist for plantar flexion) [3, 4]. The ankle joint and muscle action for cross step, slide close, slide close step is categorized as 2nd class lever (Axis-ankle; Resistance-body weight; Force-gastrocnemius/soleus).

3.3 Analysis of arms extension/ flexion (flying bird movement)

Figure2. Dancer executing the flying movement

Table 3. Biomechanical analysis of arms extension/ flexion (flying bird movement).

Joint	Type	Movement Allowed	Plane of Movement	Agonist	Antagonist	Type of Lever
Shoulder	Ball and socket	Diagonal Flexion	Frontal	Pectoralis Major	Trapezius	1st class (FAR)
		Diagonal Hyper-extension		Trapezius	Pectoralis Major	

Elbow	Hinge	Flexion	Sagittal	Bicep Brachii	Triceps Brachii	3rd class (AFR)
		Extension	Sagittal	Triceps Brachii	Bicep Brachii	1st class (FAR)

Table 3 shows the biomechanical analysis of the arms extension and flexion (flying bird movement). Figure 2 shows the dancer performing the flying bird movement as interpreted in Itik-itik. As shown in the table, the major joints involved in the arm extension are shoulder and elbow. The shoulder is a ball and socket joint type allowing diagonal flexion and diagonal extension movements which take place in a frontal plane. The muscles involved in the movement are pectoralis major (agonist for diagonal flexion; antagonist for diagonal extension) and trapezius (agonist for diagonal extension and antagonist for flexion) [4]. The shoulder joint and muscles action in arm abduction and adduction is under the 3rd class lever (Axis-shoulder; Force-arm; Resistance-hand).

For elbow joint, which is a hinge joint type, the movements allowed are flexion and extension which take place in the sagittal plane [2]. The active muscles are the biceps brachii (agonist for flexion; antagonist for extension) and triceps brachii (agonist for extension; antagonist for flexion). The elbow joint and muscle action for arm flexion and extension is categorized as 3rd class lever in flexion (Axis-joint; Force-biceps brachii; Resistance-arm weight) but 1st class lever in extension (Force-triceps brachii, Axis-elbow; Resistance-arm weight).

3.4 Analysis of flapping of the arms (itik-itik movement)

Table 4 shows the biomechanical analysis of flopping of arm (itik-itik movement). Figure 3 shows the dancer performing the wing flapping movement as interpreted in Itik-itik. As shown in the table, the major joints involved in the flopping of arm (itik-itik movement) are shoulder and elbow. The shoulder is a ball and socket joint type allowing adduction abduction movements which take place frontal plane. The muscles involved in the movement are latissimus dorsi (agonist for adduction; antagonist for abduction) and middle deltoid (agonist for abduction and antagonist for adduction) [3, 4]. The shoulder joint and muscles action in flopping of arm (itik-itik movement) is under the 3rd class lever (Axis-shoulder; Force-arm; Resistance-elbow).

Figure 3. Dancer executing the flapping movement

Table 4. Biomechanical analysis of flapping of the arms (itik-itik movement).

Joint	Type	Movement Allowed	Plane of Movement	Agonist	Antagonist	Type of Lever
Shoulder	Ball and socket	Adduction	Frontal	Dorsi Deltoid	Latissimus Dorsi	3rd class (AFR)
		Abduction		Latissimus Dorsi	Dorsi Deltoid	
Elbow	Hinge	Flexion	Frontal	Bicep Brachii	Triceps Brachii	3rd class (AFR)

For elbow joint, which is a hinge joint type, the movements allowed is flexion which takes place in the sagittal plane [3, 4]. The active muscles are the biceps brachii (agonist for flexion) and triceps brachii (antagonist for flexion). The elbow joint and muscle action for arm flopping (itik-itik movement) is categorized as 1st class lever in (Axis-elbow; Force-triceps brachii; Resistance-arm weight).

4. Conclusions

The prominent dance steps in the Philippine local dance Itik-itik are the (1) running, (2) cross step, slide close, slide close step, (3) heel, close-ball, close arm, (4) step, slide-close, slide, (5) arms extension/flexion, and (6) flapping of the arms. The joints involved are the shoulder and hip muscle which are ball and socket type of joints; and elbow, knee and ankle which are hinge joints. The major muscles involved in the dance for the lower body include the quadriceps, hamstring muscle group, adductor muscle group, calves and gluts. While for the upper body muscles involved are the pectoralis major, latissimus dorsi, deltoid, trapezius, biceps, and triceps muscles. The type of lever used in performing the dance comprise majority of 1st class and 3rd class levers. By knowing the muscles involved in the dance the dance teacher may be able to devise activities to gradually prepare the prime mover muscles before the actual execution for injury prevention. Furthermore, the movements in the dance may improve the health-related fitness of the performers in terms of muscular strength, muscular endurance, cardiovascular endurance and flexibility. Also, the dance could improve skill-related fitness such as coordination. Thus, the local dance Itik-itik is a viable dance that may promote the health and skill related fitness of the performers.

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