Research Paper

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Effect of Sugar Industry Workplace Environment on Total White Blood Cell Count of Worker During Work.

Zoology

KEYWORDS : Occupational stresses, White blood cell count, humidity etc.

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ABSTRACT

The sugar industries in Maharashtra acts as an nuclei for economic development of state.It provides employment to thousands of peoples from rural areas .The working environment of sugar industry is adverse which affects the health of the workers. The working condition to which workers are exposed constitutes high intensity noise, high temperature, high concentration of dust,toxic fumes of gases, chemicals excessive workload,shift work and night shift.In present investigation randomly selected fifty workers from engineering section of sugar industry were assessed for the total white blood cell count.It was found that the number of total white blood cells was increased in workers working as cane yard, Mill and bagasse baling section than control group general office workers and the total number of white blood cells decreased in workers working in boiler section.

Introduction

The sugar industries constitution to national economy is substantial .India is the second largest country as far as sugar production is concern next to Brazil .In Maharashtra state is one of the important agrobasedindustry which provides employment to a very large labour force .The sugar industry workers are exposed to various health hazards and environmental stress factors arising due to the workplace environment as well as lack of welfare facilities.

For refining of sugar from sugar cane is the two step operational procedure completed in various processing units or sections. In the first step juice is extracted from sugar cane in engineering section and in the second step the crystalline sugar is manufactured in manufacturing section. The present study is carried out in engineering section of sugar industry which constitutes following sub sections viz. cane yard, mill, boiler, bagasse baling and power turbine .

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 poweloom workers were carried out by Sawant et al.(1996). Haematological changes in rat in response to cotton dust exposure were carried out bySawant and Dubal (1997).Haematological studies on textile workers in Ichalcarangi was carried out by Gaikwad (1997).Cotton dust induced nutrophillia in power loom workers at Ichalkarangi were studied by Sawant et al.(2000).The effect of cotton dust and associated endotoxin (s) on red cell count in textile environment were studied by Sawant and Sanandam (2001).

MATEIRAL AND METHOD

Study area

The observational study was carried out in PadambhushanDr. Naganath Anna NayakawadiHutatmaKisanAhirSahakariSakhar Karkhana,Walwa.Dist.Sangli.Nationally renowned for the recovery of sugar.The industry provides employment to 324 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 engineering section of sugar industry viz. cane yard, mill, boiler, bagasse baling and power turbine. A control group constitutes ten subjects, office workers those who are not exposed to sugar industry workplace environment .A complete history of the workers was recorded with respect to duration of occupational exposure, respiratory symptoms,smoking habits and socioeconomic status with due consent in a pre-structured proform.

Methods

Dust monitoring from sugar industry processing units was carried out by Respirable Dust Sampler Model RDS-3. Recording of thermal data such as dry bulb temperature was made in different sections during working hours. The anthropometric measurement (Standing height and weight etc.) was recorded. The enumeration of total white blood corpuscles was done with aid of a Neubauer counting chamber. The results obtained were expressed in number of cells per cubic mm.

RESULT AND DISCUSSION

In the sugar industry workers are exposed to adverse working condition .The health of the worker is affected by working environment and working conditions.

Table :1. Dust concentration, Temperature and Relative humidity at engineering section of sugar industry

Section	Dust Concentration(µg/mm^3)	Temperature in ^{0}C	Relative humidity in %
Cane Yard	264	38	32
Mill Section	205	39	33
Boiler section	175.16	43	39
Bagasse baling Section	515.45	38	33
Power turbine Section	110.15	40	37

Table 1 shows dust concentrationtemperature and Relative humidityin different sections of sugar industry.The dust concentration ranges from 110.15µg/mm^3 to 515.45µg/mm^3.The higher dust concentration is recorded in bagasse baling, cane yard and mill section.

Table :2. Anthropometric measurement of workers in engineering section of sugar industry

Section	Height(Cm)	Weight(Kg)	Age(yrs)	Employment time (Months)
General Office	159.4±5.54	58.9±11.02	39.8±5.8	101.04±20.69
Cane Yard Section	161.2±7.06	58.2±11.01	40.3±7.54	109.80± 14.46
Mill Section	165.1±3.44	64±7.02	39.2±7.72	97.20± 23.82
Boiler Section	161.7±4.02	59.6±10.37	42.7±6.36	121.80± 37.76
Bagasse Baling Section	162.8±4.13	60.1±11.10	40.8±7.33	82.80± 19.86
Powe Turbine Section	162.9±3.66	56.6±5.23	40.3±5.9	105.60±18.04
Values are means ±S.D.				

Table No 2.indicates mean height, weight ,age and employment time of workers working in engineering section of sugar industry. It is found that the workers are of the middle aged the mean age range from 39.2 to 42.7 years .Furthermore, usually workers render long period of service ranging from seven to ten years.

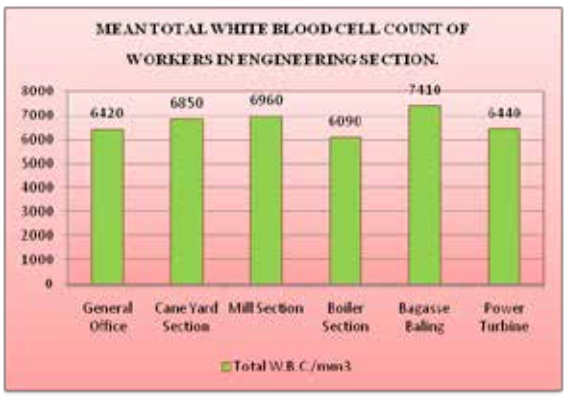

Figure 1

Fig 1 indicates mean total white blood cell count of workers in engineering section. It was found that the total white blood cell count was increased in workers working in cane yard, mill and bagasse baling section. It was significantly increased in bagasse baling section workers. The total white blood cell count was decreased in workers working at boiler section.

Major functions of white blood cells are accomplished in the tissues and that in the blood. Even in normal persons are in transit from the site of production or storage to the other tissues. From this it is evident that variations in the blood concentration of each white blood cell can result from changes in the flow of cells into the blood the egress of cells from the blood, the distribution of cells within the vascular compartment or due to the combinations of thereof furthermore, these changes may be of brief duration and thus easily missed, or they may persist for days or weeks. Quantitative measurement of such changes in the distribution and in the inflow and the egress rates has been possible only in recent years. These have provided some insight concerning the pathophysiologic significance of the variations in the white blood cells in toxic states.

In present investigation it was observed that there is significantly high total white blood cell count in workers working at cane yard, mill, and bagasse baling section. The elevation in white blood cell count may be attributed to the bodies response to the inhaled dust particles at cane yard, mill, and bagasse baling section.The low level of white blood cell at boiler section may be due to the high temperature to which workers exposed. The workers working without protective clothing ,mask or any other equipment.

It has been reported that the hemp and cotton textile workers exhibit an increase in the number of polymorphonuclear leukocytes in the nasal fluids (Merchandet at 1975). An increase in the number of polymorphonuclear leukocytes in the airways of gunca pigs exposed to water extracts of bale cotton has been reported (Rylander and Nordstand, 1974).

Sharma (2001) reported leukocytosis, neutrophilia and elevated ESR and increased level of quantitative immunoglobulinsand C-creative protein in patients with hypersensitivity pneumonitis.

Peripheral blood leucocytosis with neutrophilla observed in hypersensitivity pneumonitis(Schuyle,2002). Joshep et al.(1991) indicates a decrease in WBC count, neutrophilia, eosinophilia and lymphocyteopenia in albino rats as the effect of acute heat stress. In present investigation similar observation found in workers working in boiler section where the tempreture was 43^0C

Thus the improvement of hygienic norms on dust, heat, noise, vibration and toxic fumes as the most wide spread stressful factor of occupational environment is necessary for the maintenance of the health status of workers and for creation of the environment for productive and qualitative labour.

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