

UNIVERSITI TEKNOLOGI MARA

**PHYSIOLOGICAL RESPONSES OF
UNILATERAL VERSUS BILATERAL
ACUTE RESISTANCE TRAINING
AMONG TRAINED WOMEN**

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Dissertation submitted in partial fulfillment
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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.


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ABSTRACT

Resistance training (RT) refers to a method of physical conditioning of complex programming which consists of progressive and various training techniques to achieve the desired training goals. An appropriate programme design is the key to success; where exercise selection is one of the critical factors. The selection of exercise will expose different stimulation as in the application of the specific adaptation on imposed demand principle. The option of choosing either bilateral (BI) or unilateral (UNI) exercise is an important decision to perform in the construction of any strength or RT programme. This study aimed to investigate the physiological responses of unilateral versus bilateral acute RT on heart rate (HR), blood pressure (BP), blood lactate (BLa), blood glucose (BG), creatine kinase (CK) and rate of perceived exertion (RPE). Sixteen ($n = 16$) trained women with mean age of 23.31 ($SD = 1.35$) years old went through a total body exercise session for each unilateral and bilateral protocols which both consisted of major muscles group for 80% 1RM, 10 repetitions to maximal effort for 3 sets. The results revealed that all variables examined including HR, systolic blood pressure (SBP), diastolic blood pressure (DBP), BLa, BG, CK and RPE were statistically changed ($p < .001$) across the times. Apart from that, unilateral and bilateral RT imposed significantly different stimulus on SBP, BLa and CK ($p < .05$).

Keywords: *Resistance training, unilateral, bilateral, heart rate, systolic blood pressure, diastolic blood pressure, blood lactate, blood glucose, creatine kinase, rate of perceived exertion*

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CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Over the past twenty years, resistance training (RT) has massively grown in popularity for improving athletic performances (Kraemer & Ratamess, 2004), cardiovascular, body composition, improving health (Blair & Connelly, 1996) increasing bone mass (Allison, Folland, Rennie, Summers, & Brooke-Wavell, 2013) as well as enhancing mental health (Kirkcaldy, Shephard, & Siefen, 2002).

RT refers to a method of physical conditioning of complex programming which consists of progressive and various training techniques to achieve the desired training goals (Miller, Cheatham, & Patel, 2010). RT which gained popularity in 1960s was then used by few athletes such as in strength-based-sports and body-building who strived for the hypertrophy effect (Miller et al., 2010). At present, a better understanding in RT gained indicated that it also provides various stimulus and training effects. Most if not all of RT exercises can be perform either unilaterally or bilaterally.

Unilateral (UNI) exercise refers to a loading on one limb at a time (arm or leg) during an exercise movement such as lunges and one-sided (unilateral) chest press. It often used as a variation for bilateral exercise such as bilateral bench press and squat (McCurdy, K. W., Langford, Doscher, Wiley, & Mallard, 2005; Waller & Whittall, 2008).

Bilateral (BI) exercises provides a simultaneous loading on both limbs (either legs or arms) during exercise such as in the bilateral squat, bilateral bench press and bilateral bench pull. Bilateral exercise involves the combination of efforts from both limbs to produce force against a single load (Baechle & Earle, 2008).

Sports have become more competitive, each country and each athlete always trying to improve their performance for a better record. As an example, the 100 meters sprint World Record was once held by Calvin Smith from United States of America (USA) with 9.93 seconds in 1983. The World Records were constantly improved over time and the latest record was held by Usain Bold from Jamaica with