
A review on the occupational health of sugar cane workers

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Abstract

Sugar industry is a growing sector to combat increasing demands of sweeteners throughout the world. Sugar, molasses, jiggery, *khandasari* etc. are made from sugarcane whereas bagasses and ethanol are the by-products. Poor rural people are directly engaged in the production work under various stressful conditions. Prevalence of several fatal occupational and workplace health hazards is seen among these sugarcane industry workers. Research works of different investigators are reviewed to highlight problems of sugarcane workers for future scopes of work.

Keywords: Sugarcane workers, Occupational health, Musculoskeletal disorder

1. Introduction

The largest producer of sugarcane in the world is Brazil followed by India, China and Thailand. Sugar industry is one of the important agro-based industries not in the India but also in the world which directly contributes creating employment, income and social developments in the rural areas of the country. Both skilled and unskilled workers from rural areas are engaged in this sector [1].

Most of the sugar mills have poor occupational health and safety measures, inadequate policies and infrastructure to meet the health hazards. Hence the workers are exposed to workplace accidents, repetitive strain injury (RSI) and musculoskeletal disorders (MSDs) in neck, upper back, lower back and arms due to continuous movements.

A devastating chronic kidney disease was present since 1999 in the coastal lowlands of El Salvador but the reason was unknown till 2014 when Correa- Rotter *et al* found that cane cutters are mainly suffered from CKD [2,3].

Reduced pulmonary function parameters are reported in patient of bagassosis first by Vishwanathan *et al* [4] and then Nair and Das [5] in India.

To explore the occupational health problems, this paper is an attempt to identify different factors responsible towards illnesses of sugarcane workers from scientific articles.

2. Researches on sugarcane workers

The use of sugarcane was originated in India on 8th century BC [6]. In India sugar and associated industries support about 50 million farmer's family and thus contribute largely to the development of the economy [7]. Moreover the potential of energy generation from bagasse in the world is about 10⁵GWatt per year [8]. First sugar mill was established in 1802 on the island of Lana'i. In 1840,s it stepped up as agriculture in Hawaii but decline of plantation start from 1980,s due to different hazards [9,10].

Scattered observations were made at sugar producing countries in nineteenth century but concern of occupational health and safety in this field starts in this century. The outputs of different observations are summarized in Table 1.

Table 1: Occupational health researches on sugarcane workers

Years	Descriptions
2001	Fatalities occur in Australian sugarcane farms on an average three per year. 54.6% incident occurs under working conditions with crops and rest are during maintenance and monitoring [11].
2003	Risk of oral cancer is observed among the sugarcane farmers who exposed to solvents [12].
2006	Poverty, repetitive work, quality of life along with environmental parameters are the determinant factors of occupational health as obtained from a survey of sugarcane workers of Brazil. Moreover sugar cane cutter are less prone to hand or wrist pain than office workers or nurses [1,13].
2007	A cross-sectional study among the workers of Iranian sugar-producing factory showed the level exposure to MSD risks particularly knee (58.6%) and lower back pain (54.3%) [14].
2008	Low pulmonary function parameters viz TV, IRV, ERV, ICV and VC are found among the sugar industry workers and may be due to Bagasse [15-17].
2009	Industry workers are exposed to severe heat stress depending on their tasks particularly oven cleaners. Higher risk of heat stress also found among the sugarcane workers in Costa Rica, USA. Stress in sugarcane cutters increased from pre-harvest (34.2%) to post-harvest (46.1%) whereas for urban workers, stress decreased from pre-harvest (44.0%) to post-harvest (42.0%) as obtained from a study in Mendonça, Brazil [18-20].
2010	In North-West Nicaragua more than 70 deaths per 100,000 sugarcane workers are due to chronic kidney problems. 95% has been suffering from CKD. Estimated glomerular filtration rate (eGFR) is decreased during the harvest varying from (28.6 ml/min/1.73 m ²) to (25.0 ml/min/1.73 m ²) depending on the category of job as compared with other factory workers [21].
2011	Migrated sugarcane harvest workers of Ahmednagar, Maharashtra are suffered from ill health. Well defined policy, medical care and integrated approach will improve the conditions of the workers according to Somsundaram and Bangal [22].
2012	IUF Global Sugar Program and KUSPW had given some recommendations for different risk factors present in the sugar industry of Kenya [23].
2013	Sugar workers in Kenya are found dissatisfied about the safety training and safety education [24].
2014	Malnutrition, musculoskeletal and dermatological diseases are also common among the migratory workers of Maharashtra, India. Prevalence of knee (80%) and lower back (73.3%) pain is found among the sugar mill workers aged between 30-60 years carrying and lifting more than 50kg load in Punjab, India [25].
2014	Water-Rest-Shade programme (OSHA) when applied on the sugarcane workers of Central America, significantly reduce health problem related to heat stress and dehydration without decreasing productivity are observed [26].
2015	An Epidemic of kidney failure has been present since 1999 among the workers of sugar cane field along Pacific ocean from Mexico to Costa Rica. Cardiac strain with dehydration during six month of sugarcane cutting may be the cause of illness of the sugarcane cutters from El Salvador of ages varying from 18 to 54 years [27,28].
2016	Decrease of volume with occupational heat stress is the main factors for the kidney diseases among the sugarcane workers in Nicaragua. Prevalence of decrease pre-shift glomerular filtration rate is observed among the sugarcane cutter in El Salvador [29,30].
2016	High rates of lower back (50%) and knee joint pain (29%) are observed among the sugarcane workers of Ahmednagar [31].

3. Conclusions

Sugar cane industries are highly heterogeneous place where workers have to expose different health risks depending on the working activity. Poor working condition results ergonomic problems viz musculoskeletal disorder, repetitive work strain, and accidents. Workers faced accidents or injuries frequently due to hand tools [32]. With the use of manual sugar cane stripper, physiological cost of sugar is reduced from 43 beats to 33 beats [33]. Musculoskeletal discomfort was found maximum in low back and knee for cane workers performing manual lifting and carrying task. Ergonomic intervention in the sugarcane cutting activity has shown

less cutting force and stress on the body muscles of the sugarcane harvesters [34]. According to International Finance Corporation of World Bank Group, to minimize the occupational risk factors, sugar industries should follow the Environment, Health and Safety (EHS) guidelines [35].

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