

CHAPTER 2

LITERATURE REVIEW

2.1 Pilates Philosophy

The Pilates method of body conditioning was developed by Joseph H. Pilates which incorporates six key principles as following (2):

1. “Centering” is the main focus point of the Pilates method. Centering refers to the center or core of the body and is usually known as the “powerhouse”. The “powerhouse” is defined as the area between the anterior and posterior abdominal wall and pelvis floor.
2. “Concentration” is the mind that guides the body when carrying out Pilates exercises.
3. “Control” refers to the work of an exercise which is being done from the center with concentration.
4. “Precision” refers to developing each exercise and the precision of each exercise should be carried out. Pilates exercise emphasizes the quality of movement instead of quantity.
5. “Breath” is the most importance between all exercises should be done with a rhythm to the breathing for the purpose of obtaining optimal circulation of oxygenated blood to all tissues of the body.
6. “Flow” refers to the graceful and flowing succession of one exercise to another during a Pilates session.

2.2 The benefits of the Pilates Method in the research literature

The primary advantages of Pilates exercises were indicated by Lange et al, practitioners, and clients. Pilates exercise provides three major benefits: physiological function (e.g., flexibility and range of motion), psychological function (e.g., stress), and motor relearning (e.g., trunk stability and core control) (8, 26-28).

Kish et al determined the effect of Pilates training on abdominal strength, hip flexor flexibility and hip adductors flexibility in 17 dancers (10 Pilates and 7 control) (29). The training program was 3 times per week duration with the training period of 75 minutes for each session. The exercise equipment included reformer, arm chair, mat, small arch, magic circle, and theraband. It was found that the Pilates group significantly increased abdominal muscle strength, both left and right leg adductor functional flexibility; both left and right leg hip flexor functional flexibility. In addition, there was no difference between before and after training in control group. Segal et al also assessed claims regarding the effect of Pilates training on flexibility, body composition, and health status. The 47 athletic samples participated 1 hour per week during 6-month period of Pilates training. Pilates training resulted in an improvement of flexibility. However, its effect on body composition, health status, and posture are more limited and difficult to establish (9).

Conversely, Aguilar et al studied moderate resistance plus flexibility training compared with Pilates based training in 26 healthy subjects using 11 weeks training which enhanced strength maneuvers. The strength was assessed by hand grip and dynamometers; moreover the function was also evaluated with ramp walk, get up and go, and functional rodeo (10). The results indicated significantly better in shelf task and rodeo score between and after testing in both Pilates based training and moderate

resistance plus flexibility training groups. However, the Pilates-based training provided more changes than the control. Another study by Wimer et al examined Pilates and resistance plus flexibility training on dynamic strength and range of motion in 24 samples. After 10 weeks of training, there was no difference of flexibility between groups, and also there was no change of strength in Pilates group (11).

Regarding the benefits of Pilates on motor re-learning, this exercise promotes particularly core control and improves static and dynamic posture. It also enhances intralimb and interlimb coordination, aesthetically pleasing movement form, body awareness and static and dynamic balance. To support the benefit on core control, Harrington et al studied the ability of trunk muscles to control lumbopelvic posture in 36 asymptomatic females (12). The study design included of 12 subjects in the Pilates trained group, 12 in the abdominal curl group (both Pilates and abdominal curl groups attending a minimum of 25 classes in 6 months), and 12 were non-training controls. The study appears to indicate that Pilates trained subjects could contract the transverses abdominis muscle to maintain better lumbo-pelvic control than those who perform regular abdominal curl exercise or no abdominal reverse exercise.

The benefits of Pilates on balance and coordination were studied by Hall et al. They examined the effects of Pilates-based training on balance and gait in an elderly population. Thirty-one men and women participated in the study; 24 subjects completed the 10-week training program and all post treatment measures (30). The results indicated that Pilates-based training provided an effective mode exercise for improving static or postural balance in elderly adults. The evaluation of balance gait with the Berg Balance scale showed better improvement of static balance in Pilates-

based training compared with a strength plus flexibility training group, although the complexity of dynamic balance made it difficult to measure and determine the effectiveness of this or any training protocol.

The other benefit of Pilates is on psychological function; it enhances mood, motivational status, attention focus, enjoyment of life, and energy and zest (8). However, there is a limited amount of research related to psychological function, and the nearest associated studies conducted are based on aerobic exercise (16, 19, 22, 31, 32). Byrne et al stated that those performing regular exercise reported improvements in psychological outcome (i.e., stress, depression, anxiety, mood status). In agreement with Sunsern, the study indicated dramatic reduction in stress after participating fully in 40-50 minutes aerobic exercise and 2 times per week during 12 weeks in Thai populations (15, 16). Alternatively, Thomas et al remarked that grouping exercises enhanced societal relations due to the opportunity for individuals to exchange experiences and help each other. Some participants continued to conduct exercise together in spite of the termination of the investigation (25).

2.3 The control of lumbo-pelvic posture and clinical testing

Testing the control of lumbo-pelvic investigates the ability of the trunk muscles to hold the lumbo-pelvic region in a steady position during progressive level of leg loading. A key portion of these tests is the pre-contraction of deep muscles via a drawing in of the abdominal wall in preparation for the load and maintaining a neutral lumbar spine position. The pressure biofeedback is placed under the lumbar spine to detect movement of the lumbo-pelvic region. The pressure biofeedback assesses where movement away from neutral occurs. An important feature of the test

of lumbo-pelvic control is that the abdominal drawing-in action is performed first, prior to adding leg loading, and must be held (keeping the abdominal flat) throughout the entire test. The pressure in the unit will rise slightly while the patient pre-contracts the deep muscles with an abdominal drawing-in action. The patient is asked to maintain this pressure reading during the test procedure, indicating a steady position of the lumbo-pelvic region, and to keep the abdomen flat. Leg load is added gradually, when the leg load exceeds the muscle capacity, the pressure registered on the gauge changes. Ideally, there should be minimal change in pressure, indicating little lumbo-pelvic movement and a good ability of trunk muscles to support the spine (33, 34).

2.4 Flexibility

Flexibility is the ability to move a joint through its complete range of motion. It is crucial in athletic performance (e.g. ballet, gymnastics) and in the ability to accomplish the activities of daily living. Consequently, maintaining flexibility of all joints promotes movement; on the other hand, when an activity moves the structures of a joint beyond a joint's shortened range of motion, tissue damage can occur. Flexibility relies on a number of specific variables, including distensibility of the joint capsule, adequate warm-up, and muscle viscosity. Additionally, compliance ("tightness") of various other tissues such as ligaments and tendons influences the range of motion. Just as muscular strength is specific to the muscles involved, flexibility is relatively joint specific. Although, no single flexibility test can be used to evaluate total body flexibility, the sit-and-reach box test is one of acceptable method using in clinical and research bases. Flexibility may contribute to improve

physical performance, reduce energy requirements for movement of joints (because of reduced tissue tension), and reduce likelihood of soreness or injury with physical exercise (42).

2.5 Psychological stress

Stress is theorized as a particular relationship between the person and the environment that is appraised as taxing or exceeding his or her resources and endangering his or her well-being (35). It is operationally defined as subjects' written self-reported response to questions as measure by scores on Stress Inventory questionnaire (36). Exercise is important for both stress reduction and health promotion. The effect of exercise on stress responses remains to be clarified; sensitivity to stress is reduced after exercise training. Two broad explanations should be considered. The first is to reduce responses to concurrent or recent stress and also to cope with stress and other problems (37). The second possible effect would be to attenuate responses to stressors experienced shortly afterwards. By causing changes in several neurotransmitter systems, which have been causally implicated in behavioral adaptation, exercise plays an important role in coping with stress. It is believed that noradrenergic and opioid effects on antidepressant and mood improvement result in reduction of stress levels (38).

2.6 Education/application advantages

Results of this thesis study will demonstrate the training effect of Pilates method on lumbo-pelvic control, flexibility, and psychological stress in Thai adult populations. Physical and psychological improvement after Pilates training can be

applied as another therapeutic approach for physical therapy rehabilitation. Pilates may have a role in attenuating the predisposition to chronic axial musculoskeletal pain caused by spinal instability. Particularly, Pilates can benefit not only to athletes and individual with medical conditions such as low back pain but also to general population with the claims that it: “balances strength and flexibility”, “produces longer, leaner muscles”, “improves posture”, “increases core strength and peripheral mobility”, “helps prevent injury”, “enhances functional ease of movement”, “heightens body awareness”, and “improves performance in sports (e.g. golf, skiing, skating, dance)”, consequently improving both physical and mental health. In back pain prevention, Pilates may be another approach for therapists aim to prevent musculoskeletal injury and to retrain muscle dysfunction that shows to exist in almost all lower back pain sufferers.