

A Study of Oxidative Stress in Bidi Industry Workers from Solapur City

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ABSTRACT

Workers in bidi industry are constantly in contact with tobacco powder. Illnesses like cancer, asthma, chronic bronchitis, backache, joint pain and arthritis are reported to be common among bidi workers. These disorders induced by tobacco dust and nicotine absorption seems partly be mediated by increase in oxygen free radicals. The present study was carried out to assess exposure effects of tobacco on oxidant and antioxidant status which may induce related health hazards. 90 bidi industry workers and 30 healthy controls were screened for serum lipid peroxide (MDA) and serum nitric oxide (NO \dot{y}) as oxidants and superoxide dismutase, glutathione peroxidase, glutathione reductase and catalase as antioxidants. Total antioxidant status was also measured. These bidi industry workers were divided in three groups. Group I included workers with 5 to 9 years exposure to tobacco dust while group II and III workers were exposed to tobacco dust for 10 to 14 years and 15 to 19 years, respectively. Highly significant increase in serum MDA and NO \dot{y} was observed in all groups of bidi industry workers as compared to controls. The erythrocyte-SOD activity was found to be significantly decreased in group III workers. Our study demonstrated significant decrease in glutathione peroxidase, glutathione reductase and catalase activity as well as in total antioxidant status of groups II and III workers. From present study, it is evident that tobacco dust exposure induced oxidative stress among bidi industry workers. As duration of exposure was increased, the effect was enhanced. This resulting oxidative stress may contribute to respiratory disorders observed in these workers.

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It is a fact that increasing population, the modern civilization and demands of industrial economy make some pollution inevitable. Human activities, such as manufacturing of various products such as tobacco, rubber, steel, cotton etc. introduce tremendous amount of varieties of dust in the atmosphere. As we are exposed to atmosphere, naturally we are going to be exposed to these varieties of dusts having wide range of chemical composition.

Even than the normal person, the workers in these industries are exposed to work environment which is loaded with corresponding dusts. Bidi industry is one such industry which is loaded with the tobacco dust, making it a dangerous occupation as this dust is composed of many hazardous chemicals. In Solapur city bidi industry is well established. The large number of labor force from lower economic group is available in Solapur city. Women are the part of labor force, doing the most menial work and often employed in this dangerous occupation.

Workers in bidi industry are constantly in contact with tobacco powder. Illnesses like tuberculosis, asthma, chronic bronchitis,

backache, joint pain and arthritis are reported to be common among bidi workers (Kumar, 2003). Studies in bidi workers have shown increased chromosomal aberrations, elevated mutagenic and genotoxic burden (Mahimkar and Bhisey *et al.*, 1995). Aqueous extract of bidi tobacco exhibited skin tumor promoting activity in S/RV Cri-ba mice (Bagwe *et al.*, 1994). These findings support the possibility of an increased cancer risk among bidi workers.

These disorders induced by tobacco dust, nicotine absorption seems partly be mediated by increase in free radicals or oxidative stress. Free radicals are highly reactive species characterized by an unpaired electron in their outer orbital. Because of their avidity for accepting electron from target molecules, oxidants can modify the structure and/or function of proteins, lipids, carbohydrates and nucleic acids. Oxygen derived free radicals can easily produce injuries to cell membranes by initiation of lipid peroxidation, inactivation of membrane enzymes and receptors and protein cross linking and fragmentation (MacCall and Frie, 1999).

Although oxidants are generated during

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