

CHAPTER 1

INTRODUCTION

1.1 Rationale

Pilates is a core stabilizing exercise consisting of the following principles: concentration, awareness, alignment, breathing, centering, precision, coordination, lengthening and persistence (1). This approach combines the coordination of the body, mind, and spirit, termed “contrology”. The Pilates’ concepts focus on the core of the body, usually defined as the “powerhouse”. Pilates maneuvers aim to improve coordination and stability of muscles within the body in a gentle way, thus improving activation of trunk muscles enhance pelvic and lumbar spine control. It is believed that improving a strong powerhouse provides core stabilization. Consequently, the distal body segments can move both effectively and efficiently (2). Weakness and low stability of the core body are inclined to damage the proximal body parts and also reduce the effectiveness of the movement in the distal parts. With a less stable core, the pulling force of the working muscles will create greater movement at proximal attachments. Repetitive movements of the spine, resulting from contraction of many muscles that attach to the spine provide wear and tear. These effects can lead to increased repetitive stress upon the joints and soft tissues surrounding the spine, resulting in degeneration of the proximal part or spine itself. The local or core muscle system has a primary responsibility for segmental stability; it appears that both multifidus and transverses abdominis are important components of this system (3). There is a lot of theoretical evidence suggesting the vital role of trunk muscles in the stabilization of the lumbar spine, especially the multifidus and transverse abdominis

which have shown the most important role (4-6). The neuromuscular system also acts to maintain posture and reduces the impact of deleterious loads on the spine.

Specific training in muscle flexibility, strength, endurance, coordination and neuromuscular control could improve the control and support of the spine and pelvis. In chronic low back pain, it is assumed that pain recurrence is caused by repeated mechanical irritation of pain sensitive structures (7). It is suggested that a very specific type of exercise has provided effective pain relief for recurrent and chronic back pain. The mechanism for pain relief is due to improvement of control and stability of spinal segments which would diminish mechanical susceptibility, alleviate pain and prevent reinjury (4). The Pilates exercise has been used successfully in rehabilitation and training in various populations especially dancers and gymnasts. As elite performers, dancers and gymnasts often suffer from injuries resulting in a long recovery period and inability for peak performance. Despite the lack of supportive research-based data on Pilates exercise, anecdotal report by practitioners and clients indicate significant benefits on core control, static and dynamic posture, interlimb coordination, aesthetically pleasing movement form, body awareness and static and dynamic balance. The biggest advantage of Pilates exercise was indicated by Lange et al (8). This exercise improves flexibility and range of motion, muscular strength, endurance, power, and cardiorespiratory fitness. Recently, the claims for Pilates-inspired benefits made by practitioners and some scientific studies reveal the three benefits of this approach to promote physiological function, psychological function, and re-learning of functionally effective postural sets and motor patterns.

In the literature since the 1990s, Pilates' technique gained popularity in the rehabilitation setting among many clinicians in multiple fields of rehabilitation including general orthopedic, geriatric, chronic pain, and neurological rehabilitation.

Most of research in Pilates is related to flexibility and strength. Those studies consist of agreeing and controversial views, detailing the training program and aspects of studied groups. Although many assertions regarding the benefits of Pilates exercise have been made, only a small number of published experimental studies measure the effectiveness of Pilates exercise.

Segal assessed claims regarding the effects of Pilates based training on flexibility in 47 adult samples, resulting in an improvement in flexibility in Pilates training compared with a control group (9). Regarding the claims of Pilates training on strength, Aguilar studied the effect of moderate resistance plus flexibility training and Pilates-based training in functional strength in 26 healthy subjects (10). The result demonstrated improvement in function and strength (i.e., ramp walk, get up and go, and functional rodeo) of the Pilates training group.

In contrast, Wimer examined Pilates and resistance plus flexibility training on dynamic strength and range of motion in 24 samples (11). In the Pilates training group, there was no change of knee extensor strength after training and also no difference of flexibility between groups. Moreover, the data revealed that there was no change in flexibility in all groups. The effect of Pilates training on flexibility is still

controversial. Most of the studies to date have been conducted in an elderly population and compared the Pilates program with other types of stretching programs.

Further research is required to determine Pilates' effect on flexibility in the other sub-groups (e.g. adult) and compare the Pilates program with control condition in a well designed study. The Pilates benefit on re-learning of functionally effective postural

sets and motor patterns is supported by the study of Pilates training on the ability to contract the trasversus abdominis muscle in asymptomatic individuals (12). The transverses abdominis muscle is regarded as the vital trunk muscles in the

stabilization of the lumbar spine (5, 6). Evaluation in 36 asymptomatic females, by comparing Pilates training group (n = 12), abdominal curl group (n = 12), and control group (n = 12). After 6 months of training, the results indicate that Pilates training subjects could contract the transversus abdominis muscle to maintain better lumbo-pelvic control than those who perform regular abdominal curl exercise or no abdominal reverse exercise. Most research was conducted in Western populations using small sample size. Yet, there is no research that has focused on the significance of this experience in other cultural and ethnic groups. Moreover, it has been shown that Caucasoid, Nicoid, and Mongoloid have differences in the proportion of muscle type (13). This issue may also be a contributing factor to influence the training effect on ability to contract the transverse abdominis and lumbo-pelvic control (14). Up to the current date, there are no reports on the therapeutic effect of Pilates training from the Asian population for this specific outcome (i.e. ability to contract transverse abdominis and lumbo-pelvic control).

Regarding the psychological benefits of Pilates exercise, it has been claimed by many practitioners that Pilates training has a positive psychological influence, although there is a lack of scientific data to support this claim. Many studies suggest that exercise could improve psychological well being. Byrne et al stated that fitness gains after exercise reported concurrent improvements in psychological outcome (i.e., stress, depression, anxiety, mood status) (15). This study is in agreement with a study by Sunsern, showing that there was a dramatic reduction in stress after participating in 40-50 minutes, 2 times per week of the aerobic exercise program for 12 weeks (16). Other psychological benefits attributed to exercise include enhanced mental performance and concentration, improved self image, feelings of confidence, perception of mastery, greater sleep quality and a reduction in perceived feeling of

anger, time urgency, and time pressure (22-24). Thomas et al also indicated that exercise-induced increases in aerobic fitness have beneficial short-term and long-term effects on psychological outcome (25). However, regarding whether or not the Pilates program can modulate psychological functions (i.e., stress), no clear consensus has been reached. This suggests the need for exploration of the relationship between the Pilates program and psychological functions such as stress. Therefore, exploration on this topic is required to determine the influence of Pilates training on psychological components.

Today, there are an increasing number of health care practitioners using the Pilates-based approach in rehabilitation, health promotion, and the athlete training field. However, there has been little research on the effectiveness of Pilates exercise, and many studies to date have been poorly controlled (most studies are case reports and case series) and of a small sample size. Therefore, there would appear to be an opportunity to evaluate the effect of Pilates exercise with regard to lumbo-pelvic movement control, flexibility, and psychological stress.

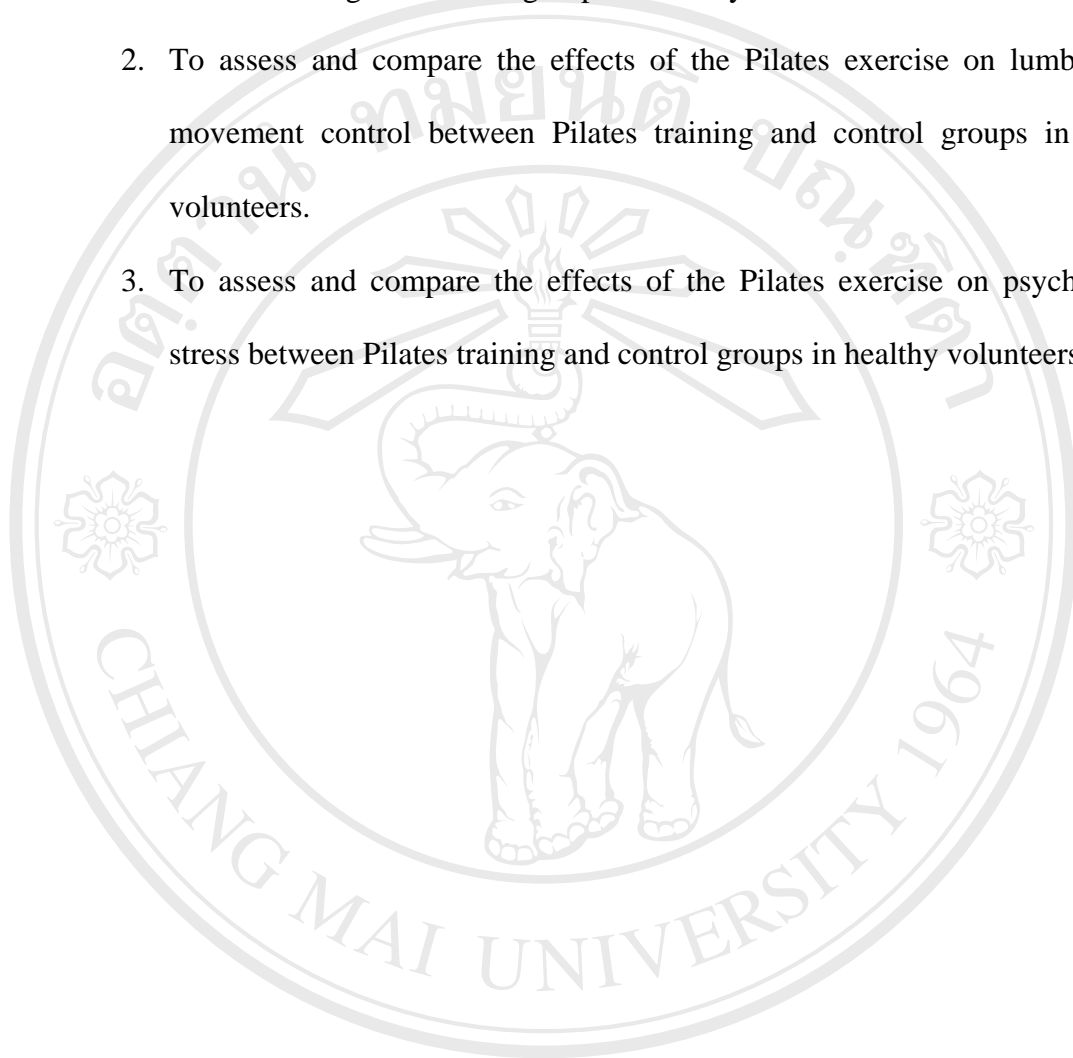
1.2 Research hypotheses

The following research hypotheses will be tested:

1. Pilates group significantly improves the lumbo-pelvic control better than the control group.
2. Pilates group significantly increases trunk & hamstrings flexibility greater than the control group.
3. Pilates group significantly promotes psychological status as fitness-well being by modulating stress levels better than the control group.

1.3 Purposes of the study

1. To assess and compare the effects of the Pilates exercise on flexibility between Pilates training and control groups in healthy volunteers.
2. To assess and compare the effects of the Pilates exercise on lumbo-pelvic movement control between Pilates training and control groups in healthy volunteers.
3. To assess and compare the effects of the Pilates exercise on psychological stress between Pilates training and control groups in healthy volunteers.



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