

CHAPTER I

INTRODUCTION

1. Rationale

Cerebral palsy (CP) is a motor disorder appearing in children due to damage of the brain before it has fully developed. The damage to the brain affects strictly the motor system, producing poor coordination, poor balance, or abnormal movement patterns. The motor disorder causes gait abnormal pattern which uses more energy expenditure and decrease of gait velocity during walking therefore, limits of activity daily living (ADL) that causes problems in communication, behavior, cognition and perception (1-3). Therefore, the aims of treatment are decrease of energy expenditure and increase gait velocity during walking. The prevalence of CP is 1.5 to 2.0 cases per 1000 births (3).

Recently, several researches have mentioned that forward walking training on a treadmill plays an important role in increasing the endurance and ability during walking. Morgan et al (4) found that the speed on the treadmill affected the energy expenditure in children with CP. The oxygen uptake or consumption (VO_2) increased with slow speed walking and decreased with fast speed walking. Dodd et al (5) reported the effect of gait training on the treadmill in children with CP by improving the gait velocity and distance during walking. Schndl et al (6) showed that gait training with partial body weight support (PBWS) on the treadmill could improve functional ability in children with CP. Since energy expenditure has been improved, the gait velocity and functional ability in children with CP are also better (5-7). In

addition, the treadmill training can assist therapists in correcting posture, stepping, and weight bearing during training by using PBWS which provides the proper upright posture as well as balance and safety during treadmill walking. Besides the forward walking training on a treadmill with PBWS, a backward walking training should be considered. Advantages of backward walking are reduction of ground reaction force at contact, stretching hamstring muscle during stride, improvement of muscle balance (agonist/antagonist relationships) (8), decreasing flexion angles of the trunk, hip and knee, facilitation of upright posture during walking, and increasing ankle dorsiflexion (9). Weng et al (10) and Yang et al (2) were found that that patients with hemiplegia improve motor function, balance, and walking velocity performing backward gait training. Children with CP have poor coordination, poor balance, gait abnormal pattern especially, crouch gait which is characterized by persistent hip and knee flexion during standing and walking (11-13). Therefore, if children with CP have gait training by backward gait training with PBWS on a treadmill, leading to improve muscle balance and postural, decrease flexion angle of the trunk, hip, and knee, facilitation of upright posture during training and walking, decrease of energy expenditure, and increase gait velocity. However, the evidences of children with CP performing backward gait training with PBWS are not found but there were some evidences that showed that patients with hemiplegia. Therefore, backward walking on treadmill with PBWS in children with CP is still needed.

2. Purposes of the study

2.1 Purpose of the study

The purpose was to evaluate the effects of backward gait treadmill training with PBWS in children with CP by comparing between a group of forward gait treadmill training with PBWS (Group A) and a group of the combination of forward and backward gait training with PBWS (Group B).

2.2 Specific objectives of the study

- 2.2.1 To compare energy expenditure, maximum gait velocity, gross motor function, and hip joint angle in the standing position between pre- and post-training in Group A.
- 2.2.2 To compare energy expenditure, maximum gait velocity, gross motor function, and hip joint angle in the standing position between pre- and post-training in Group B.
- 2.2.3 To compare percent changes after training of the energy expenditure, maximum gait velocity, gross motor function and hip joint angle in the standing position between Groups A and B.

3. Hypotheses of this study

- 3.1 For Group A, the energy expenditure, maximum gait velocity, gross motor function, and hip joint angle during standing position in pre-training significantly differ from those in post-training.
- 3.2 For Group B, the energy expenditure, maximum gait velocity, gross motor function, and hip joint angle during standing position in pre-training significantly differ from those in post-training.

3.3 The percent changes after training of the energy expenditure, maximum gait velocity, gross motor function, and hip joint angle during standing in Group A significantly differs from those in Group B.

4. Advantages of the study

The knowledge derived from the present study will: 1) help to understand more on the forward and backward gait training with PBWS in children with CP; 2) be useful for applying in clinical setting, especially for gait training in children with CP; 3) be helpful for a further study in gait treadmill training with PBWS.

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