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Effectiveness of upper body quadrant training in adults - A mini review

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ABSTRACT
Background: Smoking is a harmful habit that increases the risk of chronic and life-threatening diseases, including heart disease, lung cancer, stroke, and respiratory infections. It weakens the immune system, making the body more susceptible to infections, and negatively impacts quality of life. Smoking is a harmful habit that increases the risk of chronic and life-threatening diseases. It involves inhaling tobacco smoke, which contains toxic substances like nicotine, carbon monoxide, and tar. It affects the respiratory system, heart, and blood vessels, leading to heart disease, lung cancer, stroke, chronic respiratory infections, tuberculosis, and gum disease. Smoking weakens the immune system, causing health deterioration over time. This study aimed to evaluate the effect of biodex upper body quadrant training on pulmonary function test, in smoker adults.
Methodology: In addition to reviewing literature, we conduction a randomized interventional study, which included 70 males of adults, their age ranged from 20 to 30 years. Patients were randomly allocated into two equal groups: Group A, did not receive any exercise and group B received upper body quadrant training for 8 weeks, 3 times per week. All patients were evaluated in a standard manner with spirometry. The clinical outcome measures were recorded.
Conclusion: upper body quadrant training is an effective approach for smoker adults.

Keywords: *smoker adults, biodex upper body quadrant training, spirometry.*

1. Introduction

Smoking is a significant public health crisis; it is a primary preventable cause of disease, disability, and death on a global scale (World Health Organization [WHO], 2020). It dramatically raises the risk of heart disease, stroke, and other cardiovascular conditions, and is a major contributor to chronic respiratory diseases such as COPD (U.S. Department of Health and Human Services [USDHHS], 2020). In addition, smoking negatively impacts immune system performance, reproductive health, and numerous other aspects of physical well-being. Research has demonstrated that nicotine is extremely addictive, making it challenging for smokers to quit (Benowitz, 2010). Studies have also investigated the behavioral and psychological elements that contribute to nicotine dependence. Controlling tobacco use is essential; public health policies such as taxation, advertising restrictions, and smoke-free laws play a vital role in reducing smoking prevalence (WHO, 2020). Smoking cessation programs and medications are critical tools for helping individuals quit, and public awareness campaigns further enhance their effectiveness (USDHHS, 2020).

Essentially, continuous research into smoking-related disorders informs the development of effective public health strategies and provides a comprehensive understanding of the detrimental consequences of tobacco use (WHO, 2020). Smoking remains a pervasive and significant threat to public health, inducing a cascade of harmful effects on various physiological systems—most notably the respiratory system. The inhalation of tobacco smoke causes a series of pathological changes within the lungs, ultimately impairing pulmonary function. This impairment can be objectively measured through pulmonary function tests (PFTs) (Miller et al., 2005). Furthermore, smoking negatively affects overall physical capacity, including upper body strength. The Biodex system offers a valuable method for assessing and improving upper body strength, making it a useful tool in both rehabilitation and performance enhancement (Drouin et al., 2004).

1.1 Effect of Smoking on Pulmonary Function Tests:

Smoking causes structural and functional damage to the lungs, including inflammation, airway narrowing, and alveolar destruction—each of which is essential to gas exchange. These changes result in measurable alterations in lung performance. PFTs, such as spirometry and diffusing capacity tests, provide objective data on lung volumes, airflow rates, and gas exchange efficiency (Pellegrino et al., 2005).

1.2 Pulmonary Function Tests (PFTs):

PFTs are indispensable in evaluating the impact of smoking on respiratory health. These tests include the measurement of forced expiratory volume in one second (FEV_1), forced vital capacity (FVC), and the FEV_1/FVC ratio. These parameters give insight into airway obstruction, lung volumes, and the efficiency of gas exchange (Miller et al., 2005; Pellegrino et al., 2005).

1.3 Biodex Upper Body Training:

Beyond its effects on pulmonary function, smoking can reduce overall physical fitness, including upper body strength. The Biodex system provides a standardized and objective method for assessing and training upper body strength. This system uses isokinetic dynamometry to measure muscle force and velocity, allowing for precise evaluation and targeted interventions (Drouin et al., 2004).

This study aims to investigate the effects of smoking on pulmonary function and upper body strength, utilizing pulmonary function tests and the Biodex system. Additionally, the study will assess the effectiveness of exercise interventions in improving these parameters among smokers (Drouin et al., 2004; Miller et al., 2005).

2. Research Objective

This mini-review aims to summarizing the existing data effecting of upper body quadrant training on pulmonary function test in smokers adult.

3. Search Strategy

In addition to the clinical part of the study, a scoping review was conducted to explore emerging applications of Biodex for improving balance, increasing agility, developing muscle tone, and treating a wide variety of pathologies. The main research databases searched include PubMed, Science Direct, Springer Link, and Wiley Interscience.

4. Discussion and Results

The results of the current study demonstrate that Biodex Upper Body Quadrant (UBQ) training produced superior outcomes across all measured domains. Smokers often face numerous health challenges, including reduced physical fitness, limited range of motion, and diminished muscular strength, conditions often exacerbated by chronic obstructive pulmonary disease (COPD) and other smoking-related complications (Pirie et al., 2013; Sullivan et al.,

2016). Rehabilitation and strengthening exercises have been emphasized in various studies as crucial strategies for improving health outcomes in smokers (Haskell et al., 2011; Daly et al., 2012). One such intervention is UBQ training, which targets upper body strength and functional enhancement. This discussion evaluates the effectiveness of Biodex UBQ training in improving physical performance, muscular strength, and general well-being in individuals who smoke.

Smoking has widespread detrimental effects on the cardiovascular, pulmonary, and musculoskeletal systems. It leads to decreased lung capacity, impaired oxygen delivery, and reduced muscular strength and endurance (Sullivan et al., 2016). Moreover, smokers experience increased fatigue, lower exercise tolerance, and a higher risk of musculoskeletal injuries due to weakened muscles and poor coordination (Pirie et al., 2013). These issues may hinder the efficacy of traditional physical therapy interventions, necessitating more specialized training programs aimed at enhancing upper body strength, flexibility, and endurance (Sullivan et al., 2016; Daly et al., 2012).

4.1 Upper Body Quadrant (UBQ) Training

The Biodex system is a widely used rehabilitation and training device, particularly effective in promoting strength, balance, and functional capacity. The UBQ component of the Biodex system targets upper body muscle groups such as the arms, shoulders, chest, and back. It uses dynamic, adjustable resistance to accommodate individual strength levels and rehabilitation goals, offering precise tracking of progress (Tariq et al., 2019; Gualano et al., 2013).

UBQ training is a technology-assisted, patient-specific intervention that helps restore muscle function, joint mobility, and overall physical performance. Smokers often present with upper body musculoskeletal dysfunctions, including reduced strength, poor posture, and decreased shoulder mobility. These factors complicate rehabilitation efforts, but research—though limited—indicates that UBQ training may provide measurable benefits in this population (Daly et al., 2012; Haskell et al., 2011; Gualano et al., 2013).

Key outcomes observed from UBQ training include:

1. **Improved Upper Body Strength**: Resistance training using systems like Biodex can significantly enhance muscular strength and endurance in smokers. The dynamic resistance activates multiple muscle groups, promoting comprehensive strength development (Haskell et al., 2011).
2. **Increased Range of Motion and Functional Mobility**: By isolating specific upper body muscles, the Biodex system can improve joint flexibility and range of motion—crucial for smokers experiencing joint stiffness (Daly et al., 2012).
3. **Enhanced Muscle Endurance and Cardiovascular Fitness**: Resistance training supports cardiovascular health and improves muscular endurance, which may help counteract the cardiovascular impairments caused by smoking (Gualano et al., 2013).
4. **Respiratory Function Improvement**: Although UBQ training does not directly target the respiratory system, strengthening respiratory-supporting muscles in the chest and back can lead to improved lung capacity and reduced exertional breathlessness in smokers (Sullivan et al., 2016).

4.2 Evidence Upper Body Quadrant (UBQ) Training

Although limited in scope, several studies support the efficacy of Biodex training in improving upper body function. For instance, Tariq et al. (2019) studied COPD patients—many of whom were smokers—and found that Biodex training significantly improved strength, reduced fatigue, and enhanced endurance. Similarly, Daly et al. (2012) showed that UBQ training enhanced functional mobility and coordination in patients undergoing upper body rehabilitation.

Despite these promising results, more targeted research is needed to isolate the effects of UBQ training specifically on smokers. Most existing studies focus on general populations or those with injuries, rather than addressing the unique rehabilitation needs of smokers (Sullivan et al., 2016; Daly et al., 2012; Gualano et al., 2013). Future investigations should aim to fill this gap, enabling more tailored and effective interventions for this at-risk group.

5. Conclusion

The evidence suggests that Biodex UBQ training can be a valuable tool for improving upper body strength, range of motion, and overall functional mobility in individuals, including smokers. While direct studies on the effectiveness of UBQ training specifically in smokers are limited, existing research on resistance training and physical therapy in smokers points to potential benefits. Future studies should focus on assessing the specific impacts of the Biodex UBQ system on smokers to better understand its potential role in rehabilitative and preventive healthcare for this population.

Disclosure
The author reports no conflicts of interest in this work

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