

A review of obstructive sleep apnea among coronary artery disease patients

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Article History:

Received on: 10 Feb 2020
Revised on: 19 Mar 2020
Accepted on: 28 Mar 2020
Published on: 09 Apr 2020

Volume: 10 Issue: 1

Keywords:

Obstructive Sleep Apnea (OSA),
Coronary Artery Disease (CAD),
body mass index,
central obesity,
diabetes mellitus,
hypertension and
dyslipidemia.

ABSTRACT

Lifestyle has seen a tremendous change in the past few decades. Globalization and urbanization has made the world smaller. With advancement in science and technology, human mortality has decreased tremendously due to invention of new treatment modalities, vaccines, newer and effective drugs. But the lifestyle changes and sedentary pattern has also paved way for development of new lifestyle related disorders especially obesity, diabetes mellitus, hypercholesterolemia and hypertension which impose a major threat not only to human life but also to economic burden of the world. Traditional era had less incidence of these disorders compared to the industrial era today. Though increase in blood pressure and cholesterol level are considered age related changes in western countries, there exists a steep curve in the incidence of these disorders as age advances. Further, evidences are adequate to indicate hypertension and dyslipidemia are prevalent even in middle aged adults. Increased susceptibility of a few individuals to lifestyle related changes can also be attributed to their genetic variability. It has been estimated that more than 70% of cardiovascular morbidity, over 80% of coronary artery disease and about 90% of diabetes can be attributed to few of the lifestyle related factors. Even a slight alteration in lifestyle has a great impact on individual health and economic burden. Smoking is identified as one of the major lifestyle factor which has its adverse effects not only on those who smoke but also to other members in the proximity by way of passive smoking. Though the hazards of smoking and its impact on health have been emphasized to a greater extent, eradication of smoking has become next to impossible. Decline in smoking substantially reduces cardiovascular risk but the practice of smoking has seen only an upward slope. Likewise, alcoholism is another social factor which has multitude of effects on health particularly cardiovascular disorders.



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eISSN: 2277-4149

DOI: <https://doi.org/10.26452/irjpas.v10i1.1273>



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INTRODUCTION

In this section presents introduction of this research work. Sedentary lifestyle and digitalization has led to one of the major lifestyle disorder i.e., physical inactivity. [1, 2] It involves a vicious cycle of events ranging from physical inactivity, unhealthy eating habits, central obesity, diabetes mellitus, hypertension, high body mass index (BMI) leading to cardiovascular disorders which again hinders physical activity. [3, 4] Moderate improvement in physical activity has tremendous impact on curtailment of cardiovascular risk factors as

well as improvement in physical wellbeing. Physical exertion improves high density lipoprotein, reduces total serum cholesterol, serum triglyceride levels, improves insulin sensitivity, maintains optimal blood pressure, induces and maintains weight loss, corrects BMI and also creates a psychosocial wellbeing. [5, 6] These pleiotropic effects are accompanied by 30-50% decrease in cardiovascular events. Inpatients with previous cardiovascular events, moderate physical activity also reduces symptoms of angina, reduces claudication, improves systolic and diastolic functions of the heart and prolongs survival period after myocardial infarction. [7] All these health benefits do not require Herculean tasks. Moderate exercise such as brisk walking every day for 30 minutes has greater impact in improving health of the individual. [8]

Although a number of pharmacological methods are available for each of the above mentioned cardiovascular risk factors, physical activity is the one modality with multiple effects that provides an overall wellbeing. [9] In spite of an optimal lifestyle some age related and genetically related changes in coronary vasculature are inevitable. Hence pharmacotherapeutic intervention may be necessary due to advancing age. However sufficient focus on these lifestyle related behavioral changes can postpone the initiation of these therapeutic interventions and can prolong the life of the individual without morbidity. [10]

Apart from all these above mentioned factors, poor sleep hygiene is one of the major contributor for development of non-communicable disorders. Sleep hygiene indicates proper timing, duration of time spent in sleep and quality. Of the various sleep related disorders such as insomnia, hypersomnolence etc., sleep related breathing disorders are gaining high prevalence. [11]

In this paper presents section 2 of this paper explains the detail on the related works. In section 3 presents the materials and methods adopted and section 4 presents the details of the experiments and discussions. Finally section 5 concludes the paper by sharing our inferences and future plans.

RELATED WORKS

In this section presents focuses the related works of this research work. Coronary artery disease (CAD) represents a broad spectrum of disease which affects the coronary vasculature. According to American Heart Association, cardiovascular disease is one of the leading cause of death which accounts for 17.3 million deaths per year. By the year 2030, this is expected to become 23.6 million per year (1). Fur-

ther, CAD also causes morbidity and loss of quality of life making it a major public health problem that imposes a heavy burden on the economy [12]. The prevalence of CAD is 3-4% and 8-10% in rural and urban areas of India respectively [13]. In urban south Indian population prevalence of CAD is reported to be 11% [14].

The clinical spectrum of CAD could be classified as stable angina pectoris and acute coronary syndromes (ACS). ACS is a broad term which can be further classified as unstable angina (UA), non ST elevation myocardial infarction (NSTEMI), and ST elevation myocardial infarction (STEMI) [15]. Coronary vasculature has inherent defense mechanism to maintain antithrombotic surface, controlling the adhesion of inflammatory cells and maintenance of vascular tone. Loss of these natural defense mechanisms leads to changes in the vascular microenvironment resulting in collections of lipids in sub-intimal layer of coronary vessel, proliferation of vascular smooth muscle, fibroblasts and intercellular matrix producing atherosclerotic plaque. Rupture of protective covering of the plaque exposes it to blood stream causing activation of platelets and coagulation cascade thereby forming fibrin meshwork with entrapped erythrocytes and other blood components which compromises the blood flow to myocardium causing myocardial ischemia clinically manifested as angina pectoris or severe chest pain (5, 6). The location of the obstruction has direct influence on the extent of damage to myocardium which in turn reflects the severity of clinical manifestations.

MATERIALS AND METHODS

In this section presents the materials and methods of this research work. This is a cross sectional study conducted in a tertiary care hospital in India. This study included 500 male subjects with cardiac symptoms who were posted for Coronary angiogram. Lifestyle monotherapy which indicates change in any one of the lifestyle related factors has substantial effect on health. Incidence of diabetes has reduced to 58% compared to placebo with slightest change in lifestyle habits such as consumption of diet less in calories or involving in physical activity such as walking for about 20 minutes per day. 98 subject with positive coronary angiogram findings were sub-grouped based on number of vessels involved in CAD. All the patients were administered modified Berlin's questionnaire to detect the risk for OSA. Anthropometric measurements and biochemical measurements were also recorded. Coronary Artery Disease (CAD) is a major health

problem in developing countries and one of the leading causes of death. Prevalence of CAD in rural India is 3-4% and 8-10% in urban India. Several studies have shown association between Obstructive Sleep Apnea (OSA) and Coronary Artery disease (CAD). Prevalence of OSA in India is 9.2%. Assessment of OSA in CAD patients is rarely done in clinical settings. This study aims to evaluate the prevalence of OSA in CAD patients in India.

RESULTS AND DISCUSSIONS

In this section focuses the results and discussions of this research work. Prevalence of OSA among CAD subjects was found to be 62.2%. A significant positive correlation was observed between severity of OSA and severity of CAD. Involvement of three vessels in CAD was significantly higher among those with high risk for OSA. Significant difference in mean value was seen for neck circumference ($p = 0.003$) and percent predicted neck circumference ($p = 0.002$) among triple vessel disease compared to the other group. The key measures identified in this study, mainly history of snoring and neck circumference, could probably be included during history taking to suspect risk for OSA. If there is a suspicion for risk for OSA, it can be further confirmed with either overnight PSG or home based PSG. Most of the treatments for OSA are life style based without the use of medications. Increase in physical activity serves as one of the major modes of treating obstructive sleep apnea. This helps in reducing BMI and central adiposity thereby reducing the pressure on the upper airway and helps in regaining muscle tone of the pharyngeal musculature. Apart from loss of weight, exercise also has additional benefits such as increasing the ventilator capacity of the lungs and opening up of minute airways thereby increasing the ventilation perfusion ratio. This helps in compensating the increased oxygen demand of the myocardial musculature during unexpected hypoxic states. Exercise also has multiple cardiovascular benefits such as increase in cardiac output and stroke volume which in turn has cardio-protective effects. Further metabolic dysregulation can also be corrected by increased physical activity which helps in increased expression of insulin receptors and upregulation of high density lipoprotein synthetic pathway. Thus the various treatments for OSA could be given as an adjunct along with the cardiac drugs, this would not only reduce the risk for CAD development or complications but probably reduce the cardiac drug dosage.

CONCLUSION

Finally this work concludes that the High prevalence of OSA among CAD patients was observed. Presence of snoring and neck circumference > 40 cm were identified as important predictors of OSA. Severity of OSA implies involvement of multiple vessels in CAD. Hence identification of high risk for OSA has to be emphasized in clinical settings. Prevalence of OSA among CAD patients is very high. Though this study is questionnaire based for OSA risk prediction, two key questions emerged as good predictors for OSA, viz a viz, history of snoring and neck circumference greater than 40cm. Risk for OSA also increases the number of coronary vessels involved in the CAD. As control of OSA is mainly through life style changes, identification of OSA would probably prevent or delay the onset of CAD. It would probably also reduce the complications of CAD. Hence awareness of OSA and its implication on CAD development should be created among the doctors and the common man.

ACKNOWLEDGEMENT

The authors are thankful to all who have extended their constant support for the completion of the work.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest for this study.

FUNDING SUPPORT

The authors declare that they have no funding support for this study.

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Cite this article: K Kokila, M Kalaichandar, K Kirubakaran, V Baskaran, M Jeevitha, Bhavani J. **A review of obstructive sleep apnea among coronary artery disease patients.** *Int. Res. J Pharm. App. Sci.* 2020; 10(1): 11-14.

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