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Letter to the Editor

Unless all Factors Influencing Muscle Endurance are Included in the Analysis, any Potential Effect of Chewing Tobacco Remains Questionable

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Letter to the Editor

We read with interest the article by Noorain *et al*. regarding a cross-sectional study on the effects of tobacco chewing on the electrical and mechanical parameters of muscle performance in 40 obese subjects who chew tobacco and 40 obese subjects without this habit [1]. Endurance time was longer in non-tobacco users than in tobacco users [1]. Although the study is interesting, several points warrant further discussion.

The first point is that endurance time depends not only on whether a person consumes tobacco but also on numerous other factors [2]. These include: Cardiovascular performance (stroke volume, capillary density); the number and size of mitochondria in muscle fibers; the proportion of type I muscle fibers (which are fatigue-resistant and specialized for aerobic endurance); movement economy; the lactate threshold (the exercise intensity at which lactate accumulates faster than the body can clear it); maximal oxygen uptake; muscle and liver glycogen stores; fluid balance and mineral concentrations; sleep quality (which promotes muscle recovery); haemoglobin levels; motivation, and mental toughness; genetic factors; and environmental conditions, such as altitude, humidity, and temperature, that influence oxygen availability and thermal stress on the body [2].

The second point concerns the discrepancy between the definition of obesity stated in the introduction (BMI >24 kg/m²) and the definition cited in the methods section (BMI >22 kg/m²) [3]. This inconsistency should be clarified. According to the WHO definition, a BMI >24 kg/m² is classified as obesity [3]. Was an alternative definition used for the present study?

A third point is that surface EMG measurement is susceptible to artifacts [4]. Furthermore, surface EMG cannot capture the activity of deep-seated or small muscles. EMG signals can be distorted by the electrical activity of adjacent muscles, external power sources, or movement artifacts. Even a deviation of one centimeter in electrode placement from the ideal muscle belly can significantly compromise data accuracy or result in signals being recorded from a tendon instead [4]. Body hair, sweat, and the use of dry or gel-coated electrodes alter skin impedance and can degrade signal quality. Moreover, the relationship between surface EMG signal amplitude and muscle force is non-linear and is strongly influenced by fatigue and joint position [4].

A fourth point is that the use of hand dynamometers entails various disadvantages. Most models require adjustment to the individual's hand size; measurement accuracy suffers if the grip span is incorrectly set; there is a lack of a universally standardized testing position, which compromises inter-tester reliability; the rigid handle and the requirement for maximal grip force can cause discomfort, potentially reducing the patient's willingness to exert effort and, consequently, the validity of the test; additionally, while static isometric force is measured, dynamic movement patterns are not [5].

A fifth point is that surface EMG was also recorded from an extensor muscle; therefore, the correlation with handgrip strength, which primarily measures the hand flexors, is not meaningful. A sixth point is that the conclusion (that tobacco chewing might be associated with altered muscle endurance) is untenable due to methodological flaws. Unless all factors influencing muscle endurance are included in the analysis and the limitations of surface EMG measurement are addressed, the results obtained and their interpretation - may be misleading.

Finally, assuming tobacco use does affect muscle performance, it should be clarified whether this effect is dose-dependent. Was the amount of chewed tobacco estimated, and was there a correlation between endurance performance and the dose?

Keywords: Tobacco Chewing, Obesity, Dynamometer, Surface EMG, Endurance

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