



## Existence of Stresses in Sugar Industry Units in Different Stages of the Process

### KEYWORDS

Occupational stresses, Sugar industry workers, Dust, Bagasse

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### ABSTRACT

*In number of occupation the workers are exposed to various health hazards and environmental stress factors arising due to the work place environment as well as lack of welfare facilities. Workplace assessment of many sugar factories indicated poor sanitary provisions, lack of personal safety equipment poor ventilation and total lack of welfare facilities. The health hazards resulting from sugar industry may occur due to high concentration of dust, excessive 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. If adequate attention is paid, regarding provision of satisfactory working conditions, there will increase in production and workers will be in healthy and comfortable condition. In present investigation various stress factors occurring in different processing units or sections of sugar industry have been accessed. It is found that although human factor is very important factor which plays important role in productivity it is often being neglected.*

### INTRODUCTION

The Indian sugar industry is a key driver of rural development, supporting India's economic growth. The industry is inherently inclusive supporting over 50 million farmers and their families, along with workers and entrepreneurs of almost 500 mills, apart from a host of wholesalers and distributors spread across the country. 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.

At the sugar industrial workplace a variety of factors influence the level of risk for the working population of sugar industry. They include the extent of exposure to hazards, which in turn is affected by process design, the safety precautions taken, the extent and quality of support services and their ability to respond rapidly and effectively to injury or disease. The extent to which workers and management alike understand the industrial process, the control technologies and safety equipment is also important.

The working and living conditions of the sugar industry workers are extremely poor. The occupational health problems in workers working in various processing units of sugar industry are enormous, mainly because of variety of occupational stress factors. The little attention have been paid on occupational stresses in sugar industry workers.

### MATERIAL AND METHODS

#### Study area

Many sugar factories were assessed for the study of existence of stress factors in various processing units. The present study was carried out in sugar industry at Walwa, Dist. Sangli(MH) having 4500 tons of crushing capacity per 24 hrs.

#### Methods

##### I. Methods of Assessment of Work Place Environment

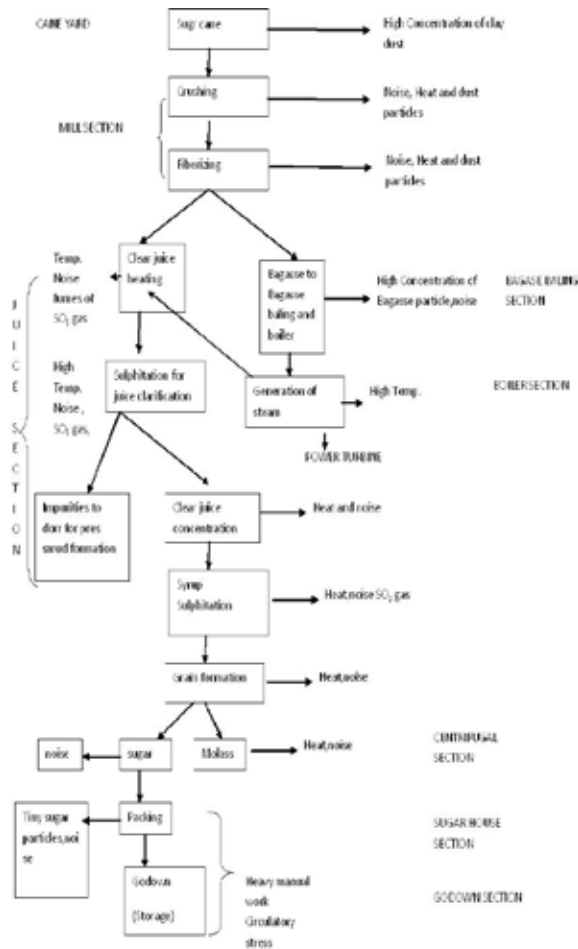
Sound level at different sections of the sugar industry was recorded by sound level meter. The sound level was recorded in decibel (dB). Recording of thermal data such as dry bulb temperature was made in different sections during working hours. Assessment of thermal load with special reference to different physiological responses of workers working in

processing unit of sugar industry was carried out. The illumination levels at different places of processing units were recorded by Lux meter. The illumination level was recorded in lux. The sampling of the dust was done by high volume sampler. The amount of respirable suspended particulate matter is observed

Directly with sampler the sugar industry under present investigation consisted of the following sections involved on the processing of sugar cane upto the sugar crystallization.

1. Cane Yard
2. Engineering
  - a. Mill Section
  - b. Boiler section
  - c. Bagasse baling Section
  - d. Power turbine Section
3. Manufacturing
  - a) Boiling house (Manufacturing Work)
    - i) Juice Section
    - ii) Pan Section
    - iii) Centrifugal Section
  - b) Sugar house Section
4. Godown

RESULT AND DISCUSSION



A. Noise and Vibrations

In sugar industry noise due to machineries is a very common stress factor all over the industry from cane yard section of the sugar industry upto the sugar house section. High intensity of noise is also generated in the factory by leakage of high pressure steam, moving mechanical parts such as pumps, fans, stirrers. Another Factor responsible for generation of noise is steam which is used to wash sugar layers in centrifugal machine.

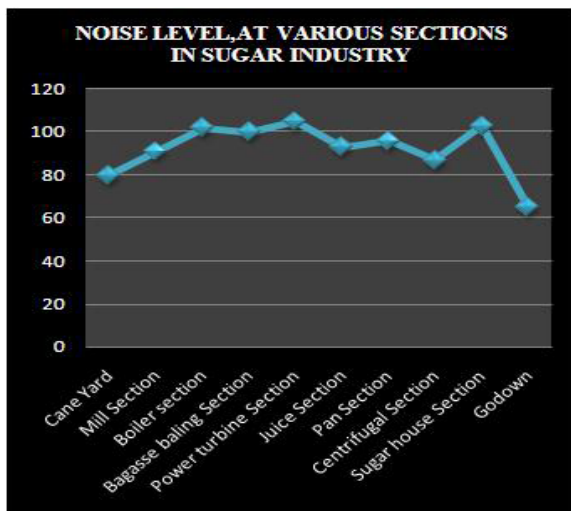


Fig.1.

Fig 1. Indicates noise level at various sections of sugar industry. It is observed that the high intensity noise is generated at the power turbine section (105dB), sugar house section (103dB) and boiler section (102dB) as compared to rest of the sections.

B. Heat

In present study, it is observed that in sugar industry the workplace environment is hot at many sections. The workers working in mill, boiler, power turbine, boiling house, pan and centrifugal section are exposed to hot environment. Fig.3 shows the worker performing the job in vicinity of the heavy machinery.

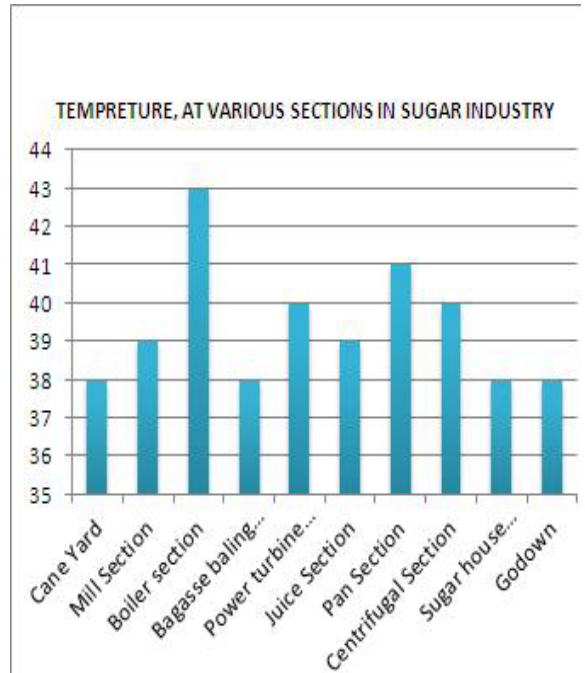


FIG.2

Fig.2 indicates temperature level at various sections of sugar industry. It is observed that relatively high temperature 43 °C is observed in boiler section.



FIG.3. WORKER IN CLOSE VICINITY OF BOILER NOTE THE EXCESSIVE HEAT AT THE WORKPLACE AND WORKERS WITHOUT PROTECTIVE CLOTHING.

C. Light

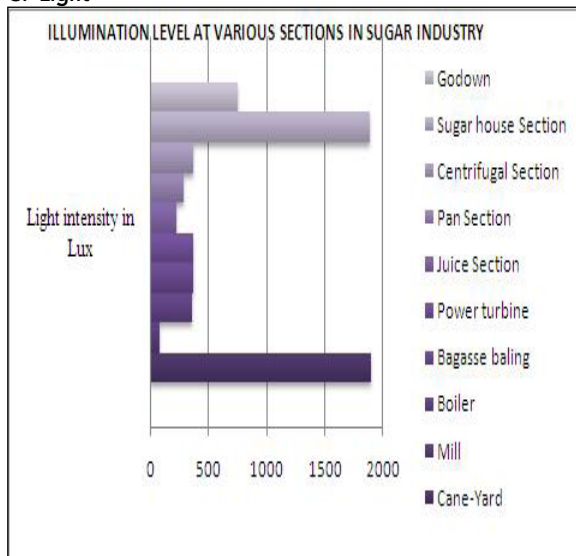


FIG.4

FIG 4 indicates illumination condition in various section in sugar industry. It is interesting to note that the mill section shows inadequate illumination (80 lux) as compared to rest of the section.

D. Dust

In sugar industry dusts are produced in the Cane Yard section due to unloading of bullockcarts and other vehicles. Similarly high concentration of dust was observed in the mill ,boiler and bagasse baling section. In Cane Yard section the nature of the dust is inorganic and soluble in nature, while in Mill section, boiler section and bagasse section main fraction of the dust is tiny bagasse particles organic in nature and insoluble. The fraction of dust from this is respirable dust and likely to be inhaled into the lungs and is retained there, because workers in these section were found to be without any protective equipment such as face mask etc



FIG.5.INDUQUATE ILLUMINATION IN MILL SECTION

The dust concentration at various sections of sugar industry was recorded and indicated in FIG 6.It has been significantly found that the concentration of suspended particulate matter is 545  $\mu\text{g}/\text{Nm}^3$  and respirable particulate matter is 182  $\mu\text{g}/\text{Nm}^3$  at the cane yard section. In bagasse baling section the concentration of suspended particulate matter is 1245  $\mu\text{g}/\text{Nm}^3$

$\text{Nm}^3$  and respirable particulate matter is 415  $\mu\text{g}/\text{Nm}^3$ . In sugar house section the concentration of suspended particulate matter is 508  $\mu\text{g}/\text{Nm}^3$  and respirable particulate matter is 160  $\mu\text{g}/\text{Nm}^3$ . The workers in all these sections were found to work without using any personal protective equipments such as, face masks, ear muffers, goggles, heavy duty shoes, etc.

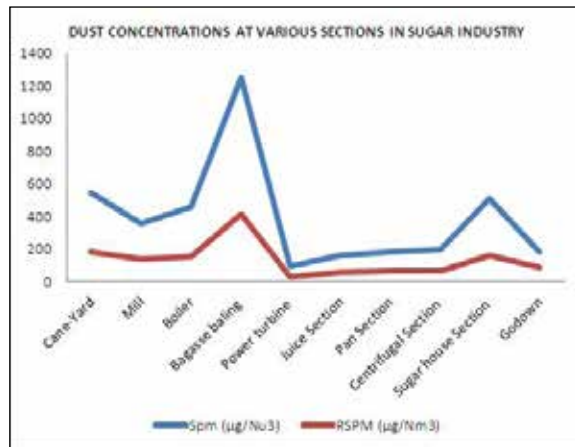


Fig. 6.

E. Gases and Chemicals

i. Sulphur dioxide

In the sugar industry for the clarification of juice sulphitation-process is carried out that requires sulphur dioxide gas which is prepared by burning solid sulphur in furnaces called sulphur furnace.The gas bleaches coloured impurities present in the juice and syrup. During sulphitation workers working in juice particularly on sulphurbhatti are exposed to sulphurdioxide gas. Every two hours the furnace has to be opened and is again charged with fresh sulphur. When this furnace is opened the hot sulphur dioxide gas rushes out and the workers working in juice section are exposed to the sulphur dioxide gas. The pipe line which conveys the hot sulphur dioxide gas leaks and the workers in the vicinity inhale this gas.

ii. Nitrogen Oxides:

In sugar industry the nitrogen oxides are produced due to incoming vehiclesloaded with sugarcane, due to furnaces, boilers, welding processes and internal combustion engines. Carl Zenz (1994) reported 3,00,000tonnes of nitrogen oxides are produced annually from industrial processes.

F. Lime:

In sugar industry lime solution is required for juice clarification. Factory purchases lumps of lime packed in polythene bags from outside. This lime purchased is stored in godown near lime solution preparation unit. To prepare solution water is showered on lime in lime slaker. This lime slaker unit is placed at 10 to 12 feet height from ground level. Hence the lime bags are required to be transported from godown to slaker. In the preparation of lime solution lot of powder lime spreads in the godown and near lime slaker. Fig. 7 shows concentration of lime dust near lime slaker. The lime dust contaminates air which is breathed by workers. Alkaline lime affects skin of the body, hands, feet and all organs which come in contact with it. While preparing lime solution small tiny particles of lime splash on workers body, on eyes causing unbearable irritation to eyes.



**FIG.7 LIME STIRRER UNIT NEAR LIME SLAKER NOTE THE HIGH CONCENTRATION OF LIME DUST AND WORKER WITHOUT PERSONAL PROTECTIVE EQUIPMENT.**

#### **G. Awkward working postures during work:**

In the present study it is observed that in sugar industry workers working in all the sections have to perform various types of jobs viz. rotation of valves of machineries at various sections, baling of bagasse, lifting carrying in sugar house and godown involves movement of body in awkward posture



**FIG.8 AWKWARD WORKING POSTURE OF THE WORKER IN MILL SECTION.**

#### **H. Welding Work :**

The process of arc welding is constantly carried out in sugar industry as per need during seasonal work as well as off season.



**FIG.9AWKWARD WORKING POSTURE OF THE WORKER IN CENTRIFUGAL SECTION.**

Welders may be injured by flying sparks or particles of hot metal. The ultraviolet radiations and metal fumes produced during welding may seriously harm the welder's health. Eye and face injuries may be caused from flying particles, molten metals, chemical gases or vapors. Workers are exposed to high noise level from welding equipment.

#### **I. Lifting and Carrying :**

The workers from godown section of sugar industry are continuously engaged for lifting and carrying the heavy bags of sugar. They have to arrange stacks of the bags in godown and also load the trucks with bags continuously. Working hours of godown workers are about eight hours in shift and most frequently they have to continue the lifting and carrying job for additional two hours.

In sugar industry workplace environment and working conditions were quite adverse. The optimum level of health status of these workers is difficult to maintain. High intensity noise, excessive heat, high concentration of clay dust, bagasse dust, sugar dust, inadequate illumination, glare, toxic fumes of sulphur dioxide gas, lime, NO, bacteria, fungal spores, shift work, night shift, excessive workload, awkward posture are some of the important stress factors to which sugar industry worker is exposed. The physiological responses of the workers change due to occupational stresses (Nayakawadi, 2004). It was found that the workers working without any personal protective equipment. The health of worker is important but workers are ill rate and not aware of that. The point to be noted is that in industry decision makers and management does not accept responsibility for the occupational hazards that affects the workers. Factory management doesn't care about it.

#### **REFERENCE**

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