Effects of Nordic Walking in Water Training on Glycemic Control and Vascular Function in Elderly with Type 2 Diabetes

Tawatchai Ploydang* Weerapan Khovidhunkit** Hirofumi Tanaka*** Dr.Daroonwan Suksom****,*****[1]

ABSTRACT

Nordic walking in water (NWW) is a novel therapeutic exercise that involves the whole body. Because it is a non-weight-bearing exercise performed in water, it is safe and suitable for a variety of older adults with chronic conditions. However, its efficacy on cardiometabolic risks has not been investigated. The purpose of this research was to determine the effects of NWW training on glycemic control, vascular function, and physical fitness in the elderly with type 2 diabetes (T2DM). Thirty-three elderly participants with T2DM were randomly allocated to non-exercise control (CON; n=17) and 16 participants in NWW groups. The NWW was performed 3 times per week for 12 weeks in pool temp of 34-36°C. Exercise bouts were 40-minute at 40-60% of HRR. The measurements were conducted in both groups before and after the 12-week interventions. We found that functional physical fitness measures including chair stand, timed up and go, chair sit and reach, reach and back scratch, and 6-minute walk test scores were all improved after the NWW training (all p-value < 0.05). NWW produced significant reductions in body fat percentage and resting heart rate (p-value < 0.05). Glycemic control markers including HbA1c and HOMA-IR decreased in NWW (HbA1c; Pre 7.59±0.63% vs Post 7.00±0.73%, HOMA-IR; Pre 2.76±1.25 vs Post 2.17±1.03) compared with CON (HbA1c; Pre 7.85±0.71% vs Post 7.78±0.71%, HOMA-IR; Pre 2.94±1.15 vs Post 3.41±1.56) (all p-value < 0.05). Vascular reactivity as assessed by flow-mediated dilatation (FMD) increased, and carotid artery intima-media thickness and brachial-ankle pulse wave velocity decreased (all p-value < 0.05). No such significant changes were observed in the CON. In conclusion, NWW is a safe and effective training modality to improve glycemic control, vascular function, and physical fitness in the elderly with type 2 diabetes.

Keywords: Insulin resistance; HbA1c; Vascular reactivity; Therapeutic exercise; Physical fitness

[1] *Corresponding author: Daroonwan Suksom, Ph.D., Faculty of Sports Science, Chulalongkorn University, Rama 1 Rd., Wangmai, Pathumwan, Bangkok 10300, Thailand; E-mail: Daroonwan.S@chula.ac.th*

**Student, Doctor of Philosophy in Sport and Exercise Science, Faculty of Sports Science, Chulalongkorn University, Thailand*

***Professor, Division of Endocrinology and Metabolism, Department of Medicine, Faculty of Medicine, and Hormonal and Metabolic Disorders Research Unit, Chulalongkorn University and Excellence Center in Diabetes, Hormone and Metabolism, King Chulalongkorn Memorial Hospital, Thai Red Cross Society, Bangkok, Thailand*

****Professor, Department of Kinesiology and Health Education, The University of Texas, Austin, USA*

*****Professor, Faculty of Sports Science, Chulalongkorn University, Thailand*

******Exercise Physiology in Special Population Research Unit, Chulalongkorn University, Bangkok, Thailand*