



## Effect of Occupational Hazards on Haematological Parameters of Cane Sugar Manufacturing Employees

### KEYWORDS

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**ABSTRACT** *The sugar industries contribution to national economy is substantial .In Maharashtra state it is one of the important agrobased industry providing employment to rural peoples. The workers working in sugar industry are exposed to various occupational stress factors-Viz. high intensity noise, excessive temperature, high concentration of dust, toxic fumes of gases and chemicals, excessive workload etc., the health status of the workers is affected due to adverse working conditions. In present investigation randomly selected ten workers from various processing units/sections cane sugar manufacturing sections were selected for the study of hemoglobin concentration and erythrocyte sedimentation rate. It was found that the hemoglobin concentration of the workers is found to be at low level and erythrocyte sedimentation rate is at high level as compare to control group general office workers*

### INTRODUCTION

There are physical, chemical and biological agents in the working environment of sugar industry which may adverse to health of worker. The working capacity of the workers is affected by physical agents such as noise, temperature, humidity, light etc. The chemical agents in working environment include dust, toxins, gases and fumes of chemical which cause health hazards like respiratory illness, injury to skin and have a dexterous effects on other organs of body. In Overall biosphere biological agents have very toxic effect on human body e.g. microbes, fungi and parasitic agent's affects the humans and also contaminate water soil and food material. 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 powerloom workers 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 Idhalkaranji 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 Sanandam 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 Idhalkaranji were studied by Sawant et al. (2000). Physiological reactions to cotton dust 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).physiological evaluation of jobs and occupational stresses in sugar industry. 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 is manufactured from extracted juice in manufacturing section.as follows.

Manufacturing section: It constitutes following sub sections:1.Juice section- It involves boiling the juice until it begins to thicken and sugar begins to crystallize and the clarification of juice by sulphitation 2.Pan section- Spinning the crystals in a centrifuge to remove the syrup, producing raw sugar.3.Centrifugal section- Shipping the raw sugar to a refinery where it is washed and filtered to remove remaining non-sugar ingredients i.e molasses and color.4.Sugar house section- Crystallizing, drying and packaging the refined sugar 5.Godown section –Lifting carrying and storage of sugar bags.The boiling house engineering work section workers look after the maintenance of machineries

### MATERIAL AND METHOD

#### Study area

The observational study was carried out in Padambhushan Dr.Naganath Anna Nayakawadi Hutatma Kisan Ahir Sahakar i Sakhar Karkhana, Walwa, Dist. Sangli. Nationally renowned for the recovery of sugar. The industry provides employment to 420 permanent workers.

#### Selection of subjects

The study sample comprised of male permanent workers employed in the sugar factory. About fifty subjects were randomly selected i.e. ten from each sub department of manufacturing section of sugar industry viz. boiling house engineering section ,juice, pan, centrifugal ,sugar house section and godown section.

#### Methods

Dust monitoring from sugar industry processing units was carried out by Respirable Dust Sampler Model RDS-3. Sound level at various sub departments was recorded by sound level meter in decibel (dB). Recording of thermal data such as dry bulb temperature was made in different sections during working hours .The sampling of sulphur dioxide was done by Sodium Tetrachloromercurate Method. Nitrogen oxides as nitrogen dioxide are collected by bubbling air through a sodium hydroxide solution to from a stable solution of sodium nitrite. The nitrite ion produced during sampling is determined colorimetrically by reacting the exposed absorbing reagent with phosphoric acid, sulphanilamide and N (t – naphthyl) ethylene diamine dihydrochloride. The method is applicable to collection of 24 hours samples in the field and subsequent analysis in the laboratory. The Hemoglobin concentration was determined by making use of Sahilshemometer as described

by Wright(1996).The Westergren method of measuring the Erythrocyte sedimentation rate was measured by Westergren method.

**RESULT AND DISCUSSION**

The workers working in the sugar industry have to perform various types of work in various section of sugar industry and are exposed to adviser environment, which is different from section to section. Inoder to assess occupational stresses, about ten workers from each section have been randomly selected .The workers are mostly middle aged, The age ranges from 25 to 59 years. Furthermore ,usuallyworker render long period of service ranging from 18 years to as long as 40 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 eye irritation head ache, acidity, suffocation.

Figure 1

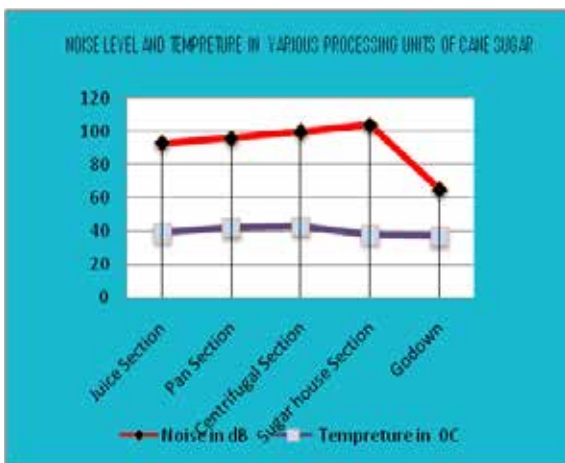


Fig 1 indicates Noise level and temperature in various processing units of cane sugar manufacturing section. It was found that the high intensity noise is generated at sugar house section and Centrifugal section. The temperature level is higher at centrifugal and pan section.

Figure 2

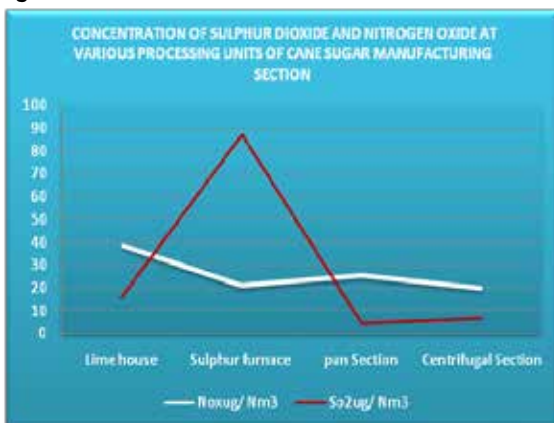


Fig.2 indicatesconcentration of sulphur dioxide and nitrogen oxides at various processing units of cane sugar manufacturing section .It has been found that the concentration of sulphur diaoxide In boiling house section near sulphur furnace was significantly high i.e 87. 17 µg/Nm<sup>3</sup>

**Table no. 1 Dust concentrations at various processing units of cane sugar manufacturing section**

Section	Concentration of dust(µg/mm <sup>3</sup> )
Juice Section	214.35
Pan section	140.16
Centrifugal section	180.17
Sugar house section	630.15
Godown	110

Table No 1 indicates dust concentrations at various processing units of cane sugar manufacturing section.It has been significantly found that the concentration of dust is higher at 630.15 µg/mm<sup>3</sup> at sugar house section.

**Table.2.Mean Hemoglobin Percentage and Erythrocyte sedimentation rate of workers in cane sugar manufacturing section.**

Section	Hb % g/dl	E.S.R. mm/hr.
General Office	13.57± 1.05	7.50± 1.02
Boiling house engineering work	11.78± 0.98	8.90± 2.30
Juice Section	12.66± 1.30	9.30± 1.62
Pan section	12.13± 0.86	7.90±1.81
Centrifugal section	12.36± 1.18	8.00± 1.73
Sugar house section	12.32± 0.68	9.90± 2.02
Godown	13.28± 1.12	7.00± 1.41

Table No 2 indicates Mean Hemoglobin Percentage and Erythrocyte sedimentation rate of workers in sugar manufacturing sections. It was found that the hemoglobin percentage of workers was at low level in all the processing unit as compared to control group. The Erythrocyte sedimentation rate was significantly higher in workers working at juice and sugar house section.

Studies on hematological parameters of the workers working in various units of cane sugar manufacturing sections showed that the hemoglobin concentration of the workers working in all sections pcessing is at low level except godown workers. It may be because of unhealthy working conditions, excessive work load, high concentration of dust at sugar house and centrifugal section. It may also be due to excessive heatand noise observed at pan, centrifugal and sugar house section and sulphurdioxide at boiling house and juice section.

The erythrocyte sedimentation rate of workers working in cane yard, mill, bagasse baling, juice and sugar house section is significantly at high level than control group. Changes in erythrocyte sedimentation rate levels in these workers could reflect cause effect relationship in the higher concentration of sugar dust at sugar house section and sulphur dioxide gas at juice section workplace environment. Erythrocyte sedimentation rate is increased in all conditions where there is tissue break down or where there is entry of forign proteins in the blood, except for localized mild infections.

The determination is useful to check the progress of disease (Godkar, 1994). Erythrocyte sedimentation rate is increased in textile workers exposed to cotton dust (Sawant and Shinde, 1997). Increase in erythrocyte sedimentation rate suggest the chronicity of respiratory impairment.The investigator plan to continue working on these lines for finding susceptibility as well as suitability of animals.

**REFERENCE**

Castranova V., Robinson V. A., Frazer D. G.(1996) : Pulmonary reactions to organic dust exposure : Development of an animal model *Env. Heal. Persp.* Vol. 104, Suppl. 1, 41-53. | Dubal R. S. (2002) : Physiological reactions to cotton dust exposure: Development of an animal model. A Ph.D. thesis submitted to Shivaji University, Kolhapur - 416 004, India. | Gaikwad P. Y. (1997) : M.Phil. dissertation on "Haemato-logical studies on textile workers in Ichalkaranji" submitted to Shivaji University, Kolhapur, M. S. India, 416 004. | More R. B. (2003): "Physiological studies on foundry workers in relation to work and stress". A M.Phil. Dissertation submitted to Shivaji University, Kolhapur - 416 004, India. | Johnston B., Smith P. and Health D. (1982) : Experimental cotton fibre pulmonary embolism in the rat. *Thorax*, 36 (12), 910-916. | Rylandcr E., Haglind P. (1986) : Exposure of cotton workers in an experimental cardroom with reference to airborne endotoxins *Environ. Health Perspect.* 1986, 66, 83-86. | Sanandam M. R., Sawant V. A. and Sawant G. V. (2000) : The effect of cotton dust and associated endotoxin on platelet count in rat. Paper presented in National Seminar on Zoology | for 21<sup>st</sup> Century at Goa University, Goa, 7-9 Dec., 2000. | Sawant V.A. and Sanandam M.R(2000): Assessment of occupational stresses using animal model.Paper presented in National conference on " Stress and Environment" at Osmania University, Hyderabad(A.P),9-11 March ,2000.. | Sanandam M. R. (2002) : Physiological studies of rats exposed to cotton dust. A Ph.D. thesis submitted to Shivaji University, Kolhapur - 416 004, India. | Sanandam M. R. and Sawant V. A. (2001) : Physiological studies on rat liver on exposure to textile environment. Paper presented in International Congress on "Chemistry and environment" sponsored by International Journal of Chem. and Environ. Indore, 16-18 Dec., 2001. | Wright S.(1966) *L I " Applied physiology "*, Oxford University press ,London. |