

UNIVERSITI TEKNOLOGI MARA

**ASSOCIATION OF FATIGUE
SEVERITY WITH PAIN LEVEL,
OBESITY INDICES, FUNCTIONAL
PERFORMANCES AND EXERCISE
CAPACITY IN WOMEN WITH
KNEE OSTEOARTHRITIS**

ASLINDA BINTI CHE MOOD

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ABSTRACT

Introduction: Knee Osteoarthritis (KOA) is a painful degenerative joint disease that may limit movement and lead to physical inactivity. This project was conducted in two phases. Study I, a case-controlled study comparing characteristics between women with and without KOA, and Study II aimed to determine factors associated with fatigue severity and exercise capacity among women with KOA. **Methods:** In study I, a case-controlled design recruited 33 female patients (mean age = 54.76 ± 5.54 years) diagnosed with KOA and 33 healthy participants (mean age = 53.30 ± 5.57 years). In study II, the cross-sectional design recruited 155 participants with KOA (mean age = 56.08 ± 7.59 years). Sociodemographic factors, pain level, obesity indices (body weight, body mass index, fat %, waist circumference), functional performances (handgrip strength, lower limb functional strength), quality of life (total and subscales of pain, stiffness, and physical function), fatigue severity and exercise capacity (6-minute walked distance, heart rate recovery, rating of perceived exertion) were measured. Data for Study I were analysed using independent t-tests and Chi-square test, while for Study II, Pearson's correlation and linear regression analysis were used. **Results I:** Individuals with KOA were significantly higher in upper limb strength, perceived fatigue, and poorer in lower limb functional strength (All $p < 0.05$). There was a significant difference in height ($p=0.046$), body weight ($p=0.001$), BMI ($p=0.002$), body fat ($p=0.029$), waist circumference ($p=0.006$), exercise capacity ($p=0.001$), level of pain ($p=0.001$), fatigue levels through HRR immediately after 6MWT ($p=0.038$) and Borg Scale before 6MWT ($p=0.005$), immediately after ($p=0.001$), at 5th ($p<0.001$), 10th ($p<0.000$) and 15th minute ($p<0.001$) post 6MWT between both groups. No significant difference in the muscle mass between participants with and without KOA ($p=0.785$). **Results II:** In the stepwise multiple regression analysis, fat % and total QOL emerged as the most significant predictors for fatigue severity. Exercise capacity significantly predicted by lower limb functional strength, waist circumference, hand grip strength, age and pain level. Stepwise multiple regression analysis showed that fat percentage ($\beta = 0.815$, $p < 0.001$) and total quality of life ($\beta = 0.261$, $p < 0.001$) were the strongest predictors of fatigue severity ($R^2 = 0.110$, $F(1,153) = 14.903$, $p < 0.001$). Exercise capacity was significantly predicted by lower limb functional strength ($\beta = -3.907$, $p = 0.002$), waist circumference ($\beta = -1.395$, $p = 0.016$) ($R^2 = 0.108$, $F(2,152) = 9.194$, $p < 0.001$). Additionally, handgrip strength ($\beta = 0.959$, $p < 0.001$) significantly predicted heart rate recovery at 0 minutes ($R^2 = 0.078$, $F(1,153) = 12.977$, $p < 0.001$). **Conclusion:** The findings of this study suggest that individuals with KOA may have lower functional strength of the lower limb and higher perceived fatigue. Fat % and total QOL may influence the perception of fatigue severity. While exercise capacity may be influenced by lower limb functional strength, waist circumference, hand grip strength, age, and pain level. **Implications for practice:** The outcomes of this study provide understandings of the factors that may interfere with exercise capacity and helpful to clinical management for individuals with KOA. Healthcare providers must consider pain, fatigue, body weight, lower limb and hand grip strength when planning the exercise for the women aged 40-65 years old with and without KOA to provide effective exercise for them. In the future, it is recommended to perform a similar study with a larger sample size to allow the variables to be tested more accurately.

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TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	xi
LIST OF TABLES	vi
LIST OF FIGURES	xiv
LIST OF PLATES	xv
LIST OF ABBREVIATIONS	xvi
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Research Background	1
1.2.1 Definition of Osteoarthritis	1
1.2.2 Prevalence of Osteoarthritis	2
1.2.3 Pathology of Osteoarthritis	4
1.2.4 Burden of Osteoarthritis	5
1.2.5 Risk Factors of Osteoarthritis	6
1.3 Motivation for This Work	8
1.4 Problem Statement	11
1.5 Research Question	13
1.6 Research Objectives	13
1.7 Research Hypotheses	13
1.8 Significance of Study	14
1.8.1 Body of Knowledge	14
1.8.2 Clinical Practice	14
1.8.3 Future Study	14
1.9 Scope of the Study	14
1.10 Definition of Terminologies	15

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter describes the background of the study to present the importance and justification of conducting the study. Subsequently, the problem statement is presented to provide the gaps in the previous studies and support the need for the current study. This chapter also outlines the research objectives and hypotheses of the current study. Finally, the significance of the study, the scope of the study and the operational definition of the main keywords used in the study are presented.

1.2 Research Background

1.2.1 Definition of Osteoarthritis

Osteoarthritis (OA) is a common slow progressive degeneration and pathological process of the joint, characterised by thinning or loss in cartilage, changes in subchondral bone, degeneration of the meniscus and synovial inflammation (Araujo et al., 2016; Favero et al., 2015; Karande & Kini, 2018). Geng et al. (2023) defined OA as a wear and tear of the joint cartilage, subchondral bone formation, osteophyte formation, and the changes in the synovial membrane.

The classification of OA depends on its cause being primary or secondary. The development of primary OA requires multiple interacting elements including mechanical stress, inflammation, metabolism, immunity and genetics and risk factors include age, genetics, body weight, sex and race. Secondary OA develops mostly from three underlying causes including trauma and congenital articular dysplasia and iatrogenic injury (Bannuru et al., 2019). The degenerative lesions of OA represent active tissue changes from an imbalance that develops between tissue destruction and healing processes. The pathological changes lead to tissue damage in particular bones together with subchondral bones as well as ligaments and synovium and joint capsule and periarticular muscular structures (Peng et al., 2021).