ORIGINAL ARTICLE

GENDER BASED VARIATION IN SIMPLE MUSCLE TWITCH

Sadia Shah, Urooj Bhatti, Saad Memon, Muhammad Qasim Memon

Department of Physiology, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan

Background: Muscle twitch or fasciculation is an involuntary action marked by small muscle contractions as a result of action potential. Aim of this study was to determine the gender based variation in the current required to develop muscle twitch. **Methods:** This cross-sectional study, using convenient sampling procedure was carried out in the Physiology department LUMHS, Jamshoro. The study was carried out on PowerLab® with stimulating bar electrode as transducer. Fifty male and fifty female students of 1st and 2nd year MBBS were enrolled in the study. Data was analysed on MS Excel 2013. **Results:** The mean current required for muscle twitch to develop was more in case of males (67.064±105 mA) than that of females (41.41±0.69 mA). **Conclusion:** The skeletal muscles of the females require less current to develop muscle twitch.

Keywords: Muscle Twitch, Action Potential, PowerLab

Pak J Physiol 2015;11(4):30–1

INTRODUCTION

Muscle twitch, also called as fasciculation is a physiological phenomenon. It is an involuntary action marked by small muscle contractions, as a result of action potential. A single action potential causes a brief contraction of muscle followed by relaxation. After depolarisation muscle twitch starts in about 2 mSec before the repolarisation of a membrane is complete.[1] Depolarisation of muscle fibre initiates contraction by a process called excitation-contraction coupling. The action potential runs via T-tubular system and causes release of calcium ions from sarcoplasmic reticulum, which then binds to troponin-C to initiate contraction. Uncovering of myosin head binding sites on actin. Formation of cross linkages between actin and myosin and sliding of thin on thick filaments produces shortening of muscle fibres. Relaxation is caused by Pumping back of calcium to sarcoplasmic reticulum.[2] The energy required for contractile process is obtained by breakdown of adenosine triphosphate (ATP) into adenosine diphosphate (ADP) and inorganic phosphate (Pi).[3] Interaction of one myosin filament, two actin filaments and calcium ions in presence of ATP causes contraction.[4]

There is a wide range of conditions resulting into twitching of muscles. The common and less serious causes include exercise, stress, anxiety, and excessive use of caffeine, psychiatric illness, and reaction to drugs like corticosteroids. Often twitching is seen in eyelids, calves and thumbs.[5]

The aim of the study was to determine the current required to develop muscle twitch both in males and females.

METHODOLOGY

A cross-sectional study, using convenient sampling procedure was carried out at Physiology Department LUMHS Jamshoro, from December 2013 to December 2014. Fifty male and 50 female students of 1st and 2nd year MBBS were included in study after a verbal informed consent. PowerLab® was used for this study with stimulating bar electrode and transducer. It was ensured that the stimulator switch is off and then after applying the gel on the skin of the volunteer, the stimulating bar electrode was placed over the volunteer's ulnar nerve at wrist along the axis of arm with red dot close to elbow. In stimulator panel current was set to 5 mA. Start icon was then clicked and stimulator was switched on. The stimulator status light flashed green indicated that the chosen current passed thru the skin of the volunteer, and waited to observe twitch contraction in thumb and fingers.

Simultaneously, the current was slowly being increased till the twitch appeared, and then the reading was noted. The data were analysed using Microsoft Excel-2013. The numerical variable like current was expressed as Mean±SD and Student's *t*-test (two tailed) was applied to compare the means between male and female subjects, and $p \leq 0.05$ was considered statistically significant.

RESULTS

The mean current eliciting a muscle twitch was 67.064±1.05 mA in males, while it was 41.41±0.69 mA in females. There was highly significant differences in current between males and females ($p<0.00001$).

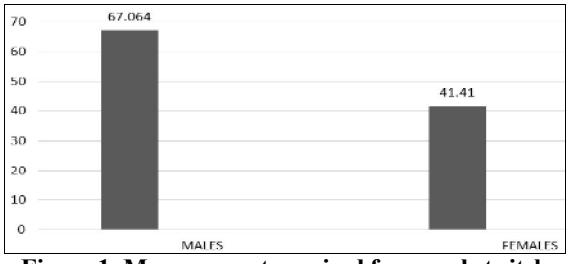

Figure-1: Mean current required for muscle twitch (mA)

DISSCUSION

According to the present study, less current was required to cause muscle twitch in females, than males.

Many underlying factors are thought to be responsible for this change, including significant life stress, such as divorce or some other traumatic event, genetics, muscle mass and strength and hormonal changes.[6] Physiologically men may have more muscle mass, but women may have more endurance, which is the ability of a muscle group to contract over long periods of time. Muscle endurance may be affected by different muscle recruiting patterns between men and women. Because of an effective activation pattern, females have increased muscular endurance than men.[7] Women fatigue less quickly than men because they recruit more synergistic muscle groups.[8] Thus, men have more muscle mass, but they do not necessarily have more muscular endurance than women.[9]

In males, androgens act by a physiological mechanism to regulate multiple gene pathways controlling muscle mass, strength, and fatigue resistance.[10] Men have more testosterone and more lean body mass or muscle compared to women. However, more muscle does not mean more muscular endurance.[11]

CONCLUSION & RECOMMENDATIONS

The skeletal muscles in females require less current to develop muscle twitch. It would be worth to do a prospective study on all three types of muscle to see the current required to initiate the contraction in skeletal, cardiac, and smooth muscles.

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Address for Correspondence:

Dr Urooj Bhatti, Lecturer in Physiology, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan.
Cell: +92-333-2671404
Email: uroojbhatti@yahoo.com