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HAND FUNCTIONS AMONG INDIVIDUALS WITH AND WITHOUT DIABETIC PERIPHERAL NEUROPATHY IN TYPE 2 DIABETES MELLITUS

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ABSTRACT

Hand functions are important for functional activities which is depended on the good sensory function, joint mobility, muscle strength, and manual dexterity. Previous studies revealed that diabetes mellitus (DM) patients with and without diabetic peripheral neuropathy (DPN) presented with decreased sensation, limited joint mobility of the hand, and low muscle strength including both hand and pinch strength as compared to the healthy individuals. This study aimed to investigate the effects of DPN on hand functions among patientswith type 2 diabetes mellitus (T2DM). Eighty-four T2DM patients with DPN, 84 T2DM patients without DPN, and 84 healthy controls participated in this cross-sectional study. The sensory function was assessed using the 10 g Semmes-Weinstein monofilaments. The wrist and finger joint's mobility were assessed using a goniometer, and grip and pinch strength was measured using the JAMAR hydraulic dynamometer and pinch gauge. The nine-hole peg test was used to assess dexterity. The Jebsen hand function test was used to assess hand's functional activities during the performance of activities of daily living (ADL). The Kruskal-Wallis test was used to analyse the data parameters. There were significant differences in the magnitude of sensory function, joint mobility, grip and pinchstrength, manual dexterity, and hand function duringADL ($p< 0.05$). T2DM patients with DPN demonstrated deficits in sensory function, joint mobility, grip and pinch strength and manual dexterity as compared to the T2DM patients without DPN and healthy control participants. The study showed that hand functions were affected in T2DM patients with DPN. Investigation of the association between DM with and without DPN would shed light on the better understanding of the hand function performance in this population.Further investigations are alsowarranted to explore the impact of DPN on the muscle activity related to the performance of hand functions in T2DM patients with DPN.

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF STUDY

Diabetes Mellitus (DM) is one of the most common causes of mortality and morbidity worldwide (Leon & Maddox, 2015). This disease is also one of the common chronic diseases globally with increasing prevalence each year (Leahy et al., 2015). An approximation of 425 million people in the world had DM in 2017, and this figure has increased from 382 million people in 2013 (Guariguata et al., 2014; International Diabetes Federation (IDF), 2018). In addition, type 2 DM (T2DM) accounts for 90-95% of DM cases that involved adult population and being an emergence issue to the health care system. In fact, an estimation of over than 500 million cases of T2DM worldwide in 2018 with greatest increase of prevalence in the lower-income countries (Kaiser, Zhang and Pluijm, 2018).

Locally, there were over 3,492,600 cases of DM in 2017 with 16.9% prevalence of DM in adults (IDF, 2018). The prevalence of DM has increased tremendously from 653,326 cases in 2009 to 2012 (National Diabetes Registry Report, 2012). The overall prevalence of type 2 DM in Malaysia was 17.5% while the prevalence of undiagnosed of type 2 DM was 9.2% (Ismail et al., 2018). In brief, Malaysia has become one of the top ten countries with a high diabetes prevalence between 2010 and 2030 (Shaw, Sicree, & Zimmet, 2010).

The high prevalence of DM may contribute to the economic burdens of the health care system in the management of DM especially in the developing countries (Meyers, Parasuraman, Bell, Graham, & Candrilli, 2014; Zhuo et al., 2014). The United States invested USD 239 billion on diabetes mellitus annually, and this contributes to about 36% of the global health expenditure (Control & Prevention, 2014). In Malaysia, it is reported that an estimated cost of RM42,362 was invested per patient per year for complications of DM, Diabetic Peripheral Neuropathy (DPN) and RM5,519 for foot amputation (Mustapha et al., 2017). This background information suggests an urgent need for effective DM management as this disease has become one of the Malaysia's