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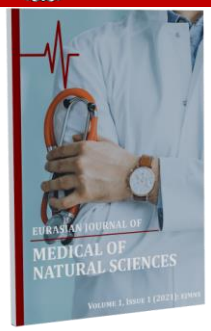

DYSLIPIDEMIA IN INDIVIDUALS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: PATHOPHYSIOLOGY, CLINICAL IMPLICATIONS, AND MANAGEMENT

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ABSTRACT

Dyslipidemia, characterized by abnormal lipid profiles, is frequently observed in individuals with chronic obstructive pulmonary disease (COPD). This condition has gained attention due to its potential impact on the progression of COPD and its association with increased cardiovascular morbidity and mortality. The mechanisms linking dyslipidemia to COPD are multifactorial, involving systemic inflammation, oxidative stress, and alterations in lipid metabolism. These changes may exacerbate the underlying pulmonary pathology and contribute to the higher cardiovascular risk seen in COPD patients. This review examines the pathophysiological mechanisms, clinical significance, and potential therapeutic strategies to address dyslipidemia in the context of COPD. Emphasis is placed on the importance of early detection, monitoring of lipid profiles, and the role of lipid-modifying agents in improving patient outcomes.

ДИСЛИПИДЕМИЯ У ЛИЦ С ХРОНИЧЕСКОЙ ОБСТРУКТИВНОЙ БОЛЕЗНЬЮ ЛЕГКИХ: ПАТОФИЗИОЛОГИЯ, КЛИНИЧЕСКИЕ ПОСЛЕДСТВИЯ И ЛЕЧЕНИЕ

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ABSTRACT

Дислипидемия, характеризующаяся аномальным профилем липидов, часто наблюдается у лиц с хронической обструктивной болезнью легких (ХОБЛ). Это состояние привлекло внимание из-за его потенциального влияния на прогрессирование ХОБЛ и его связи с повышенной сердечно-сосудистой заболеваемостью и смертностью. Механизмы, связывающие дислипидемию с ХОБЛ, являются многофакторными, включая системное воспаление,

сердечно-сосудистый риск, окислительный стресс, терапевтическое управление, липид-модифицирующие агенты.

окислительный стресс и изменения в липидном обмене. Эти изменения могут усугублять лежащую в основе легочную патологию и способствовать более высокому сердечно-сосудистому риску, наблюдаемому у пациентов с ХОБЛ. В этом обзоре рассматриваются патофизиологические механизмы, клиническое значение и потенциальные терапевтические стратегии для решения проблемы дислипидемии в контексте ХОБЛ. Особое внимание уделяется важности раннего выявления, мониторинга липидных профилей и роли липид-модифицирующих агентов в улучшении результатов лечения пациентов.

Relevance. Chronic obstructive pulmonary disease (COPD) is a progressive and debilitating condition characterized by airflow limitation and chronic respiratory symptoms, including cough, sputum production, and dyspnea. It is a leading cause of morbidity and mortality worldwide, with an estimated 251 million cases globally as of 2016 (World Health Organization, 2017). COPD is primarily caused by long-term exposure to harmful particles, such as tobacco smoke, but environmental pollutants and genetic factors also contribute to disease development (Vestbo et al., 2013). Although COPD is traditionally viewed as a pulmonary disorder, an increasing body of evidence suggests that it is also associated with significant systemic manifestations, including cardiovascular diseases (CVD), skeletal muscle wasting, and metabolic disturbances (Agusti et al., 2012).

Among the metabolic disturbances commonly observed in COPD patients, dyslipidemia stands out as a prevalent condition. Dyslipidemia refers to abnormalities in lipid levels, including elevated low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL-C), and elevated triglycerides. Several studies have demonstrated that patients with COPD are more likely to exhibit dyslipidemia compared to the general population, and this is associated with worse clinical outcomes, including increased risk for cardiovascular events and poorer lung function (Tsiligianni et al., 2014). The pathophysiology behind the relationship between dyslipidemia and COPD remains complex, involving a combination of systemic inflammation, oxidative stress, and disruptions in lipid metabolism (Liu et al., 2017). Additionally, the presence of dyslipidemia in COPD patients has been linked to accelerated disease progression and exacerbations (Faner et al., 2015).

Despite the recognition of dyslipidemia as a common comorbidity in COPD, its clinical management remains underexplored. Current guidelines primarily focus on managing COPD symptoms and preventing exacerbations, with less emphasis on addressing metabolic abnormalities such as dyslipidemia (GOLD, 2023). This gap in management is concerning given the well-established role of dyslipidemia in exacerbating cardiovascular risk and its potential to influence the overall prognosis in COPD patients. As such, there is a critical need

to investigate the mechanisms that link dyslipidemia to COPD, identify effective management strategies, and incorporate lipid-modifying therapies into routine COPD care.

In this review, we explore the pathophysiological mechanisms connecting dyslipidemia and COPD, discuss the clinical implications of dyslipidemia in COPD patients, and highlight potential management strategies to improve patient outcomes.

Dyslipidemia is increasingly recognized as a common comorbidity in individuals with chronic obstructive pulmonary disease (COPD). Various studies have demonstrated that lipid abnormalities are more prevalent in COPD patients compared to the general population. A systematic review and meta-analysis by Tsiligianni et al. (2014) found that COPD patients have significantly higher levels of triglycerides and lower levels of high-density lipoprotein cholesterol (HDL-C) when compared to non-COPD individuals. Furthermore, elevated total cholesterol and low-density lipoprotein cholesterol (LDL-C) levels have been observed in COPD patients, although the findings are less consistent across studies (Liu et al., 2017). This lipid imbalance in COPD is thought to contribute to the heightened cardiovascular risk seen in these patients (Faner et al., 2015).

The clinical significance of dyslipidemia in COPD is considerable. Studies have shown that lipid abnormalities are associated with poorer outcomes, including increased cardiovascular events, accelerated lung function decline, and a higher incidence of COPD exacerbations. Faner et al. (2015) reported that dyslipidemia in COPD patients is linked to a higher risk of coronary artery disease, a condition frequently observed in these patients. Moreover, the presence of dyslipidemia is associated with worse quality of life and functional status in COPD individuals (Dahl et al., 2007). Notably, the cardiovascular burden in COPD patients is not solely attributed to traditional risk factors, such as smoking and physical inactivity, but also to metabolic disturbances like dyslipidemia (Agusti et al., 2012).

The pathophysiological mechanisms underlying the association between dyslipidemia and COPD are multifactorial and complex. One key factor is systemic inflammation, which is a hallmark of COPD. Inflammation leads to changes in lipid metabolism, resulting in dyslipidemia (Liu et al., 2017). COPD patients often exhibit elevated levels of inflammatory markers such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α), all of which have been shown to influence lipid homeostasis (Harrison et al., 2013). These inflammatory cytokines can impair lipid metabolism by reducing the activity of lipoprotein lipase, an enzyme responsible for the hydrolysis of triglycerides in lipoproteins (Zhou et al., 2014). Furthermore, chronic inflammation in COPD can lead to increased oxidative stress, which has been implicated in the development of dyslipidemia by modifying lipoproteins, particularly LDL-C, making them more susceptible to oxidation and atherogenic activity (Matsuo et al., 2014).

Additionally, adipokines, which are hormones produced by adipose tissue, play a significant role in the development of dyslipidemia in COPD. Leptin and adiponectin, two major adipokines, have been shown to be dysregulated in COPD. Leptin, which promotes inflammation, is typically elevated in COPD patients, contributing to lipid disturbances, while adiponectin, which has anti-inflammatory properties, is often reduced in these individuals (Liu et al., 2017). This imbalance between pro-inflammatory and anti-inflammatory

adipokines exacerbates lipid abnormalities and may further contribute to the progression of COPD.

Dyslipidemia has been associated with increased frequency and severity of COPD exacerbations, which are acute worsening episodes of respiratory symptoms that often lead to hospitalization and can accelerate disease progression. A study by Agusti et al. (2012) found that dyslipidemia, especially elevated triglyceride levels, was a predictor of COPD exacerbations. These exacerbations are often triggered by respiratory infections, but the underlying metabolic disturbances, including dyslipidemia, may amplify the inflammatory response, leading to more severe exacerbations (Burge et al., 2003).

Moreover, dyslipidemia has been shown to influence the rate of decline in lung function. Several studies have observed that COPD patients with lipid abnormalities experience faster lung function deterioration. A study by Guo et al. (2016) demonstrated that higher triglyceride levels were associated with more rapid decline in forced expiratory volume in one second (FEV1), a key measure of lung function in COPD patients. This relationship suggests that lipid abnormalities could potentially accelerate the progression of COPD, making early diagnosis and management of dyslipidemia crucial for improving long-term outcomes.

Despite the growing body of evidence linking dyslipidemia to worse outcomes in COPD, management guidelines for COPD largely focus on pulmonary symptoms and exacerbations, with little emphasis on lipid abnormalities. The GOLD guidelines (2023) recommend the use of bronchodilators, corticosteroids, and other respiratory therapies to manage COPD symptoms, but there is limited guidance on the treatment of comorbid conditions such as dyslipidemia.

Statins, commonly used for the management of dyslipidemia in the general population, have been investigated for their potential benefits in COPD patients. Statins not only reduce LDL-C levels but also possess anti-inflammatory and antioxidant properties, which may benefit COPD patients by modulating the underlying inflammatory processes (Tse et al., 2013). However, the evidence regarding the efficacy of statins in improving clinical outcomes in COPD remains inconclusive, with some studies showing benefits and others demonstrating no significant effect (Tashkin et al., 2009).

Other approaches to managing dyslipidemia in COPD include lifestyle modifications, such as diet and exercise, and newer lipid-modifying agents, such as PCSK9 inhibitors, which have shown promise in treating dyslipidemia in other populations. Further research is needed to better understand the specific role of dyslipidemia in COPD progression and to develop targeted therapies that address both lipid abnormalities and the underlying pulmonary pathology (Liu et al., 2017).

Conclusion

Dyslipidemia is a common and clinically significant comorbidity in COPD that is linked to increased cardiovascular risk, accelerated disease progression, and exacerbations. The complex pathophysiological mechanisms underlying the association between dyslipidemia and COPD highlight the need for further research into the role of lipid abnormalities in COPD. While current management strategies largely focus on the pulmonary aspects of COPD, there is growing recognition of the importance of addressing dyslipidemia to improve overall

patient outcomes. Future studies should aim to establish more definitive guidelines for the management of dyslipidemia in COPD, with an emphasis on early detection, lipid-lowering therapies, and lifestyle interventions.

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