

A BIOLOGICAL PERSPECTIVE FOR THE MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE BY TESTOSTERONE

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Abstract - Chronic obstructive pulmonary disease (COPD) is mainly characterized by a chronically poor airflow that worsens over time. COPD is believed to be a bio-pathological entity with unclear boundaries that affects the rest of the body through various pathophysiological mechanisms. There have been recent discussions regarding the possible relevance of various hormones such as testosterone in the management of COPD. In our paper, we decided to study this possible relevance by comparing the levels of testosterone in COPD patients with an age-matched control group in order to see if testosterone levels may act as an important parameter for the functional disability and deterioration in the management of COPD. Our analysis showed a significant decrease ($p=0.001$) in the specific concentrations of testosterone in the serum of the COPD group, as compared to the control. Although our results suggest that testosterone is in fact decreased in COPD, there is still an absence of sufficient evidence to draw firm conclusions about its long-term benefits and risks in the management in COPD.

Key words: testosterone; chronic obstructive pulmonary disease; management

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is mainly characterized by chronically a poor airflow that worsens over time (Decramer et al., 2012). Although it includes some other various physiological abnormalities, its main manifestation is represented by a major shortness of breath (Atlantis et al., 2013). In addition, COPD is believed to be a pathological entity with unclear boundaries that also affects the

rest of the body through various pathophysiological mechanisms including genetic mutations (Foreman et al., 2012), systemic inflammation (e.g. increased TNF- α and other cytokines. Wouters et al., 2005), while also having an important behavioral-addictive component such as smoking (Jiemenez et al., 2013).

Lately it has been shown that an altered endocrine function can worsen the manifestations of COPD through several mechanisms, including de-

creased protein anabolism or the activation of the rennin-angiotensin-aldosterone system (Laghi et al., 2009).

There have been recent discussions regarding the possible relevance of various hormones such as testosterone or insulin in the management of COPD (Casaburi et al., 2004; Laghi et al., 2009). However, there are still some controversies regarding the relation between COPD and testosterone levels. While some isolated studies have shown that men with COPD could exhibit decreased testosterone levels (Atlantis et al., 2013; Wang et al., 2012), some reports stated that the modifications/relevance of testosterone use in COPD are quite modest (Svartberg et al., 2010) and it seems that more research is needed to determine if androgen therapy could be a solution for the management of COPD.

We studied the possible relevance of testosterone on the COPD management by comparing the levels of testosterone in COPD patients with an age-matched control group in order to see if testosterone levels may act as an important parameter for the functional disability and deterioration in the management of COPD.

MATERIALS AND METHODS

The study group included 34 male patients, diagnosed with COPD using the GOLD classification, and recruited from the Clinic of Pulmonary Diseases in Iasi. The study was conducted according to the provisions of the Helsinki Declaration and all the patients signed a consent form for their participation. The determination of serum testosterone and luteinizing hormone was performed using a chemiluminescence method, through an AccuLite CLIA Kit, Monobind, USA on a LUMISTAT 4100 analyzer, USA. The results obtained were compared with a group of healthy age-matched controls (n= 20).

RESULTS AND DISCUSSION

We confirmed a significant decrease in serum testosterone concentration in COPD patients, which could

suggest the relevance of testosterone usage for the management of this condition. However, we did not find any significant modifications for the luteinizing hormone concentrations in COPD. Our analysis showed a statistically significant decrease ($p=0.001$) for the specific concentrations of testosterone in the serum of the COPD group, as compared to the control (Fig. 1). In addition, we also wanted it to see if there are any differences in the serum concentration of the luteinizing hormone between our selected study groups. However, no significant modifications were found in terms of serum luteinizing hormone level in the COPD group versus the control group (Fig. 2).

Regarding some other studies in this area of research, we could mention the so-called ECLIPSE study which showed that patients with COPD and low testosterone serum levels present an increased risk of mortality (Wang et al., 2012). Casaburi et al. (2004) determined the effects of testosterone supplementation in COPD (100 mg of testosterone injected weekly) with good effects reported and with well-tolerated responses. In 2013 Atlantis et al. performed a consistent meta-analysis regarding the relevance of testosterone in COPD by using 9 observational studies in 2 918 men, and they concluded that men with COPD could have relevant decreased testosterone levels (Atlantis et al., 2013). They also draw the attention to the importance of testosterone on fatigue complaints and sexual dysfunctions, which are characteristics of COPD (Atlantis et al., 2013; Bercea et al., 2013; Svartberg et al., 2010).

The manifestations of COPD include a variety of deficiencies on very different levels, such as those involving the pituitary, the thyroid, the adrenals or the pancreas. However, the mechanisms by which COPD alters endocrine function are not completely understood (Laghi et al., 2009). Mechanistically speaking, the possible relevance of testosterone in COPD could be due to elements such as hypoxemia, systemic inflammation or glucocorticoid use (Laghi et al., 2009). In regards to the implicated mechanisms in this matter, it has been shown that decreased testosterone levels and COPD have been associated

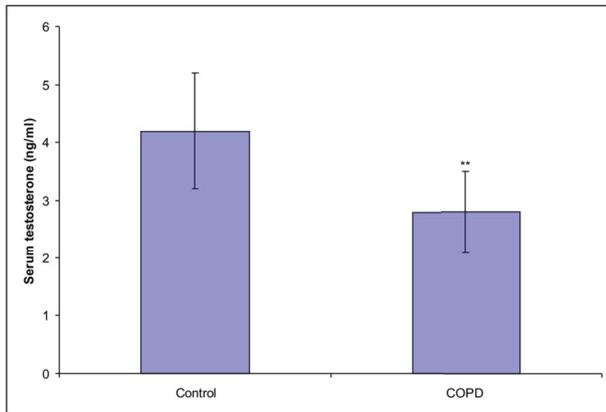


Fig. 1. Testosterone levels for the two study groups (control versus COPD group). The values are mean \pm SEM (n = 34 in the COPD group, n= 20 in the control group); p=0.001.

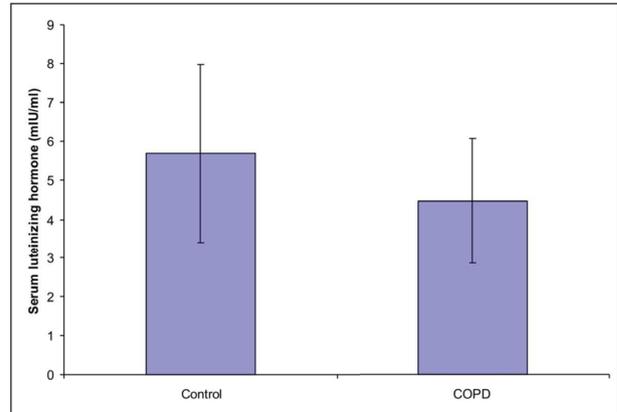


Fig. 2. Luteinizing hormone levels for the two study groups (control versus COPD group). The values are mean \pm SEM (n = 34 in the COPD group, n= 20 in the control group).

with depressed mood (Santoro et al., 2005, Laghi et al., 2009). Also, the oxidative stress status (Halliwell et al., 1997) could play an important role in this matter, since cigarette smoking can indeed increase the risk of insulin resistance and diabetes by increasing systemic inflammation (Wouters et al., 2005) and oxidative stress (Halliwell et al., 1997), both of which are common events in COPD (Barnes et al., 2003).

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