IMPACT OF DYSPNEA ON ACTIVITIES OF DAILY LIVING

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ABSTRACT

Dyspnea is a multifactorial symptom, involving the interaction between various physiological, psychological, and environmental factors. Its understanding may only derive from a multidisciplinary and multidimensional approach. It can lead to reduced physical activity, impaired sleep and increased anxiety and depression, all of which result in a symptom burden.[2] A connection can be seen between the seriousness of symptoms in the morning, the physical activity and the severity of dyspnea during the day.

Keywords: *Dypnea, impact, daily living, heart attack, congestive heart failure, breathing difficulties, chronic obstructive pulmonary disease, cardiac contractions, systole, diastole.*

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INTRODUCTION

Dyspnea can be defined as "a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity". It is a debilitating symptom, whose impact is second only to that of pain; it is estimated that up to a quarter of the general population and half of severely ill patients are affected by it. Dyspnea is also an important predictor of quality of life, exercise tolerance and mortality in various conditions. In patients with chronic obstructive pulmonary disease (COPD), it has been shown to be a better predictor of mortality than forced expiratory volume in 1 s (FEV_1) (1).Tn patients with heart disease referred for clinical exercise testing, it is a better predictor of mortality than angina. Dyspnea is also associated with decreased functional status and worse psychological health in older individuals living at home. It is also a factor in the low adherence to exercise training programs in sedentary adults and in patients with COPD (2).

Dyspnea is the main symptom of people with respiratory diseases like COPD, and it negatively affects their levels of physical activity. Thus, dyspnea may lead to physical inactivity and peripheral muscle deconditioning. And both peripheral muscle dysfunction and dyspnea impact life-space mobility of older people with COPD (3).

Chronic obstructive pulmonary disease (COPD) is a prevalent disease. In 2030, COPD is expected to be the third most common cause of death in the world. COPD, due to its symptoms such as shortness of breath, cough, and increased mucus production, its exacerbations, and treatment, such as stopping smoking and pharmacological treatment, imposes a significant burden on the affected person; a burden in terms of reduced quality of life and effects on daily activities (4). It can lead to reduced physical activity, impaired sleep and increased anxiety and depression, all of which result in a symptom burden. A connection can be seen between the seriousness of symptoms in the morning, physical activity, and the severity of dyspnea during the day. Breathlessness impacts daily life in practical, medical, and psychosocial ways (5).

Dyspnea is a debilitating symptom that affects quality of life, exercise tolerance and mortality in various disease conditions/states. In patients with chronic obstructive pulmonary disease (COPD), it has been shown to be a better predictor of mortality than forced expiratory volume in 1 s. In patients with heart disease, it is a better predictor of mortality than angina. Dyspnea is also associated with decreased functional status and worse psychological health in older individuals living at home. It also contributes to the low adherence to exercise training programs in sedentary adults and in COPD patients (6). The mechanisms of dyspnea are still unclear. Recent studies have emphasized the multidimensional nature of dyspnea in the sensory–perceptual (intensity and quality), affective distress and impact domains. The perception of dyspnea involves a complex chain of events that depend on varying cortical integration of several afferent/efferent signals and colored by affective processing (6).

Exercise and dyspnea

During exercise, breathing is tightly coupled to muscular and cardiovascular demands. In healthy, non-athletic subjects, exercise is more of a challenge to the cardiovascular and locomotor muscle systems than the respiratory system. Healthy subjects, therefore, usually report limb muscle fatigue as the primary cause for exercise cessation, although high level athletes may encounter respiratory limitation to exercise performance. Dyspnea in healthy humans increases in proportion to increasing ventilation and respiratory contractile effort, the latter measured as the ratio of tidal esophageal pressure swing relative to maximal pressure. Healthy young adults at the symptom-limited peak of exercise generally rate dyspnea intensity as "moderate" or "severe" and describe a heightened sense of effort, "work" or "heaviness" of breathing. Such sensations are not usually perceived as threatening in this population because they represent, based on learning and experience, the anticipated ventilatory response to heavy exercise. These findings may, however, depend on the testing modality and protocol; cycling exercise may put more emphasis on leg muscles while running may induce higher levels of respiratory discomfort. In addition, testing protocols have varying guidelines that may affect cardiorespiratory and symptomatic response. The current accepted theory is that dyspnea results from a conscious awareness of the dissociation between what the brain expects and what it receives in terms of afferent information from receptors in the respiratory muscles, lungs, airways, and chest wall. This feedback from peripheral sensory afferents may enable the brain to assess the effectiveness of the motor output to the respiratory muscles. When the mechanical/muscular response of the respiratory system is appropriate for the prevailing level of central respiratory motor drive then dyspnea intensity increases in direct proportion to the level of drive and is described as a heightened sense of effort, work or heaviness of breathing (7).

Exercise not only elicits respiratory discomfort, but also limb muscle discomfort and general exertion. As a whole, the perception of physical exertion during exercise is the conscious sensation of how hard, heavy and strenuous a physical task is. In exercise physiology, it is widely assumed that this conscious sensation is generated by central processing of sensory stimuli coming from skeletal muscles, heart and lungs (afferent feedback model). However, this assumption is based on philosophical arguments and correlative evidence, and it does not fit with available experimental evidence. In fact, studies in which afferent feedback during exercise has been reduced

experimentally *via* pharmacological reductions in heart rate, heart and lung transplantation, upper airways anesthesia, and spinal blockade of sensory stimuli from the working muscles do not show any significant reduction in perception of effort. On the contrary, a recent study has demonstrated a significant correlation between neurophysiological measures of central motor command (motor-related cortical potentials) and perception of effort during exercise. This psychophysiological data suggests that perception of effort is generated by central processing of a corollary discharge reflecting central motor command to the active muscles (corollary discharge model). This model mirrors the conceptual models of pain and dyspnea, with sensory and affective components interacting together (9). In fact, a study has shown that while intensity may increase linearly, the affect associated with exercise may worsen nonlinearly. Understanding the normal symptomatic (respiratory, limb fatigue, general exertion) response to exercise is of great psychophysiological interest but can also provide important information that could better direct pathophysiological research (8).

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