

Occupational Health Hazards Of Sugar Cane Industry Workers – A Review

G.Durai¹, R.Ramsenthil¹ and E.Krishnaprabhakaran²

1. Department of Chemical Engineering, Annamalai University, Annamalai Nagar -608002.

2. Institute of Chemical Technology, Taramani, Chennai – 600113.

Corresponding E mail: drgdurai@gmail.com

Abstract

OHS is one vital area that encompasses several aspects: It is a worker's fundamental right to work in a safe, hazardless and sound environment causative to increasing productivity with active participation. Among the emergent industrial sectors, sugar industry playing an important role in which workers are facing number of OHS hazards such as high noise, dust from baggase and fly ash etc. Occurrence of several work place hazards are common in sugar industry. During working season flulike symptoms, fine pulmonary fibrosis and ineffective respiratory pattern are caused by repeated attacks would be developed among the workers. In this study works carried out by various investigators are analysed to highlight OHS struggles of sugar manufacturing industrial employees for further research works.

Key words: occupational health and safety (OHS), hazards, sugar industry.

Introduction

Socio-economic development is contributed by the industrial workers whom representation is about half of the world's population. Occupational health and safety services available to them at their place of work determine the health [1]. In India the sugarcane was used since 8th century BC [2]. Sugar industry is one of the most significant agriculture based industry promoting job opportunities, revenue and development of the society in the backward areas of the country, where both educated and illiterate peoples from rural areas are incorporated throughout the world [3]. Various activities involved in sugar production causes numerous workplace hazards to the workers who are exposed. Worldwide daily 2.9 peoples in industries are facing occupational hazards including sugarcane factory sector. Because of these exposures to hazards more than 153 workers got injury and 6300 peoples are died every

day [4, 5]. Around 170,000 sugarcane workers are killed annually around the world due to exposure to hazards [4]. Occupational hearing loss could cause by excessive noise levels, serious burns, lack of fluids at huge levels because of elevated temperature range in boilers and evaporators, improper electrocution, hazards during work at height, burns caused by faulty usage of turbines, fire from bagasse during summer season and lagoons leakage leading to dermatological problems are also important hazards [6].

Poor maintenance of safety and occupational parameters, insufficient policies and poor facilities to tackle the health related problems and continuous movements of organs causes industrial accidents, RSI and MSD in neck, back and arms. Correa- Rotter et al., found that CKD is common among the sugar cane cutters [7, 8]. Bagassosis which results reduced pulmonary function was investigated first by Vishwanathan et al [9] and secondly Nair and Das [10] in India. High toxicity of pesticides leads to plenty of industrial accidents in sugar cane workers. Lung cancer, possibly mesothelioma causing parameters is also common among these workers. This is mainly because of the combustion foliage during the cutting of sugar cane. The personnel may also be suffered by persistent infections which causes production loss.

Worker's age, unsafe acts & unsafe work conditions, exposure duration, not using personal protective equipment (PPE), improper job rotation, not providing health & safety training, dissatisfaction of job, prolonged working hours in a week, safety inspection & employment pattern in irregular manner are significantly associated with occupational exposure resulting in occupational health problems [11], Not carrying out safety audit, safety training, improper assessment of risk and vibration protection device also significantly causes the occupational health problems. So the demands for fundamental services regarding safety and health have grown significantly. The various parameters leading to health impairment for workers of sugarcane sector which lead to occupational health problems from scientific articles are identified and analysed in this paper.

Reviewing occupational health hazards

In sugar producing sectors poor working conditions with crops and improper maintenance and monitoring causes 54.6% incidents. It is found that daily minimum three fatalities occurred in Australian sugarcane farms on an average [12]. In an investigation of

sugar industry personnel in Brazil, Occupational health is dependent on poverty; work in repetitive manner, life quality including environmental parameters. The survey also illustrates that pain in hand or wrist of sugar cane cutters are less than nurses and office workers [3, 13]. Sugar workers in Kenya are not satisfied regarding the training education for the purpose of safety [14]. so by the Kenya IUF Global Sugar Program and KUSPW recommendations for different risk factors are given in the sugar industry [15]. Bagasse causes Tuberculosis, Inspiratory reserve volume, Endogenous retrovirus, Bauhin's syndrome and Vinyl chloride disease which are low pulmonary function parameters mostly found in the workers of sugar industries [16-18].

By a study amongst the workers in an Iranian sugar-producing factory, MSD risks exposure level of knee and lower back in the percentage of 58.6 and 54.3 are found [19]. Out of 100,000 sugarcane workers 70 fatalities are occurred as a result chronic kidney problems. CKD level is measured as 95%. Along Pacific Ocean, since 1999 chance for failure of kidney is common among the sugar cane workers. It is also found that sugarcane cutting over half of the year may perhaps direct cardiac damage with lack of fluids between the age group of 18 to 54 years at El Salvador. During the harvest season of sugar cane eGFR is decreased to 25.0 ml/min/1.73 m² from 28.6 ml/min/1.73 m² based on the type of work as compared to other industry employees in North-West Nicaragua [20]. Solvents used in sugar industry increases the risk of oral cancer [21].

In IMA Industry cleaning of oven increasing the risk of severe heat stress. In the sugarcane workers Costa Rica, USA, elevated threat for heat stress is mostly found. Stress in sugar cane cutters increased to post-harvest (46.1%) from pre-harvest (34.2%), but for urban workers it is found that stress decreased to post-harvest (42.0%) from pre-harvest (44.0%) at Mendonca, Brazil [22-24]. To improve the well being of the sugarcane produce workers medical care, well defined policy and approach in integrated manner are essential [25].

15 to 20% injuries are reported among the sugarcane during the harvesting season in Pakistan. It is observed that safety equipments only reach to the employees 40% in sugar cane industries. It is also recorded that the sugar industry high noise levels between 85 and 112 dB affects human well being very badly. It is also estimated that safety measures are not reaching to 50% of the workers. The results show dissatisfactory about the available ergonomics and

working health conditions in the sugar mills. So it is inferred that to reduce the sugar industry injuries skilled manpower recruitment is necessary [26].

In the migratory sugarcane workers of Maharashtra, India, undernourishment, musculoskeletal and skin diseases are common. Between the age group of 30 and 60 years, knee pain about 80% and pain in lower back of 73.3% are found in Punjab, India during lifting more than 50kg load [27]. Heat stress and dehydration problems of sugar cane workers are reduced by water–Rest–Shade programme (OSHA) of Central America without decreasing productivity [28]. It is found most of the sugar producing employees in Nicaragua occupational heat stress with decreased volume is the main reason for the kidney diseases. In El Salvador occurrence of decreased pre-shift nephron filtration rate is found in sugarcane cutters [29, 30]. In the sugar producing employees of Ahmednagar in 2016, the high rates of pain in lower back (50%) and joint of knee (29%) are observed [31]. 42% of backside pain, joint or muscle problems, vision problems of 52% are common among the workers sugarcane factory of Doiwala, Dehradun and Personnel protective equipment is not accessible for 81% of the workers [32].

50% of everyday jobs carried out by the workers are at very high risk, 18.75% of tasks are at high risk, 25% tasks are at medium risk and 6.25% tasks are at low risk are found by REBA method. Immediate measures including ergonomic intervention is required amongst sugar industry workers to reduce the high risk and high degree of musculoskeletal injury [33]. In 2017, the noise level is abnormal in the entire department of sugar industry on environmental monitoring. The standard value during the study period of boiler section temperature exceeds the allowable value. It is suggested informative lectures would be helpful regarding ergonomics and mechanization of tasks [34]. The levels of hand–arm vibration exposures are estimated in a higher level than the allowable value. Lack of audit towards safety, safety training, lack of hazard appraisal enforcement, lack of rotation for job and lack of anti-vibration equipments are found to be the reason for the higher exposure to the occupational health hazards, So it is suggested that factory must develop anti-vibration equipments purchase strategy aims to buy tools with the lowest vibration levels & should practice job rotation systems [35].

Adel Ali Abdelwahabet al., found that less knowledge and unsatisfactory self-reported practice is common in most employees of Minia sugar factory in Abu Korkas district, Egypt.

It is therefore recommends that the training programs should include awareness about safety measures and orientation of hazards at workplace and method to avoid work related injuries as well as first aid measures [36]. MSD symptoms are common in sugar processing industries with the maximum percentage of 83.1. Among these symptoms 58.6% for knees and 54.3% for lower back are taking highest. Musculoskeletal Disorder risks established with Quality enforcement cell exposure level is vast on the range of 99.1% of the workers. Awkward postures, material handling manually and prolonged standing are found to be the key ergonomic harms. WM SDs rate is very high in sugar factory. It is found that curative actions for minimising risk level to WM SDs are essential [37].

Conclusions

Exposing to different health hazards of the workers in sugar industries are based on the e working culture. Not providing safety enclosures to the rotating machine parts, excessive noise and vibration are the main causes of injuries. Adverse effects on workers health are caused by poor ventilation and lighting during working hours. Lack of safety measures, improper training and education program causes injuries to workers. The heterogeneous working conditions of the sugar factories leads to the various ergonomic problems such as musculoskeletal disorders, work strain due to repetitive manner and accidents. It is found most of the workers have poor knowledge about hazards regarding occupational health and insufficient self-reported practices. This review concluded that the creation of strong awareness among the workers for prevention & control of hazards for occupational health in the sugar manufacturing industry is mandatory.

References

1. Fatima,S.A., & Shahid,I., Study of occupational health and safety conditions of a sugar mill in Pakistan, J. Bio. & Env. Sci. 2017 ; 11(1):97-104.
2. George Rolph., Something about sugar: its history, growth, manufacture and distribution, SAN FRANCISCO, 1917.

3. Rossi-Rocha F., Palucci Marziale M., and do Carmo Cruz Robazzi M., Poverty as a predisposing factor of illness tendencies in sugarcane workers. *Rev Latino-Am.* 2011; 15: 736-41.
4. ILO, Safety and Health at Work. ILO Cataloguing in Publication Data, 2014; pp: 1-48.
5. ILO, WHO, Identification and recognition of occupational diseases. *BRI.* 2010; 74: 1-82.
6. Omusulah, I.D., Perceived influence of occupational health and safety practices on job satisfaction among employees in Chemelil sugar company limited, Kenya. 2013; P1-49.
7. Trabanino RG, Aguilar R, Silva CR, et al. End-stage renal disease among patients in a referral hospital in El Salvador. *Rev Panam Salud Publica.* 2002; 12(3): 202-6.
8. Correa- Rotter R, Wesseling C, Johnson RJ. CKD of unknown origin in Central America: the case for a Mesoamerican nephropathy. *Am J Kidney dis.* 2014; 63(3): 506-20.
9. Vishwanathan R, De Monte AJH, Shivpuri DN, Venkatasubramoni TA. Bagassosis-A Study of Pulmonary function. *Ind J Med Res.* 1963; 51: 563-693.
10. Niar KV, Das KV. Bassosis-A case report, *J Ass Physc Ind.* 1970; 18(6): 573-75.
11. Kassu, J. and K.D.A. Literature, Review On Global Occupational Safety And Health Practice & Accidents Severity International Journal for Quality Research. 2016; 10(2): 7-25.
12. Fragar LJ, Franklin RC, Allen C, Harding W. Occupational Health and Safety Risk Associated with Sugarcane Production. 2001 ACAHS and RI RDC publication, ISBN 1 87649119 1.
13. Coggon D, Ntani G, Palmer KT, et al., Disabling musculoskeletal pain in working populations: Is it the job, the person, or the culture *Pain.* 2013; 154: 856– 63.
14. Omusulah ID. Perceived influence of occupational health and safety practices on job satisfaction among employees in Chemelil sugar company limited, Kenya. MBA Research project, The University of Nairobi. 2013.

15. IUF Global Sugar Program and Kenya Union of Sugar Plantation Workers (KUSPW). Occupational health and safety in the sugar industry of Kenya. IUF Global Sugar project in East and Southern Africa. August 2012.
16. Patil SN, Somade PM, Joshi AG. Pulmonary function tests in sugar factory workers of Western Maharashtra (India). *J Basic Clin Physiol Pharmacol*. 2008; 19(2):159-66.
17. Nayakawadi SA. A study of lung function test of workers in sugar industry during working period. *Am J Sustain Cit Soc*. 2014a; 3(1): 345-49.
18. Nayakawadi SA. Pulmonary function tests in workers exposed to sugar industry work Place. *Ind J App Res*. 2014b; 4(6): 1-3.
19. Choobineh A, Tabatabaee SH, Behzadi M. Musculoskeletal problems among workers of an Iranian sugar-producing factory. *Int J Occup Safe Ergon* 2009; 15(4): 419-24.
20. Laws RL, Brooks DR, Amador JJ, et al. Changes in kidney function among Nicaraguan sugarcane workers. *Int J Occup Environ Health*. 2015; 21: 241–50
21. Coble J, Morris-Brown L, Hayes R, Huang W-Y, Winn D, Gridley G, et al. Sugarcane farming, occupational solvent exposures, and the risk of oral cancer in Puerto Rico. *J Occup Environ Med*. 2003; 45: 869-74.
22. Crowe J, Van Wendel de Joode J, Wesseling C. A pilot field evaluation on heat stress in sugarcane workers in Costa Rica: what to do next? *Glo Health Action*. 2009; 1-10.
23. Crowe J, Wesseling C, Solano BR, Umaña MP, Ramírez AR, Kjellstrom T, Morales D, Nilsson M. Heat exposure in sugarcane harvesters in Costa Rica. *Am J Ind Med*. 2013; 56(10): 1157-64.
24. Priuli RMA, Moraes MSD, Chiaravalloti RM. The impact of stress on the health of sugar cane cutters. *Rev Saude Publica*. 2014; 48(2): 225-31.
25. Somasundaram KV, Bangal VB. Living and health conditions of migratory sugarcane harvest workers of Ahmednagar district in Maharashtra. *Int J Biomed Advan Res*. 2012; 3(2):70-6.
26. Anjum Munir, Muhammad Adeel Ashraf, Abdul Nasir, Oliver Hensel and Muhammad Iqbal. Ergonomics and Occupational Health in Sugar Industry of Pakistan. *Pakistan Journal of Life and Social Sciences*. 2012; 10(1): 74-79.

27. Singh A, Singh M, Kaur A. Musculoskeletal disorders in repetitive manual lifting and carrying of 50 kg load: a case study of sugar mill. *Int J Engine Tech Res.* 2014; 2(4): 146-9.
28. Bodin T, García-Trabanino R, Weiss I, Jarquin E et al, The WE Program Working Group. Intervention to reduce heat stress and improve efficiency among sugarcane workers in El Salvador: Phase 1. *Occup Environ Med* 2016; 1–8.
29. Garcia-Trabanino R, Jarquin E, Wesseling C, Johnson RJ, González-Quiroz M, Weiss I, et al. Heat stress, dehydration, and kidney function in sugarcane cutters in El Salvador - a cross-shift study of workers at risk of Mesoamerican nephropathy. *Environ Res* .2015; 142: 746–55.
30. Laws RL, Brooks DR, Amador JJ, et al. Biomarkers of kidney injury among Nicaraguan sugarcane workers. *Am J Kidney Dis.* 2016; 67:209–17.
31. Vasave SY, Anap DB. Prevalance of musculoskeletal disorders among sugarcane workers – A cross sectional study. *Ind J Basic Appl Med Res.* 2016; 5(2):756-62.
32. Rahul Bisht, Monika Rawat, Naresh Singh, Neha Bisht, Pooja Rawat, Pooja Thapliyal, Priyanka, Priyanka Chamoli, Ranjana Pal, Vinita Kandwal, Mrs. Laxmi Kumar and Mr. Jayant Abhishek Gideon. A Descriptive Study on Prevalence of Occupational Health Hazards among Employees of Selected Sugarcane Factory in Deharadun, Uttarakhand. *IOSR Journal of Nursing and Health Science (IOSR-JNHS).* 2016; 5(4): PP 01-05.
33. Mrunal S Baxi, Dr. Shrikant S Sant, Dr. Deepali N Hande. Prevalence of musculoskeletal disorders among sugar factory Workers of Ioni: an ergonomic study *IOSR Journal of Nursing and Health Science (IOSR-JNHS).* 2016; 5(5):86-90.
34. Syeda Amber Fatima, Isra Shahid .Study of occupational health and safety conditions of a sugar mill in Pakistan *Journal of Biodiversity and Environmental Sciences (JBES).* 2017;11(1):97-104.
35. Mitiku Bensa Debela and Getachew Redae Taferi Occupational Exposure to Hand-Arm Vibration & Associated Factors among Metehara Sugar Industry Workers; East-Shoa, Ethiopia. *World Journal of Medical Sciences.* 2018; 15(4): 151-159.

36. Adel Ali Abdelwahab, Soheir Ali Bader EL-Din, Awatif Abdelrasik Mohammed
Knowledge and Practice of Workers Regarding Occupational Health Hazards At
Sugar Factory IOSR Journal of Nursing and Health Science (IOSR-JNHS).2019;
8(2):40-48.
37. Dr. G. Durai, Dr. S. Rengadurai, Dr. P. Manivanan and D. Dhivakar.
Musculoskeletal Problems among Workers of An Indian Sugar - Producing
Factory. International Journal of Engineering Research & Technology
(IJERT).2019; 8(9): 476 -479.