Abstract

The effectiveness of voice training in patients after hip or knee arthroplasty who smoke cigarettes

Introduction

Cigarette smoking remains a current and important issue in the healthcare system. It increases the risk of numerous diseases and premature death. The tobacco combustion process in cigarettes negatively affects the vocal tract and can be a predisposing factor for various disorders within it, ranging from mild irritations to cancers. The negative health consequences of smoking are widely known, yet many people still reach for a cigarette.

With the global trend of increasing life expectancy, degenerative diseases of the knee and hip joints pose a significant problem for modern seniors. Often, prolonged pain leads to the adoption of an antalgic position, thereby altering body symmetry parameters. According to the mechanism of biokinematic chains and the concept of tensegrity, a pathological state within one joint can transfer to distant body segments. An alternative, in the event that conservative treatment methods are exhausted, is arthroplasty.

Materials and Methods

The study involved 100 participants aged 55-75. The study group consisted of smoking patients after hip and/or knee arthroplasty (N=50; F=28, M=22). The smoking control group comprised 15 individuals (N=15; F=10, M=5). The non-smoking control group consisted of 15 individuals (N=15; F=10, M=5), while the group of non-smoking patients after hip and/or knee arthroplasty included 20 individuals (N=20; F=8, M=12). The study included an acoustic voice analysis, the Voice Handicap Index (VHI) questionnaire, and posture parameter measurements. In the study group, acoustic measurements and the VHI questionnaire were performed before and after voice training, whereas in the control group of non-smoking patients after arthroplasty, the assessments were performed twice during hospitalization. In the remaining control groups, a single acoustic voice measurement and VHI questionnaire were conducted. The DiagnoScope software was used for acoustic measurements. Additionally, posture parameters for the study group and the non-smoking patients after arthroplasty were measured using the DIERS Formetric system. The preventive voice training included a discussion of

theoretical issues related to voice hygiene and emission, as well as auditory, relaxation, breathing, breathing-phonation, resonance-activating, articulation-improving, and clear articulation exercises.

Results

Analysis of the collected data revealed changes in acoustic voice parameters: an increase in the NHR parameter in the female study group, and decreased Shimmer and Jitter values in the male study group compared to the non-smoking control group. No intense changes in voice parameters were observed in patients who smoke after hip and/or knee arthroplasty compared to the smoking control group. However, body symmetry disturbances were demonstrated in patients after hip and/or knee arthroplasty. Statistical tests revealed a relationship between certain body parameters and acoustic voice parameters, although the applied FDR correction did not conclusively confirm these observations. The implemented preventive voice training did not have a significant impact on the patients' self-assessment of their voice or the improvement of its acoustic parameters.

Conclusions:

1. In patients actively smoking cigarettes for at least 5 years, changes in physical voice characteristics are observed, specifically: an increase in the NHR parameter in the studied group of women, and a decrease in Shimmer and Jitter values in the men's group compared to the non-smoking control group.
2. In patients after total knee and/or hip arthroplasty who have been actively smoking cigarettes for at least 5 years, the changes in physical voice characteristics are not more pronounced.
3. Patients after hip and/or knee arthroplasty exhibit body symmetry disturbances, assessed using the Harzmann parameters..
4. Statistical tests reveal relationships between body posture and acoustic voice parameters; however, in-depth analyses indicate that caution should be exercised when extrapolating these findings.
5. Prophylactic voice training does not improve the acoustic voice parameters of cigarette smokers.

6. Prophylactic voice training does not improve the self-assessment of voice condition as measured by the VHI questionnaire in smokers.