



Effect of Occupational Stress Factors on Total Platelet Count in Sugar Industry Workers

KEYWORDS

Occupational stresses, Sugar industry workers, platelet.

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ABSTRACT *The Indian sugar industry is key driver of rural development. It is the second largest country in the world next to Brazil. It is the largest industrial sector employing over 0.5 million skilled and unskilled workmen, mostly from rural areas. The sugar industries contribution to national economy is substantial. In Maharashtra it is one of the most notable and large scale manufacturing sectors in the country. Although sugar industry is one of the biggest industry in Maharashtra the occupational health factors in this sector are many and are attributable to variety of occupational stresses such as high intensity noise, high temperature, high concentration of dust, inadequate illumination toxic fumes of gases and chemical. In the present investigation the total platelet count of the worker working in the engineering section of sugar industry was worked it was found that the number of total platelet count increased than the control subjects.*

INTRODUCTION

In Maharashtra the sugarcane industry is quite evenly and widely spread, it has higher concentration in Sangli, Kolhapur, Satara, Pune, Solapur and Ahmadnagar district. It is widely spreaded in rural areas. The health hazards resulting from sugar industry may occur due to high concentration of bagasse dust, clay dust, sugar dust, chemicals, heat, high intensity noise, vibration inadequate illumination, inadequate space, non ergonomically designed work place, shift work, night shift etc. The workers can sustain stress and fatigue work sincerely, effectively and safely within their physiological limits.

The Laboratory of Physiology, Department of Zoology, Shivaji University, Kolhapur (India) is engaged in extensive work in toxicology, occupational physiology and some applied problems in textile, foundry, dairy and sugar industry. In many jobs, the workers were exposed to various types of health hazards and environmental stress factors.

Haematological studies on powerloomworkers were carried out by Sawant et al. (1996). Haematological changes in rat in response to cotton dust exposure were carried out by Sawant and Dubal (1997). Occupational stresses among powerloom workers and their management were reported by Sawant and Dubal (1997). Haematological studies on textile workers in Ichalkaranji was carried out by Gaikwad (1997). Health risks in the spinning mill workers were studied by Sawant et al. (1999). The effect of cotton dust and/or associated endotoxin (s) on platelet count of rat were studied by Sanadam et al. (2000). Details of plasma protein profile of rat exposed to endotoxin associated with cotton dust in weaving shed were observed by Sawant et al. (2000). Cotton dust induced Neutrophilia in powerloom workers at Ichalkaranji were studied by Sawant et al. (2000). Physiological reactions to cotton dust in an animal model was developed by Sawant et al. (2001). The effects of cotton dust and associated endotoxin(s) on red cell count in textile environment were studied by Sawant and Sanandam (2001). Effect of respirable textile particulate matter on animal model rat were observed by Sawant et al. (2001). Physiological studies of rats exposed to cotton dust has been studied by Sanandam (2002). Physiological studies on foundry workers in relation to work and stress has been worked out by More (2003).

For sugarcane the process of refining carried out in two main steps in various processing units or sections. The first step constitutes processing of sugarcane to extract the juice and secondly the manufacturing of crystalline sugar. The process of extraction of juice is completed in the Engineering section of sugar industry in various sub sections by the following ways.

A) Cane-yard section: It involves unloading of sugarcane loaded vehicles. B) Mill section- Cane cutting, crushing and fiberizing is completed in mill section. C) Boiler section- Boiling of juice in series of four boilers. D) Bagasse bailing section- Bailing of shredded bagasse and its storage. E) Power turbine section- Production of electricity which is required for the factory work.

In the engineering section of sugar industry starting from cane yard to power turbine section high concentration of clay dust, bagasse, dust, high intensity noise, high temperature and vibration are the common occupational stress factors. In the present study priority has been given to study the effect of higher concentration of dust on total platelet count of the worker.

MATERIAL AND METHODS.

Study Area.

The present study was carried out at Hutatma Co. sugar industry walwa, Dist. Sangli having 4500 tons of crushing capacity per 24 hours and employing 645 workers in all.

Selection of Subjects.

For the present study, totally fifty sugar industry workers have been assessed from different sections ten from each of Cane yard, mill, boiler, bagasse baling and power turbine for the study of total plate count and stress effects. The assessment method includes interview with workers. Standard questionnaire used to collect information from workers. The persons working in the office were treated as control subjects. The sampling of dust was done by High Volume Sampler. The amount of respirable suspended particles matter is observed directly with sampler. The platelet count was done by Neubauer's counting chamber. The readings were taken in triplicate for accuracy. Standard questionnaire is used to collect information.

RESULT AND DISCUSSION

In sugar industry the working condition and work environment is quite adverse. The workers have to perform various types of tasks in various sections of the sugar industry and are exposed to adverse environment. The workers are mostly middle aged, the age ranges from 23 to 58 years and have worked for long period of service upto 18 years. The questionnaire survey revealed that most of the workers were illiterate, smoker, and drinker. Most of the workers complained about back pain, body ache, lower back pain, pains in shoulder and neck. Throat infection, fever, cough is very common among all workers at the starting of seasonal work. Some workers also complained about pains in hands and legs weakness, eye irritations, headache, acidity, suffocation. Due to changes in shifts the problem of indigestion and loss of appetite is very common.

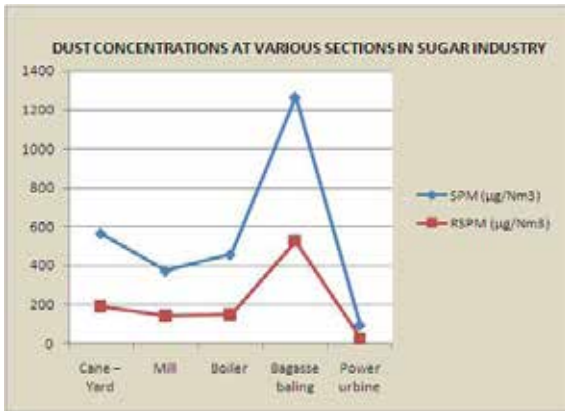


FIG.1

The dust concentration at various sections of sugar industry was recorded and indicated in fig.1. It has been significantly found that the concentration of suspended particulate matter 565 µg/Nm³ and respirable particulate matter is 192 µg/Nm³ at the cane yard section. In Bagasse baling section the concentration of suspended particulate matter is 1265 µg/Nm³ and respirable particulate matter is 525 µg/Nm³. The workers in all these section were found to work without using any personal protective equipment such as face masks, ear muffers, goggles, heavy duty shoes, etc.

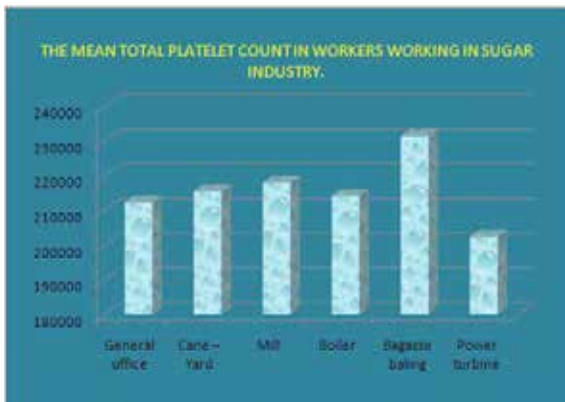


Fig.2.

Fig 2 indicates the mean total platelet count in workers working in sugar industry. It was found that the platelet count is significantly increased in workers working in bagasse baling, cane yard and mill section.

The total platelet count is at high level in present study in the Workers working at cane yard, mill, boiler and bagasse baling section. It may be because of release of megakaryoblast and Megakaryocytes in bronchoalveolar lavage. The megakaryoblast responsible for release of platelet. Increase in platelet count and megakaryocytes observed in acute lead poisoning Wintrobe (1981). Rylander and Haglund (1986) reported an increase in neutrophils and platelets over the shift in cotton mill workers.

The release of platelets in blood circulation may occur because of alveolar macrophages polymorphonuclear leukocytes and increased histamine level due to inflammation caused by cotton dust Castronova et al. (1996). The total platelet count is significantly increased in rat exposed to cotton dust reported by Dubal 2002. Johnson et al. (1982) shows that the fate of cotton wool fibers introduced into human systemic veins during medical procedure; in rats the fibers are swept into pulmonary circulation as emboli indicating that within 1 hour the fibers become covered with platelets, plasma proteins and neutrophils attach around them. In the present study in cane yard section high concentration of clay dust similarly in mill, boiler and bagasse baling section high concentration of bagasse dust. Only factors in all probability might be responsible for elevation of platelet count in the blood of workers in these sections. Exact reason for this elevation or underlying mechanism for this work change in platelet count cannot be explained at this stage. The investigator planned to continue on these lines in future. Thus the improvement of hygienic norms on dust, heat and noise which are wide spread stressful factors of occupational environment is necessary for the maintenance of health status of workers and for creation of environment for productive and qualitative labour.

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