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A Study to Assess Knowledge on Occupational Health Hazards among the Workers of Jaggery Factory with Special Emphasis to Prepare Health Educational Material in Selected Jaggery Factories at Kolhapur, India

Shrimanti D. Patil

Professor, Chatrapati. Pramilaraje. Rugnalya. Hospital, Kolhapur Krishna Institute of Nursing Sciences, Karad, Maharashtra, India

Avinash H. Salunkhe

Vice Principal, Krishna Institute of Medical Science's, Deemed University, Karad, Maharashtra, India

N. R. Kakade

Lecturer, Krishna Institute of Medical Science's, Deemed University, Karad, Maharashtra, India

A. V. Katti

Assistant Professor, Krishna Institute of Nursing Sciences, Karad, Maharashtra, India

Vaishali R. Mohite

Dean, Krishna Institute of Nursing Sciences, Karad, Maharashtra, India

Abstract:

The aim of the study is to assess the existing knowledge of the workers regarding occupational health hazards. Objective of doing this study is to determine the effectiveness of health educational material on occupational health hazards among the jaggery factory workers in terms of gain in knowledge. To find out the association between the knowledge and demographical variable of jaggery factory workers. Material & Methods used for the study is the Evaluative approach with Quasi experimental (one group for pre-test and post-test) design was used. Study was conducted at Jaggery factory located in Kolhapur 100 subjects from selected jaggery factories within 30 to 35 kilo meters around Kolhapur., Using Convenience sampling technique with randomly allocation of groups, It was observed that Overall Mean knowledge regarding occupational health hazards in the jaggery factory among the subjects was (33%) had good knowledge, (61%) had average, while (6%) had poor knowledge.2) The overall Mean knowledge about knowledge on prevention on occupational health hazards in jaggery factories among the subjects was (12%) had good knowledge, (87%) had average while (1 %) had poor knowledge.3) It was evident that maximum number of subjects had average knowledge on prevention/ control on occupational health hazards in jaggery factories among the subjects was (27 %) had good knowledge, (67%) had average while (6 %) had poor knowledge.4) Calculated χ^2 values showed there is the statistically significant association between education ($p < 0.0215$) level of significance regarding occupational health hazards in the jaggery factory. Therefore, education plays an important role in lack of knowledge regarding occupational health hazards in the jaggery factory workers

Keywords: Occupational health, Assess, PTP, Knowledge, Evaluate, Effectiveness

1. Introduction

“No one has yet realized the wealth of sympathy, the kindness and generosity hidden in the soul of a child. The effort of every true education should be to unlock that treasure.”EMMA GOLDMAN.

According to WHO occupational health should aim at the promotion and maintenance of highest degree of physical, mental and social wellbeing of workers, in all occupation, the prevention among workers of departures from health caused by their working conditions, the protection of workers in their employment from risk resulting from factors adverse to health. The placing and maintenance of workers, in occupational environment and to summarize the adoption of work to man and of each man to his job.¹ Work is considered a basic part of life experience. Most adults spend approximately $\frac{1}{4}$ to $\frac{1}{3}$ of their time at work and often perceive work as part of their self-identity. In addition, almost three quarter of employed men and majority of employed women indicate they would prefer to work even if they had no financial need to do so. Therefore, work is considered by most an integral component of life productive

society.²Kahn (1981) points out that work involved an exchange between the worker and employer where in contractual relationship exist (written or unwritten) in which the workers agree to perform certain task in exchange for a monetary commitment.

However, for many, the value of work is characterized not solely by extrinsic rewards such as compensation, benefits and status, but often and more importantly. By intrinsic rewards such as self-satisfaction achievement, pride, joy, self enhancement, self-direction and improved self-esteem. (Bezold et al. 1986; PBS, 1992)³

Worker's health has been of interest to physicians in India for almost half a century. The Indian Association of Occupational health was founded in the 1940's in the city of Jamshedpur which has the country's the best known and the oldest steel plant. However, multidisciplinary occupational health practice evolved in the 1970s and 1980s when the Indian Labour Organization sent a team which helped to create a model occupational health centre in India. ⁴Figures are unavailable for occupational hazards as well as for the number of workers exposed to specific hazards. The statistics published by the Labour Bureau do not show these. The system of occupational health surveillance is yet to develop. The number of diseases reported in 1978 was just 19 which climbed up to 84 in 1982. There is no pattern or trend visible in the reported diseases. Benzene poisoning, halogen poisoning, silicosis and pneumoconiosis, byssinosis, chrome ulceration, lead poisoning, hearing loss and toxic jaundice are the conditions reported most frequently.⁵

Sugar cane is a hardy crop that is cultivated in tropical and sub-tropical regions for its sucrose content and by-products such as molasses and bagasse (the waste fibrous residue). The plant grows in clumps of cylindrical stalks measuring from 1.25 to 7.25 cm in diameter and reaching 6 to 7 m in height. The cane stalks grow straight upward until the stalk becomes too heavy to hold itself up. Then it lies on its side and continues to grow upward. This results in a mature cane field lying on top of itself in a mesh pattern⁶

Gul (Jaggery) is a traditional product of sugarcane. It can be defined as a honey brown colored raw lump of sugar. It is the natural mixture of sugar and molasses. It contains all the minerals and vitamins present in sugarcane juice and that is why it is known as the healthiest sugar in the world. In some of the South American countries, it is known as 'Panela'.

At the time of production of sugar, it required a mix up of chemicals like sulphur dioxide, lime, phosphoric acid, formic acid and bleaching agents that is why all the contents of sugarcane cannot be found in sugar whereas Gul has all the contents and even the scientists have proved that all the essential vitamins and minerals are missing from sugar as compared to Gul. It is also used as medicine. In Ayurvedic system of medicine, it is used as blood purifier⁷

Still Gul is not producing on a good commercial scale globally. The market surveys said that Gul has good demand in metros as well as urban areas but suppliers are not able to supply as per demand. This year Rate of one kg Gul is just double than sugar in the market. In the view of this scenario, it was felt necessary to carry out a research, which can reveal the present status of Gul industry in terms of its marketing, cost-return analysis, pricing-regulatory and R&D in operations⁸

1.1. Need of the Study

The workers may also have increased the risk of lung cancer, possibly mesothelioma. Bagasse is also a problem specific industry it may follow exposure to bagasse. The worker may be affected by chronic infection which reduces their productivity. The legal framework for their protection is often inadequate and there is need of the research in future on occupational health problems of the workers in this industry.⁹

2. Literature Survey

In the present study, the research investigator has classified review of literature as:

- i. Review of literature related to general industrial worker's occupational health hazards,
- ii. Review of literature related to Sugar factory worker's occupational health hazards,
- iii. Review of literature related to jaggery factory worker's occupational health hazards.

2.1. Review of Literature Related to General Industrial Worker's Occupational Health Hazards

A study conducted by Habibullah N. Saiyed and Rajnarayan R. Tiwari from National Institute of Occupational Health, Meghani Nagar, Ahmedabad, Gujarat, India had gone through a study on occupational Health Research in India and presented the data for the same in their review article "Occupational Health Researches in India" in the Journal of Industrial Health, 2004 Edition. Agriculture (cultivators i.e. land owners + Agriculture labourers) is the main occupation in India giving employment to about 58 % of the people. The major occupational diseases/morbidity of concern in India are silicosis, musculo-skeletal injuries, coal worker's pneumoconiosis, chronic obstructive lung diseases, asbestosis, byssinosis, pesticide poisoning and noise induced hearing loss.¹⁷

A study conducted by Shirin Mirza, MBBS, Epidemiology & Biostatistics,

Community Health Sciences, Aga Khan University, Karachi on "Risks to the health of Wood Workers: What can be done?" reveals that wood workers are exposed to the wood dust, fungi, bacteria, endotoxins formaldehyde, phenol and various injuries in their working environment. This leads to impaired pulmonary function; non-cancerous respiratory diseases like rhinitis, chronic bronchitis, hyper sensitivity pneumonitis, occupational cancers like sino-nasal cancer, laryngeal carcinoma, lung cancer, mesothelioma, Hodgkin's disease, bladder cancer, skin cancer, prostate and brain cancer. This can be prevented by decreasing exposure to wood fumes in air by proper ventilation and decreasing work hours by increasing shifts, personal protective equipment and regular nasal lavage.¹⁸

2.2. Review of Literature Related to Sugar Factory Worker's Occupational Health Hazards

Another article with title "Aspects of Occupational Health in the Sugar Cane Industry" by H. N. PHOOLCHUND who is from *Occupational Health Department, London Borough of Ealing London, UK* concentrated on occupational health problems in the sugar industry, which exists in 40 countries, mostly in the Third World. Sugar cane workers have a high level of occupational accidents and are exposed to the high toxicity of pesticides. They may also have an increased risk of lung cancer, possibly mesothelioma. This may be related to the practice of burning foliage at the time of cane-cutting. Bagassosis is also a problem specific to the industry as it may follow exposure to bagasse (a by-product of sugar cane). The workers may also be affected by chronic infections which reduce their productivity.²²

2.3. Review of Literature Related to Jaggery Factory Worker's Occupational Health Hazards

In another paper entitled "Enhanced Translocation of Particles from Lungs by Jaggery" by Anand P. Sahu and Ashok K. Saxena [10] from Industrial Toxicology Research Centre, Lucknow, India a study on industrial workers in dusty and smoky environments are discussed. According to their experimental study, the findings along with the preventive action of jaggery on smoke-ipotential of jaggery as protective agent for workers in dusty and smoky environments.²⁷

3. Materials and Methods

The evaluative approach was used; Quasi experimental (one group for pre-test and post-test) control group design was used. Study was conducted 100 workers from selected jaggery factories within 30 to 35 kilo meters around Kolhapur. By using Convenience sampling technique with randomly allocation of groups. Data were collected, tabulated and analyzed in terms of objective of the study using descriptive and inferential statistics.

4. The Data Presented Under the Following Sections

Section I: socio-demographic variable of jaggery factory workers.

Section II:

- Part 1: Finding on the knowledge on occupational Health hazards in jaggery factory regarding meaning, types of hazards.
- Part 2: Finding regarding the prevention of occupational health hazards in jaggery factory.
- Part 3: Association between knowledge & selected socio-demographic variable finding regarding use of safety measure / control / prevention of occupational health hazards in the jaggery factory among the workers.

Area of analysis	Knowledge regarding occupational health hazards in the jiggery factory.	No. of subject	Percentage
Part I : Knowledge regarding Occupational health hazards in the jaggery factory	GOOD	17	17 %
	AVERAGE	75	75 %
	POOR	8	8 %
	TOTAL	100	100%

Table 1: Distribution of subjects according to pre-test knowledge scores regarding occupational health hazards in the jaggery factory.
N = 100

Above table depicts that the 75 (75%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 17 (17%) having good knowledge whereas 8 (8%) having poor knowledge regarding occupational health hazards in the jaggery factory

Area of analysis	Knowledge regarding occupational health hazards in the jiggery factory.	No. of subject	Percentage
Part -1 Knowledge regarding occupational health hazards in the jiggery factory	GOOD	33	33 %
	AVERAGE	61	61 %
	POOR	6	6 %
	TOTAL	100	100%

Table 2: Distribution of subjects according to post-test knowledge scores regarding occupational health hazards in the jaggery factory
n=100

Above table depicts that the 61 (61%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 33 (33%) having good knowledge whereas 6 (6 %) having poor knowledge regarding occupational health hazards in the jaggery factory.

Area of analysis	Knowledge on prevention of Occupational health hazards in the jaggery factory	No. of subject	Percentage
Part -2 Knowledge on prevention of occupational health hazards in jiggery factories.	GOOD	0	0 %
	AVERAGE	97	97 %
	POOR	3	3 %
	TOTAL	100	100%

Table 3: Distribution of subjects according to pre-tests knowledge score on prevention of occupational health hazards in the jaggery factory
N=100

Above table depicts that the 97 (97%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 3 (3 %) having poor knowledge regarding occupational health hazards in the jaggery factory

Area of analysis	knowledge on prevention on occupational health hazards in jaggery factories	No. of subject	Percentage
Part -2 knowledge on prevention on occupational health hazards in jiggery factories	GOOD	12	12 %
	AVERAGE	87	87 %
	POOR	1	1 %
	TOTAL	100	100%

Table 4: Distribution of subjects according to post-test knowledge scores regarding occupational health hazards in the jaggery factory
N=100

Above table depicts that the 87 (87%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 12 (12%) having good knowledge also 1 (1%) having poor knowledge regarding prevention on occupational health hazards in the jaggery factory.

Area of analysis	knowledge on prevention on occupational health hazards in jaggery factories	No. of subject	Percentage
Part -2 knowledge on prevention on occupational health hazards in jaggery factories	GOOD	9	9 %
	AVERAGE	61	61 %
	POOR	30	30 %
	TOTAL	100	100%

Table 5: Distribution of subjects according to pre-test knowledge score on prevention / control regarding occupational health hazards in the jaggery factory
N=100

Above table depicts that the 61 (61%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 9 (9%) having good knowledge whereas 30 (30%) having poor knowledge regarding occupational health hazards in the jaggery factory

Area of analysis	knowledge on prevention/ control on occupational health hazards in jaggery factories	No. of subject	Percentage
Part -3 knowledge on prevention/ control on occupational health hazards in jaggery factories.	GOOD	27	27 %
	AVERAGE	67	67 %
	POOR	6	6 %
	TOTAL	100	100%

Table 6: Distribution of subjects according to post-test knowledge score regarding prevention / control of occupational health hazards in the jaggery factory
N =100

Above table depicts that the 67 (67%) subjects having average knowledge regarding occupational health hazards in the jaggery factory & 27 (27%) having good knowledge whereas 6 (6%) having poor knowledge regarding prevention / control on occupational health hazards in the jaggery factory.

Area of Analysis	Particulars	Score	Mean	Median	S.D	P Value	't' value
Part -1 Knowledge regarding occupational health hazards in the jaggery factory	GOOD	17	9.06	9	1.516	< 0.0001	59.748
	AVERAGE	75					
	POOR	8					
PART- 2 knowledge on prevention on occupational health hazards in jaggery factories	GOOD	-	2.75	3	0.672	< 0.0001	40.903
	AVERAGE	97					
	POOR	3					
PART - 3 knowledge on prevention / control on occupational health hazards in jaggery factories	GOOD	9	9.98	10	1.348	< 0.0001	74.022
	AVERAGE	61					
	POOR	30					

Table 7: Frequency and distribution of pre-test knowledge score regarding occupational health hazards in the jaggery factory N=100

Above table depicts that the knowledge regarding occupational health hazards in the jaggery factory mean (9.06) & median (9) whereas knowledge on prevention of occupational health hazards in jaggery factories mean (2.75), median (3) & knowledge on prevention / control on occupational health hazards in jaggery factories mean (9.98) & median (10).

Area of Analysis		Min	Max	Median	Mean	S.D	't' value	P Value
Part -1 Knowledge regarding occupational health hazards in the jaggery factory	Pre-Test	5	14	9.06113	9.0613	1.516	25.798	<0.0001
	Post -Test	9	15		13.06	1.023		
PART- 2 knowledge on prevention on occupational health hazards in jaggery factories	Pre Test	1	4	3.0	2.75	0.672	14.359	<0.0001
	Post Test	2	5	4.0	3.87	0.6139		
PART -3 knowledge on prevention / control on occupational health hazards in jaggery factories.	Pre Test	5	13	10.00	9.98	1.34	17.930	<0.0001
	Post Test	10	17	13	12.99	1.150		

Table 8: Frequency and distribution of pre / post-test knowledge score regarding occupational health hazards in the jaggery factory. N=100

PRE INTERVENTION X- ± S.D.	POST INTERVENTION	MEAN DIFFERENCE	PAIRED 't' VALUE	P VALUE
9 ± 1	13 ± 1	4	25.798	Significant

Table 9: Testing of hypothesis for evaluation of effectiveness of planned teaching programme on occupational health hazards in jaggery factory PART-1 (N= 100)

The data presented in Table –9 indicates that calculated paired 't' value (t=25.798). Hence, H1 is accepted. This indicates that the gain in knowledge score is statistically significant at p<0.05 levels. Therefore, the planned teaching programme regarding occupational health hazards in jaggery factory is effective in improving the knowledge of workers working in jaggery factory.

PRE INTERVENTION X- ± S.D.	POST INTERVENTION	MEAN DIFFERENCE	PAIRED 't' VALUE	P VALUE
3 ± 1	4 ± 1	1.120	14.320	Significant

Table 10: Testing of hypothesis for evaluation of effectiveness of planned teaching programme on prevention / control on occupational health hazards in jaggery factory PART-2 (N=100)

The data presented in Table – 10 indicates that calculated paired ‘t’ value ($t=14.320$). Hence, H_1 is accepted. This indicates that the gain in knowledge score is statistically significant at $p < 0.05$ levels. Therefore, the planned teaching programme regarding prevention of occupational health hazards in jaggery factory is effective in improving the knowledge of workers working in jaggery factory.

PRE INTERVENTION X- ± S.D.	POST INTERVENTION	MEAN DIFFERENCE	PAIRED ‘t’ VALUE	P VALUE < 0.05
10 ± 1	13 ± 1	-2.910	19.167	Significant

Table 11: Testing of hypothesis for evaluation of effectiveness of planned teaching programme on prevention / control of occupational health hazards in jaggery factory PART-3 (N = 100)

The data presented in Table-11 indicates that calculated paired ‘t’ value ($t=19.167$). Hence, H_1 is accepted. This indicates that the gain in knowledge score is statistically significant at $p < 0.05$ levels. Therefore, the planned teaching programme regarding prevention / control on occupational health hazards in jaggery factory is effective in improving the knowledge of workers working in jaggery factory.

Variables	Level of knowledge						Total	χ^2	df	p value
	Good		Average		Poor					
	freq	%	freq	%	freq	%				
Age in years							0.01697	1	(NS)	
15-25	5		20		2					
26-35	1		18		2					
36-45	2		19		3					
46 & above	5		22		1					
Sex							0.002514	1	(NS)	
Male	12		69		6					
Female	1		10		2					
Religion							0.7510	1	(NS)	
Hindu	13		79		8					
EDUCATION							5.288 1	1	(S)	
Illiterate	5		40		5					
Primary	5		17		2					
Secondary	3		21		1					
Graduate			1							
OCCUPATION							0.1138	1	(NS)	
Farming & Farming Related	9		67		8					
Daily Wedges	3		8							
Self Business/private			5							
Monthly family Income							0.4072	1	(NS)	
Less than 3000	6		57		7					
3001-6000	6		19		1					
6001-9000	1		1							
9001 & above -			2							
Type of family							0.1168	1	(NS)	
Nuclear	6		29		2					
Joint	7		50		6					
Extended										
Type of House							1.320	1	(NS)	
Kachha	9		53		6					
Pakka	4		13							
Tent / Hut			13		2					
Type of Diet							0.0302	1	(NS)	
Vegetarian	1		12		2					
Mixed	11		68		6					

Table 12: Association between the knowledge and socio demographical variable of jaggery factory workers (pre-test).
N=100

Variables	Level of knowledge						Total	χ^2	df	p value
	Good		Average		Poor					
	freq	%	freq	%	freq	%				
Age in years							0.01697	1	(NS)	
15-25	5		20		2					
26-35	1		18		2					
36-45	2		19		3					
46 & above	5		22		1					
Sex							0.002514	1	(NS)	
Male	12		69		6					
Female	1		10		2					
Religion							0.7510	1	(NS)	
Hindu	13		79		8					
EDUCATION							5.288 1	1	(S)	
Illiterate	5		40		5					
Primary	5		17		2					
Secondary	3		21		1					
Graduate			1							
OCCUPATION							0.1138	1	(NS)	
Farming & Farming Related	9		67		8					
Daily Wedges	3		8							
Self Business/private			5							
Monthly family Income							0.4072	1	(NS)	
Less than 3000	6		57		7					
3001-6000	6		19		1					
6001-9000	1		1							
9001 & above -			2							
Type of family							0.1168	1	(NS)	
Nuclear	6		29		2					
Joint	7		50		6					
Extended										
Type of House							1.320	1	(NS)	
Kachha	9		53		6					
Pakka	4		13							
Tent / Hut			13		2					
Type of Diet							0.0302	1	(NS)	
Vegetarian	1		12		2					
Mixed	11		68		6					

Table 13: Association between the knowledge and socio demographical variable of jaggery factory workers (post-test).
N=100

5. Discussion

According to WHO occupational health should aim at the promotion and maintenance of highest degree of physical, mental and social wellbeing of workers, in all occupation. Article with title "Aspects of Occupational Health in the Sugar Cane Industry" by H. N. Phoolchund who is from *Occupational Health Department, London Borough of Ealing London, UK* concentrated on occupational health problems in the sugar industry, which exists in 40 countries, mostly in the Third World. Sugar cane workers have a high level of occupational accidents and are exposed to the high toxicity of pesticides. They may also have an increased risk of lung cancer, possibly mesothelioma. This may be related to the practice of burning foliage at the time of cane-cutting. Bagassosis is also a problem specific to the industry as it may follow exposure to bagasse (a by-product of sugar cane). The workers may also be affected by chronic infections which reduce their productivity.²² A study by Fernanda Ludmilla Rossi Rocha, Maria Helena Palucci Marziale and Oi-Saeng Hong focuses on the health problems in sugar industry in Brazil in their paper "Work and health conditions of

sugar cane workers in Brazil” which was done during July and August of 2006. This is an exploratory research with a quantitative approach, developed with the objective of analyzing the work and of life situations that can offer risks to the workers’ health involved in the manual and automated cut of the sugar cane. Most of the manual cutters in this study (71%) worked for less than six years in this activity; 39% of male reported cutting between 7 to 10 ton per day. In relation to the harvester operators, 87.5% had worked up to six years in this function and most of them did not know the daily amount cut by their machines.²⁸ It shows that the 75 % subjects had average knowledge and 17 % had good knowledge regarding occupational health hazards in the jaggery factory in pre-test whereas in post-test it shows that the 61% subjects had average knowledge and 33% had good knowledge regarding occupational health hazards in the jaggery factory. It shows that the 97 % subjects had average knowledge and 3 % had poor knowledge & no good knowledge regarding occupational health hazards in the jaggery factory in pre-test whereas in post-test it shows that the 87 % subjects had average knowledge and 12 % had good knowledge and only 1 % subjects had poor regarding occupational health hazards in the jaggery factory It shows that the 61 % subjects had average knowledge and 30 % had poor knowledge & 9 % good knowledge regarding occupational health hazards in the jaggery factory in pre-test whereas in post-test it shows that the 67 % subjects had average knowledge and 27 % had good knowledge and only 6 % subjects had poor regarding occupational health hazards in the jaggery factory. Efforts should be made to educate the community about occupational health hazards in jaggery factory To achieve the set objectives of the study, 100workers were studied to get the projected were studied to get the projected result.

5.1. Conclusion

Based on findings of the study, the following conclusions were drawn.

- The educational factor had an influence over the knowledge regarding occupational health hazards because of less knowledge.

The study revealed that plan of teaching was effective as the level of knowledge of the subjects had increased. The study concluded that there is a strong need to create awareness amongst the subjects regarding prevention & control of occupational health hazards in the jaggery factory.

5.2. Implication of the Study

5.2.1. Nursing Administration

Staff development through continuing education can be planned on Occupational Health Hazards in jaggery factories with emphasis on the role of nurse in each of these areas. The nurse administrators can introduce in-service education for the trained nurses on the aspect of first aid management on Occupational Health Hazards in the Jaggery Factories.

5.2.2. Nursing Services

She is a direct care provider, a change agent in the community and is also a health team member works in close association with subjects and plays an important role in implementation of first aid management on occupational health hazards in jaggery factories. So, the nurses need to update their knowledge which will be beneficial to the nurse and community.

5.2.3. Nursing Education

The nurse educator needs to assess the existing level of knowledge and impart more insights into subjects that are important to the group. Re-enforcement of known ideas and impartation of new ones allows the learner to correlate all the areas included in the educational programme making use of advanced technology like LCD projector and power point presentation.

5.2.4. Nursing Research

Based on the findings, the professional and student nurses can conduct further studies on knowledge, attitude and practices towards the occupational health hazards among the jaggery factory workers.

6. References

- i. K. Park, Text Book of Preventive and Social Medicine, 21st Edition, Jabalpur, Ms. Banarasdas, Bhanot Publishers, P. No. 744 to 759.
- ii. Keshavswarnkar, Community Health Nursing, 2nd Edition, N.R. Brothers Publishers, India 2010, P. No. 562 to 571.
- iii. G.M. Dhaar, I. Robbani, Foundation of Community Medicine, Elsevier, A division of Reed Elsevier India Private Limited, 1st Edition 2006, P. No. 315 to 360 (Occupational Environmental and Health)
- iv. NeelamKumari, Essential Community Health Nursing, 2nd Edition, P. No. 425 to 450,
- v. www.google.com
- vi. Dr. AmitkumarDwivedi, Ph.D., M.Com., Academic Associate (Finance and Agriculture Indian Institution of Management, Ahmedabad (IIMA), “A study on Gul Jaggery Industry in India”, A research outline.
- vii. R.A. Munoz, E.A. Sachman, J.M.Baztarrica, Carol J. Lhtola, “Sugar cane cultivation and processing”, Adapted from 3rd Edition, “Encyclopedia on occupational Health and safety”.
- viii. Wikipedia, the free encyclopedia, Occupational Safety and health, P.No.1 to 12.

- ix. Bonnie Roger's Occupational Health Nursing, Concepts and practices, W.B. Saunders Company, Philadelphia, London, Toronto, Montreal, Sydney, Tokyo, 1st Edition.
- x. Anjum Munir, Muhammad Iqbal and Muhammad Adeel Ashraf from Department of farm Machinery and Power, Faculty of Agriculture Engineering and Technology, University of Agriculture, Faisalabad, Pakistan.
- xi. Anand P. Sahu and Ashok K. Saxena from Industrial Toxicology Research Centre, Lucknow, India, "A study of industrial workers industry and smoky environment".
- xii. Dr. J. P. Boride, Dr. A. P. Kulkarni, Textbook of Community Medicine, Recommended as the textbook of choice by the MUHS, Nashik for the subject for M.B.B.S. course, Vora Publication, Mumbai-400 003, 3rd Edition, 2006, P.No.271 to 286.
- xiii. Kozier and Erb's, "Fundamentals of Nursing Concept, Process and practices", 8th Edition, P. No.280 to 282.
- xiv. Potter and Perry, "Basic Nursing, 7th Edition, Mosby Elsevier Restricted South Asia Edition, P.No.641
- xv. Pender N. J., Murdacyfcl and Paron M.A. 2002, Health promotion in Nursing Practice, 4th Edition, Upper Saddle, River N.J., Prentice Hall.
- xvi. Krishnaswami D. R., Methodology of research in social Science, Himalaya Publication House, Bombay.
- xvii. Habibullah N. Saiyed and Rajnarayan R. Tiwari from National Institute of Occupational Health, Meghani Nagar, Ahmedabad, Gujrat, India, Article on occupation Health Research in India, Journal of Industrial Health, 2004 Edition.
- xviii. Shirin Mirza, M.B.B.S., Epidemiology and Biostatistics, Community Health sciences, Agakhan University, Karachi on "Risk to the Health of the wood workers".
- xix. Ackerson and Awuah (2010), "Study on occupational and water related hazards".
- xx. Saloshri Naidoo (2011), "Study on women's occupational Health working in small scale Agriculture in South Africa".
- xxi. T. K. Joshi, An article on Practicing occupational health in India.
- xxii. H. N. Phoolchand, Article on "Aspects of occupational Health in the Sugar Cane Industry", Occupational Health Department, London.
- xxiii. Fernanda Ludmilla Rossi Rocha, Morial 24. Environmental system consultants and Ambiente Lab Solution Private Limited, Chennai, Study conducted on water, land, air environment and noise level.
- xxiv. MireriaGasoon from Costa Hans Kromhout and Dick Heedrik from Netherlands from Norway, published a paper on Respiratory, allergy, eye problem in bagasse exposed sugar cane workers in Costa Rica.
- xxv. Anand P. Sahu and Ashok K. Saxena, Study on Enhanced Translocation of particles from lungs by Jaggery.
- xxvi. Fernanda Ludmilla Rossi Rocha, Study on health problems in Sugar industry in Brazil, paper "Work and health condition of sugar cane workers in Brazil", July/August 2006.
- xxviii. Wikipedia the free encyclopedia, occupational safety and health.
- xxix. MireiaGascon from Costa Rica, Hans Krombout from Netherland paper on Respiratory allergy and eye problems in bagasse.