Research Paper

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Impact of Sugar Industry Environment on Erythrocyte Sedimentation Rate of Sugar Industry Workers

Zoology

KEYWORDS : Bagasse dust, work place environment, erythrocyte sedimentation rate, sugarindustry.

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ABSTRACT

The Indian sugar industry is a key driver of rural development,supportingIndia's economic growth. In Maharashtra it is one of the most notable and large scale manufacturing sectors in the country. The sugar industry is characterized by multitude of concomitantly occurring exposures such as high intensity noise, high temperature,high concentration of clay dust, bagasse dust, fumes of toxic gases, chemicals. The adverse working environment, unsafe working conditions and lack of welfare schemeaffect the safety and health of the industrial worker.In the present investigation the effect of dust and adverse working environment on erythrocyte sedimentation rateof worker has been studied.It was found that the erythrocyte sedimentation rate of workers working in cane yard, mill and bagasse baling section of sugar industry is high as compare to control group.

1. INTRODUCTION

Indian sugar industry is second largest industry in the world next to Brazil.It plays a key role in rural development.In Maharashtra it is one of the important agro based industry, employing thousands of skilled and unskilled workers . The occupational health problems in this sector are many and are attributable to variety of occupational stresses such as high intensity noise, high concentration of dust, high temperature, fumes of toxic gases and chemicals. 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,baggase 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 erythrocyte sedimentation rate of the worker.

2. MATERIAL AND METHODS.

2.1 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.

2.2 Selection of Subjects.

For the present study, totally fifty sugar industry workers have been assessed from different sections viz. Cane yard, mill, boiler, bagasse baling and power turbine for the study of erythrocyte sedimentation rate 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. Dust monitoring from sugar industry processing units was carried out by Respirable Dust Sampler Model RDS-3.The westergren method of measuring erythrocyte sedimentation rate was used as described by Westergren(1924).

RESULTS

In sugar industry process of extraction of juice is worked in engineering section which includes cane yard, mill, boiler, bagasse baling and power turbine subsection.In these different sections variety of stress factors affects health and comfort of workers .The workers are working eight hours and six day per week ,in shift work and night shift .In order to assess erythrocyte sedimentation rate about ten workers from each section have been randomly selected,the workers are mostly middle aged ,the age range from 25 to 59 years .and have worked for long period of service up to 18 years to as long as 40 years .The questionnaire survey revealed that most of the workers were illiterate ,smoker, drinker and having poor economic background. Most of the workers have many complaints regarding health i.e. back pain, body ache, pains in shoulder ,lower back pain, and neck throat infection ,fever cough is very common among all workers at starting of factory work during October-November.

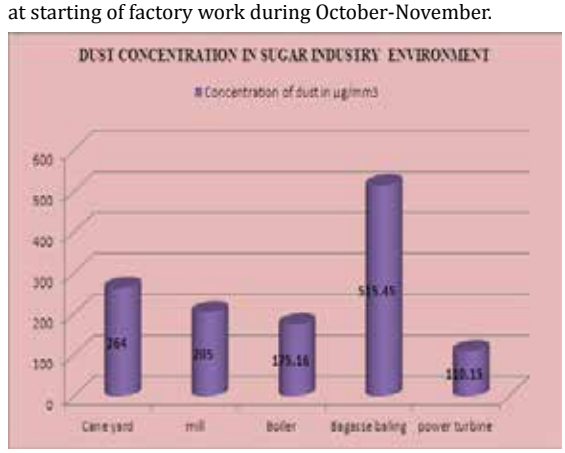

FIG.1.

Fig. 1 shows dust concentration in different section of sugar industry which was sampled by RespirableDustSampler Model RDS-3.The dust concentration ranges from 110.15µg/mm^3 to 515.45µg/mm3.The higher dust concentration is recorded in bagasse baling, cane yard and mill section.

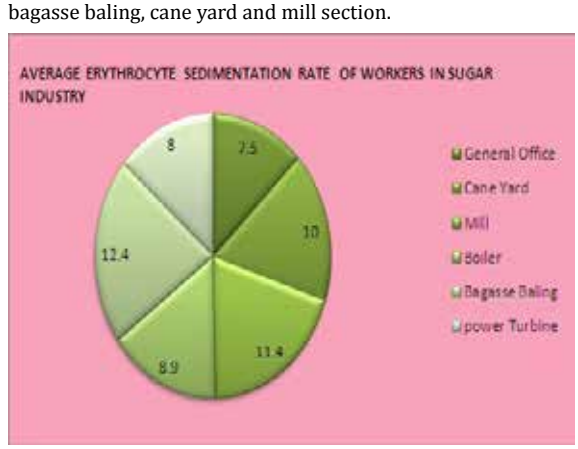

FIG.2

Fig 2. Indicates average erythrocyte sedimentation rate ofsugar industry workers .It was found that erythrocyte sedimentation rate of the workers working in cane yard, mill, bagasse baling and boiler section of sugar industry is high as compared to control group. The significant increase in erythrocyte sedimentation rate was found in workers working in bagasse baling and mill section.

In sugar industry respiratory illness was found particularly more severe among the workers working in bagasse baling section. Workers showed complex symptoms associated with cough, fever, chest tightness and wheezing. Incidence of respiratory illness shows relationship with duration of exposure to bagasse dust, the severity of illness was found to be increased with age. Most of the workers from bagasse baling section were smoker and alcoholic. Smoking is clearly a newly recognized major problem at work.

It may be because of unhealthy working conditions, excessive work load, high concentration of dust at cane yard, mill, boiler and bagasse baling section. It may also be due to excessive heat, noise observed at boiler, power turbine section. Hypersensitivity pneumonitis is granulomatous interstitial lung disorder resulting from reaction to allergens in predisposed host occupationally it occurs in susceptible workers.It was first described by Ramanzzini in 1713 with the symptoms of cough and shortness of breath in workers exposed to dust of cereal grains. Brobson(2001) has reported that about 250 substances in workplace can cause occupational respiratory disorder and the list of causative chemicals ,enzymes animal proteins and plant allergens is growing. Sharma (2001) reported leukocytosis, neutrophilia and elevated ESR and increased level of quantitative immunoglobulins and C-creative protein in patients with hypersensitivity pneumonitis.

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 dust i.e. clay dust, bagasse dust, at 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).

The endotoxins of Gram negative bacteria are responsible for several toxic effect have been studied by Cinkotoi(1977). Air environment of mill, boiler and Bagasse bailing section is contaminated with large no of gram negative and gram positive bacteria ,infectious fungi and actinomycetes (Nayakawadi,2004)

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

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 the only factors in all probability might be responsible for this elevation or underlying mechanism for this increase in erythrocyte sedimentation rate cannot be explained at this stage. The investigator planed to continue working on these lines to finding out the susceptibility to occupational diseases induced due to adverse environment in sugar industry.

REFERENCE

• WestergrenA(1924): Die senkungsreaktion,Ergebn din Med µ Kinderheilk 26:577. | • Godkar P. B. (1994) : Textbook of Medical Laboratory Technology, Balani Publishing House, 464. | • Cinkotoi F. F. (1977) : Air borne bacteria and prevalence of byssinotic symptoms in cotton spinning mill in Loncashire. Ann. Occup. Hyg., 21, 239-250. | • Nayakawadi S.A.(2004) A Ph.D. thesis entitled "Physiological evaluation of jobs and occupational stresses in sugar industry workers". submitted toShivaji university, Kolhapur(416004) Maharashtra. | • Sharma (2001) : In Hypersensitivity pneumonitis, Ed. Michael Peterson, New Orleans Publishing Group L.L.C. | • Sawant V.A. and Shinde (1997) :Hematological studies in rat in response to cotton dust exposure.Paper presented in II Congress of FIPS at department of Zollogy,S.V. university, Tirupati (A.P.)15-17.,1997 |