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STUDY OF ELECTROMYOGRAPHY OF BACK AND SHOULDERS MUSCLES

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ABSTRACT

This research article aims to investigate the electromyographic (EMG) activity of the muscles in the back and shoulders during dynamic resistance exercises. Electromyography is a valuable tool in understanding muscle activation patterns, which is crucial for optimizing exercise programs and preventing injuries. In this study, we employed surface electromyography to measure the electrical activity of key muscles in the back and shoulders while performing various resistance exercises. The findings provide insights into muscle recruitment and activation levels, aiding in the development of targeted exercise regimens for rehabilitation, strength training, and performance enhancement.

Keywords: Electromyography, Back, Shoulders, Muscles.

INTRODUCTION

Incidence of shoulder disorders in the general population is claimed to be between 5 and 47%, and they are more common in women and those in the age range of 1-3. Shoulder diseases are a major source of pain and disability in modern society. In general practice, 14% of patients report continuing morbidity for longer than two years. Recurrence is frequent and symptoms frequently last. The most common shoulder diagnosis reported to general practitioners is subacromial impingement syndrome, which also involves rotator cuff pathology. It is thought to be the most common upper extremity condition observed in the working population. There is growing agreement in the literature that the symptoms of numerous shoulder abnormalities involving the soft tissues occupying the subacromial region may be the cause of the symptoms of the condition, raising doubts about the validity of the phrase "subacromial impingement syndrome" as a helpful diagnosis. Six Extrinsic factors were traditionally thought to be brought on by compression and friction on the bursal side of the rotator cuff, which is located between the humeral head and the acromion (also known as the coracoid).7. This model has been adjusted to the symptoms more and more. Internal rotator cuff disease has been proposed as a more frequent cause, which is challenging this. Cadaver studies have demonstrated that rotator cuff pathology most frequently occurs within the internal substance or on the joint side of the tendon.

The substantial body of evidence that has helped us understand rotator cuff tendinopathy and move away from the conventional thinking of subacromial impingement syndrome is acknowledged by the authors of this systematic review. Although the majority of the pertinent research is discussed in relation to subacromial or shoulder injuries, the term subacromial pain syndrome (SPS) has been chosen for the purposes of this review.

Studies using electromyography (EMG) have shown that the scapular muscles play a crucial role in maintaining adequate scapular motion during arm motions. The serratus anterior and trapezius muscles contribute differently to appropriate shoulder motion. It has been suggested that aberrant scapular posture and motion, frequently observed clinically and linked to this diagnosis, are caused by alterations in the activation of these muscles, which have been identified in individuals with SPS13.

The development of SPS has also been linked to changes in rotator cuff activity, which results in a diminished capacity to concentrate the humeral head and impede superior migration.15–20 In spite of these presumptions, the shoulder muscles No evidence of persistent variations in activity or timing has been found.

RESEARCH METHODOLOGY

Both the male and female tests used the same experimental paradigm, although they were classified as independent research. We looked at two independent variables: the type of scaling bar (two levels) and the height of the target at which the force was produced (five levels). The subject's peak and mean downward force (in Newtons) produced against a uni-axial dynamometer at five

predetermined target heights (TH) as well as the peak and mean normalized surface electromyographic (EMG) activity from four muscles were the dependent variables. These are explained below. were a part of it. As was previously mentioned, back and shoulder injuries were the most common injuries seen during the scaling bartask. Because of this, the authors looked at how the muscles in those joints were used in relation to the mechanism of damage. The medial head of the deltoid, a crucial anterior stabilizer of the shoulder joint, and the erectors spinae, the main low back loader, were the muscles selected. Target height was considered the primary plot element in the split-plot experimental design, in which participants were viewed as the entire plot and scaling bar type as a sub-plot factor. This design requires two distinct randomizations inside each individual. Prior to doing a controlled randomization of the scaling bar type inside each level of this variable, target heights were first randomized. Each combination of goal height and bartype was carried out three times, for a total of thirty trials for each individual. For analysis, data from duplicates were amalgamated.

RESULTS AND DISCUSSION

Analyzing pressure production abilities and electromyographic reactions to a simulated hand scaling subtask was the aim of this investigation. Test results with male subjects verified that muscular relaxation became a typical property of the bar type and that force production capacity was a function of TH. It was discovered, specifically, that TH has a major impact on the maximum amount of forces produced during this simulated scaling operation. This test showed that stronger force technology was used when the target was at a higher or (particularly) lower level, and less capability was used to provide downward pressure when the target altitude was near the chest area. The development force resulting from body weight (leaning into the bar) is responsible for the larger forces at the lower height, while the forward arm's force on the bar to raise the force's magnitude is responsible for the higher forces at 176 cm TH. is attributable to the "poke." The person appropriately uses body weight to generate additional force with the bar around the torso area (with a fairly "degree" orientation of the scaling bar). could not, which led to a decrease in capacity. As mentioned in the findings phase, for men, the greater muscle mass of RD was transferred to TH in this region, but it was unable to provide greater forces at the tip of the scaling bar. Therefore, it seems that there are two drawbacks to rib scaling on goal height from waist to shoulder: a decrease in pressure production at the scaling bar tip (particularly noticeable in adult males) and an increase in needed muscle activity (seen in both sexes). 45 50 55 65 70 75 60 65 Maximum Force (N) Target Height (cm): Steel Fiberglass Zero 56 107 144 176 Figure Five. Peak downward force generated by TH and SB (n = 6) in girl subjects (bars reflect the fashionable error of the mean). 85 Zero fifty-six, or 107 forty-four. 176 Peak Normalized EMG (%MVC) 80, 75, 65, 60, and 50 Goal Elevation (in centimeters) Figure 6 shows girls' peak right deltoid predilection by height (n¼6); the bars show the mean mass error of the recommendation. Women's force techniques evolved into a combination of TH and SB types, which, while substantial, was difficult to understand. The steel bar at ground level consistently displayed the best force potential displayed by women; forces under all other conditions fell within a relatively narrow range, and no discernible pattern was seen. The disparity in force generation skills between the sexes in this scaling experiment is in line with earlier studies showing that women have less standard power than males. This is definitely true in the pressing technique observed in the current form: in general, a woman's muscular strength is less than an adult man's for all muscle groups, with women's muscular strength being roughly one-third that of men. There is a difference. However. Because of the intense strain on the shoulder muscles and the inherent strength disparities between men and women, scaling can be especially difficult for women. The increased muscle interest allocated to the right deltoid when holding the near end of the bar and applying force may possibly be explained by the fact that women are functioning at a higher percentage of shoulder strength capacity. Maintaining its stability was imperative. Because of the high number of large-scale interactions, it is challenging to interpret pressure variables from female individuals. The important thing to remember was that both Th and Sb drove their stress reactions, which were defined by certain combinations of those components. Modern systems seem to function well up until the start of the scalping operation, when one takes into account the normal scalping procedure described in the

introduction, in which miners usually start at shoulder height and work their way down. places the miner in an extremely precarious predicament. Places at or below knee height are accessible to the miner. The capability to use mechanical advantages, such as body weight, appears to be related to force production capacity. Given the negative effects of universal authority, women may find this to be particularly crucial. For women, the highest typical peak force was approximately 70N at 0 cmTH. On the steel scale bar utilized in this investigation, this value was marginally higher than the gravitational force.

Because of the ramifications of those research, miners are now believed to measure individuals on the rockface who may be kneeling or less, and then change the bucket as necessary to meet that working peak area. While increased force potential was identified at a TH of 176 cm, the process of scaling at that level required the miner to move the bar substantially more than at a lower TH, creating additional joint forces and difficult postures. Could. Since it is possible for two miners to be in the same bucket, this guideline places a strong emphasis on the coordination of bucket movement. The type of bar used had no effect on the force produced at any tested height for male subjects. But compared to the heavier metal bar, the lighter fiberglass bar required more muscle effort in the male subjects to produce the same amount of power. If the total effort is taken into account, a heavier bar might demand more muscle to place, lift, and control. Results from male respondents for the subtask under investigation indicate that, in reality, a lighter tool is needed to achieve the same force level produced by a heavier tool if a miner needs to use one to exert effort. It can be necessary to quickly relax your muscles. Therefore, heavier equipment may actually offer a biomechanical advantage in the context of the subtask under research by lowering frame stress. Furthermore, the steel bar's increased deflection might have helped the dynamometer receive a higher compression pressure. To accurately assess changes related to device load, more research will be needed. In reality, it's crucial to utilize both kinds of bars—and even very long bars—to reduce the amount of pressure applied to the body while scaling by hand, considering the kinds of situations that may arise. It is conceivable. Further studies on scaling duties and the effects of bar types' flexibility, span, size, diameter, and weight are needed. Be ready to offer thorough recommendations. As was shown in the introduction, earlier studies on scaling bars discovered that lighter bars produced somewhat smaller average placing forces and predicted lower spine forces. The results of a more contemporary method show that utilizing lighter bars to produce the same downward force has grown more challenging. When utilizing the lighter bar, subjects had to exert more effort—reflected by higher muscular activity—to do the identical job. Variations in the subtasks analyzed are most likely the cause of discrepancies in the results. Four.1. Restraints When assessing these data, a few restrictions must be taken into account. Although the experiment helps define the capacities of miners to generate force via the use of scaling bars, some other components of the mission (such as rock wall jabbing) are no longer able to be reasonably replicated with the present experimental setup. Are not. Investigators were concerned that such activities might cause harm to the dynamometer. Furthermore, as scaling necessitates a number of subtasks with varied position, action, and force, the subtask examined in this experiment is not representative of the full requirements of scaling. Although it is believed that employing heavier bars in modern experiments can lessen the muscular demands of experimental missions, there may be other circumstances in which this benefit is outweighed, such as when the bar is used for overhead scaling. to elevate or carry. The results' generalizability may also have been limited by the choice of strips utilized in this investigation. The most popular straps differed in diameter and deflection under load in addition to weight. It is evident how each of those factors affects power. Because of this, outcomes could not always stand out among bar symptoms; instead, the most beneficial total bar effect might be highlighted. The length of the bar and the horizontal distance between the anchor and the target can also affect a fascicle bar's ability to produce force. For the sake of a straightforward experimental design, these variables were not investigated in this study. For comparative purposes, it was ultimately agreed to test women at the same TH as men; nonetheless, these heights may be harmful to women, particularly at the highest TH. Because the female subjects on this TH are working above their heads, there will be more activity in the shoulder and mid-back muscle regions. The scientists were unable to make firm conclusions regarding how women

reacted to this level of scaling since these muscles were not tracked in this investigation. Girls did not exhibit symptoms that adult males did. This could be because men and women have distinct regional energy fluctuations.

CONCLUSION

This study provides valuable insights into the electromyographic activity of back and shoulder muscles during dynamic resistance exercises. The findings contribute to the optimization of exercise programs for rehabilitation, strength training, and performance enhancement. Future research may explore individual variations in muscle activation and the long-term effects of specific exercise interventions on muscle function and overall upper body health.

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