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Biopac Student Lab® Lesson 1
ELECTROMYOGRAPHY (EMG) I
Data Report
Rev. 02202020

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ELECTROMYOGRAPHY I

- *Standard and Integrated EMG*

DATA REPORT

Student's Name: A. T. P. Amarasekara

Lab Section: EMG I

Date: 2023/05/04

I. Data and Calculations

Subject Profile

Name: Dilupa Bandara Height: 175 cm Gender: Male / ~~Female~~

Age: 23 yrs Weight: 65 kg Dominant arm: Right / ~~Left~~

A. EMG Measurements

Table 1.1

Clench #	*Dominant arm* 40 Mean	*Nondominant arm* 40 Mean
1	0.05539 mV-sec	0.03146 mV-sec
2	0.12106 mV-sec	0.06798 mV-sec
3	0.28413 mV-sec	0.07748 mV-sec
4	0.41374 mV-sec	0.08341 mV-sec

B. **Use the mean measurement from the table above to compute the percentage increase** in EMG activity recorded between the weakest clench and the strongest clench of Dominant arm.

Calculation: (0.41374 - 0.05539)/0.05539 Answer: 646.96 %

C. Tonus Measurements

Table 1.2

Between Clenches #	*Dominant arm* 40 Mean	*Nondominant arm* 40 Mean
1-2	0.02087 mV-sec	0.01396 mV-sec
2-3	0.02179 mV-sec	0.01671 mV-sec
3-4	0.04756 mV-sec	0.02421 mV-sec

II. Questions

D. Compare the mean measurement for the right and left maximum clench EMG data.

Are they the same or different? Different

Which one suggests the greater clench strength? Right

Explain.

The right arm shows a greater clench strength as it's the dominant arm of the subject. The grip and the strength of the dominant arm in comparison to the non-dominant arm is higher as the neural connection to the dominant arm is stronger.

As the person grows, the dominant arm's strength increases since it receives more training while engaging in day-today activities.

E. What factors in addition to sex contribute to observed differences in clench strength?

Muscle size (build of the subject) and injuries or any disabilities can contribute to observable difference in the clench strength. Also, if the subject is an athlete, the difference would be much noticeable as they train specific muscles to engage in the sports activity and hence the strength of the muscles increase.

F. Does there appear to be any difference in tonus between the two forearm clench muscles? Yes

Would you expect to see a difference? Does Subject's gender influence your expectations? Explain.

Although both arms would be in muscle tonus (state of readiness), the reaction of the dominant arm would be quicker than the non-dominant arm. Hence the, mean value of tonus measurement of the dominant arm is slightly higher than that of the non-dominant arm.

Subject's gender would also affect this difference since in general, males have a higher clench strength than females. Therefore, the tonus measurement for males is expected to be higher than that for females.

G. Explain the source of signals detected by the EMG electrodes.

The electrical signal starts from the activation of Motor Neurons located in the spinal cord by receiving signals from the Central Nervous system to initiate a muscle contraction. Then an action potential is generated and is propagated along the motor neurons. This potential is received by the muscle fibers through the connection with the motor neurons at neuromuscular junctions. This action potential releases Neurotransmitters which activates the muscle fibers and eventually resulting in the contraction of the muscle. These electrical signals are measured by the EMG electrodes.

H. What does the term "motor unit recruitment" mean?

Motor unit recruitment is the process of increasing the no. of simultaneously active motor units in a muscle by the brain, by activating the nervous system and controlling the contractions of the skeletal muscle fibers, due to a necessity of increase of muscle strength to perform a given task.

I. Define skeletal muscle tonus.

Skeletal muscle tonus is the continuous low-level (partial) contraction of skeletal muscles at rest. Even when the muscle is not being used, it maintains a certain level of tension and this helps in maintaining the posture, stabilizing joints.

J. Define electromyography.

EMG is a diagnostic technique used to evaluate and record the electrical activity produced by the skeletal muscles and involves measurement and analysis of the signals during contractions as well as rest.

End of Lesson 1 Data Report