REVIEW ARTICLE

Melatonin and Respiratory Diseases: A Review

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Abstract: Melatonin is an indoleamine with potent multifunctional biological and pharmacological effects, both receptor dependent and receptor-independent effects, including antioxidant, anticancer, antitumor, anti-inflammatory, anti-aging, anti-diabetic, antiviral, neuroprotective activities. Melatonin mitigates tissue injury via modulation of abnormalities in redox status and other biochemical markers. At the molecular level, the biological and pharmacological activities of melatonin are attributed to the inhibition of nuclear factor-kappa beta (NF-κB), c-Fos over expression and down-regulation of matrix metalloproteinases-3 (MMP-3), which are regulators of pro-inflammatory and pro-fibrotic cytokines. There are numerous scientific reports on the therapeutic potential of melatonin in treatment of asthma, respiratory diseases for infections, chronic obstructive pulmonary disease, lung cancer, pleural cavity diseases, as well as vascular pulmonary disease. In the present communication, we systematically review the therapeutic potential of melatonin in the treatment of respiratory diseases along with its molecular mechanism of actions.

Keywords: Anti-inflammatory, Antioxidant, Lung disease, Melatonin, Pulmonary disease, Respiratory disorders.

INTRODUCTION

The main function of the lung is to transport exogenous oxygen to blood and to release carbon dioxide from respiratory tree to the atmosphere [1]. Lung diseases are major health issue and a leading cause of death worldwide [2]. The term lung diseases includes different abnormalities which affect the lungs and the respiratory tissues, such as infections, cancer, asthma, chronic obstructive pulmonary disease (COPD), drug-induced injuries, etc. [3]. For example, acute lung infection (pneumonia) is an important health problem in developing countries that accounts for 30% of all deaths in children under 5 years of age [4]. Also, lung cancer is known as common types of cancer that is often accompanied by long-term exposure to smoking [5, 6]. Other factors such as genetics, air pollution, etc. play an important role in lung cancer induction [7]. A close correlation between air pollution and mortality rates for lung diseases has been established [8]. Asthma is a common airways inflammatory disorder [9] that is accompanied by symptoms such as difficulty and shortness of breathing, chest tightness, wheezing, coughing, and bronchospasm [10]. According to the World Health Organization (WHO) report, about 235-330 million people suffered from this lung disease in 2011 [11]. COPD is another common type of lung disease is accompanied by emphysema and chronic bronchitis [12] that leads to the blockage of airflow causing breathing problems [13]. This is an important lung disease which causes of chronic morbidity and mortality in the world [14]. The WHO Statistical data accounted COPD as the third leading cause of death worldwide [15]. Pulmonary vascular disease is a serious and fatal complication of lung injury in congenital heart disease [16] which affects the blood circulation in the lungs associated with chest pain, shortness of breath, and fainting [17]. Also, it has been reported that several drugs (such as bleomycin, busulfan, chlorambucil, cyclophosphamide, methotrexate,