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Effectiveness of Structured Teaching Programme on Knowledge of Occupational Hazards Prevention and Expressed Practice of Safety Measures among Frontline Pharmaceutical Industrial Workers of Rajasthan

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Abstract:
Background : *The working population represents half of the world's population; their health is determined not only by the work place but also by social, individual factor as well as access to available health services. Literatures indicated that there is a strong relationship between training on health and safety and reduced work accident rates among industrial workers.*
Materials & methods*: An experimental pre test post test control group design was used. A sample of 30 workers in each group was administered knowledge and expressed practice questionnaires.*
Results*: Majority workers expressed physical problems like neurological (71.6%), skin (46.67%) and eye (25%). The mean post test score of workers in knowledge and expressed practice was more than their pre test scores. There was significant correlation between knowledge and expressed practice of workers.*
Conclusion*: There was significant difference between the knowledge and practice of workers in experimental and control group after teaching programme.*
Keyword: *frontline worker, occupational hazard, safety measure, structured teaching program*

I. Introduction

The working population represents half of the world's population, are being the major contributors to socioeconomic development; their health is determined not only by the work place but also by social, individual factor as well as access to available health services. Any industry plays an important role in building up of a nation. Employed people in industries spend at least one third of a day at work which have a strong effect on their health and safety due to work and work-related injuries. An occupational hazard is something unpleasant that you may suffer or experience as a result of doing your job. Globalization and rapid industrial growth (about 8% annual economic growth) in the past few years have added further complex issues relating to occupational health.

A case of a pharmaceutical worker who developed occupational asthma and rhinitis reported was caused by both serratial peptidase and lysozyme chloride. It is important to alert physicians to the possibility of occupational asthma when dealing with workers in the pharmaceutical industry. The patient had strong positive responses to peptidase and lysozyme extracts on skin-prick tests. Broncho-provocation tests showed a dual asthmatic response to peptidase and an early asthmatic response to lysozyme. These findings suggested that inhalation of peptidase and lysozyme can induce IgE-mediated broncho-constrictions in an exposed worker.[1]

A report showed that manual handling incidents like back injury were the most frequently reported occupational hazard, with occupational asthma second common in the pharmaceutical industry followed by upper limb disorders being third most frequent having cramp and tendon inflammation commonly.[2]

A review of literature of occupational toxicology and the control of exposure to pharmaceutical agents in UK using MEDLAR showed the hazards that are of concern for occupational exposure were often distinct from the primary pharmacological effects. Penicillins and cephalosporins designed for antimicrobial activity known to induce allergic contact dermatitis and asthma in occupationally exposed individuals. The most obvious occupational health hazards in the pharmaceutical industry were related to exposure to the biologically active compounds developed and manufactured as pharmaceuticals.[3]

A study was conducted to investigate occupational health status of female workers in pharmaceutical industries and to propose the protective measures for the occupational health. A total of 2816 female workers from 19 pharmaceutical industries in Shandong and Gansu provinces were investigated by a questionnaire. 73.1% of female workers exposed to occupational hazards, mainly to toxic chemicals. 63.2% of them suffered from dysmenorrhea; 38.5% of them have reproductive system diseases, i.e. mammary gland hyperplasia (44.1%), cervical erosion (26.5%), uterine annex inflammation (24.2%); 17.1% of them suffered from accidental

work injuries; 34.7% of them complained about low back pain, and 29.7% of them perceived hearing loss. 94.9% of female workers hoped to get the occupational health and labor protection knowledge and skills. Thus conclusion was made that by strengthening the supervision of labor protection for female workers, including technical measures occupational hazards control and health-related knowledge, and improving the occupational health status of female workers should be conducted.[4]

A study data showed occurrence of following diseases in the order of asthma>skin disorders>allergic disorders>bronchitis>all other respiratory diseases>nail disorders and acute pharyngitis>pulmonary tuberculosis and loss of smell and hearing>nasal septum perforation showing high risk factor for 'all other respiratory diseases' and skin disorders. The pharmaceutical industry employs >350 000 people worldwide in operations including manufacturing, research and development (R&D), sales and marketing. Workers employed in manufacturing sectors are potentially exposed to drug substances in the workplace that are designed to modify physiology and also to chemical precursors that are potentially hazardous to health. Pharmaceutical workers are at risk from adverse health effects, including occupational asthma, pharmacological effects, adverse reproductive outcomes and dermatitis.[5]

The pharmaceutical company reported that in 2008, the company's overall occupational illness rate increased by five percent over 2007. Job-related stress illness accounted for 67 % of all reported cases, Musculoskeletal disorders (MSDs) accounted for 19 % and 80 % of occupational illnesses required time off work.[6]

A training programme for the young workers of chemical and pharmaceutical sector was conducted Activity in the study included training and mentoring for new employees, partnerships with schools, universities and relevant ministries to improve the knowledge and practical skills of young workers. Results ensured that students returning to work had a good grounding in occupational safety and health and a positive attitude towards the company and their profession. Comparatively small number of occupational accidents, retention of worker health, improvement of professional skills and work efficiency.[7]

Trained occupational health specialists undertake limited research studies. In a country like India, various institutes have only carried out very basic researches in occupational health in the pharmaceutical industry. However, by and large, in India as well as elsewhere in the region, there is a lack of real operation research from public health perspectives that could be used to address the prevalent occupational conditions in the pharmaceutical industry. Hence the researcher felt the need to select this study and explore the knowledge regarding occupational hazards and safety measures adopted by the pharmaceutical factory workers thereby promoting their health.

II. Material And Methods

2.1 Research design

Evaluative research approach was used for the study with pre test post test control group design.

2.2 Subjects

The samples in the present study were the workers working in production unit of pharmaceutical industry. There were 30 workers each in experimental and control group. The sample was selected by simple random sampling technique.

2.3 Variables under study

The independent variable was structured teaching programme and dependent variables were knowledge and expressed practice scores of frontline workers regarding presence of occupational hazards and its prevention. The inclusion criteria were samples available at study period, samples understanding Hindi or local language and willing to participate. The exclusion criterion was workers not present in morning or evening shift. The system model was used as the conceptual framework for the study.

2.4 Tools

Two tools were used to collect data. First tool was knowledge questionnaire having one section for assessment of sample characteristics, second section to find out the presence of various health problems due to occupation and last section knowledge of frontline pharmaceutical workers regarding occupational hazards and its prevention. The second tool was expressed practice checklist on use of safety measures to prevent occupational hazards. Content validity was done by 9 experts from the field of medicine and nursing. The reliability of the tool was established by Kudar Richardson-20 and Cronbach alpha with scores of .81 and .83 respectively. The tool was translated to local language and try out was done on 15 workers of the pharmaceutical industry. An informed written consent was taken from workers and asked to sign an assent form before filling the questionnaire.

2.5 Data Analysis

Data was analyzed by using descriptive and inferential statistics. Descriptive statistics used include mean, frequency, percentage, median and standard deviation. Inferential statistics include 't' test Chi square and Pearson's coefficient.

III. Findings

3.1 Sample characteristics

Most of the workers who participated in the study were in the age group of 18-25 years, (66.67%) from the control group and (56.67%) from the experimental group. Majority workers (85%) were males from both the groups. Majority of the frontline workers in the production unit were Hindu (75%). Majority of the workers (48.33%) were of senior secondary school. Majority of the workers (38.33%) had experience of 2-5 years in the pharmaceutical industry. Majority of frontline workers (56.67%) did not have any in-service education exposure on occupational hazards.

3.2 Health problems assessed

Most of the frontline workers from both the control and experimental group who participated in the study reported of having neurological problems (71.67%) and among them (25%) reported of having headache at their work place. Around (65%) frontline workers reported musculo-skeletal problems and among them (23.33%) workers reported pain in shoulders. Around (46.67%) of frontline workers had skin problems of which (21.67%) workers had itching in hands. Around (41.67%) workers reported lack of sleep as a health problem. Around (25%) workers reported eye problems of which (10%) people had watering of eyes as the major problem.

3.3 Findings of effectiveness of structured teaching programme in terms of knowledge and practice scores

TABLE 1: Mean, median & standard deviation of pre - test and post - test knowledge and practice scores of frontline industrial workers in experimental and control group N=60

Group	Dependent Variable	Maximum possible score	Range of scores	mean	Median	SD
Experimental group (n=30)	Knowledge Pre test	40	10-24	19.06	19	3.09
	Knowledge Post test	40	27-37	33.63	34	1.97
Control group (n=30)	Knowledge Pre– test	40	11-24	18.73	19	3.20
	Knowledge Post -test	40	17-28	21.7	22	2.82
Experimental group (n=30)	Practice Pre – test	60	24-40	30.60	31	3.79
	Practice Post test	60	43-55	48.46	48.5	3.05
Control group (n=30)	Practice Pre test	60	20-37	30.23	30	3.40
	Practice Post – test	60	23-41	32.13	33	3.51

The table 1 shows the mean, median and standard deviation of the knowledge and practice scores of the experimental and control group. Thus it is found that the knowledge and practice of both the experimental and control group were similar in pre - test but in post - test, knowledge and practice scores of experimental group has increased after administration of structured teaching programme.

Table 2: Mean, mean difference, standard deviation difference, standard error mean difference and 't' value of pre - test and post - test knowledge and practice scores of frontline pharmaceutical industry workers in experimental group. N=30

Knowledge test	Mean	Mean difference	SD_D	SED_D	df	't'
Post test	33.63					
Pre test	19.06	14.57	3.53	0.64	29	22.54*
Expressed practice test	**Mean**	**Mean difference**	SD_D	SED_D	**df**	**'t'**
Post – test	48.46					
Pre- test	30.6	17.86	4.32	0.78	29	22.64*

* =significant at 0.05 level of significance
't'= (2.04) at 0.05 level of significance

Table-2 shows that the 't' value of pre and post - test knowledge and practice scores of frontline pharmaceutical industry workers in experimental group. The 't' value for knowledge and practice were 22.54 and 22.64 respectively at df (29) at 0.05 level of significance which is statistically significant. Hence, the null hypothesis was rejected and the research hypothesis was accepted; indicating that the structured teaching programme on presence of occupational hazards and its prevention for frontline pharmaceutical industry workers was an effective method for increasing the knowledge and expressed practice of workers.

3.4 Correlation between knowledge and expressed practice

Table 3: Coefficient of correlation showing the relationship between gain in knowledge and gain in expressed practices in experimental group N=30

Group	Variable	Mean	SD	"r" value
Experimental group	**Knowledge**	33.63	1.97	
	Practice	48.46	3.05	0.69^{*}

df(28) *= significant at 0.05 level of significance.

The data presented in the table 3 suggesting significant positive correlation between post - test knowledge scores and post - test expressed practice scores of experimental group as obtained 'r' value of 0.69 was greater than the table value of 0.361 with df (28) at 0.05 level of significance. This indicated that with increased knowledge, the expressed practice of frontline workers improved towards occupational hazards and its prevention and use of safety measures.

3.5 Association of dependent variables with selected demographic factors

Table 4: Chi square value showing association between gain in knowledge of experimental group with the selected factors N=30

Selected variables	Knowledge scores		Obtained Chi square (X^2)	Expressed practice scores		Obtained Chi square (X^2)	df	Table value of Chi square
	Below median	Above median		Below median	Above median			
Age (in years)				8	9			
18-25	8	9		2	4			
26-33	1	5		5	0	7.72^{NS}	3	7.815
34-41	4	1		0	2			
>41	1	1	7.72^{NS}					
Sex				12	12			
Male	12	12		3	3	0.00^{NS}	1	3.84
Female	4	2	0.53^{NS}					
Religion				11	10			
Hinduism	10	11		2	3			
Islam	2	3		1	1		3	
Christianity	1	1		1	1	0.248^{NS}		7.815
Sikhism	1	1		0	0			
Any other	0	0	0.12^{NS}					
Education				1	0			
Middle school	0	1		5	0			
Secondary school	4	1		9	6	15.60^{*}	4	9.488
Senior secondary school	10	5		0	8			
Graduate	0	8	13.39^{*}	0	1			
Post graduate & above	0	1						
Years of experience				5	1			
1-2	4	2		2	8	8.17^{*}	3	7.815
2-5	3	7		4	5			
5-10	2	7	9.95^{*}	4	1			
>10	5	0						
In-service education on occupational hazards				6	4			
						0.60^{NS}	1	3.84
Yes	6	4	1.07^{NS}	9	11			
No	8	12						

*= significant at 0.05 level NS= not significant

Table 4 shows the chi square values of the selected variable with the knowledge and expressed practice post test scores. The variables which showed significant association with knowledge and expressed practice scores were education and the years of experience of the workers in the industry.

IV. Discussion

The scope of occupational health services include preventing occupational hazards at work, protecting workers against hazards at work, help in adopting work and the work environment to the capabilities of the worker. Employed people in industries spend at least one third of a day at work which have a strong effect on their health and safety due to work and work-related injuries. Recent industrialization and globalizations changing the occupational morbidity drastically, the new pathologies like cancers, stress, AIDS, geriatrics, psychological disorders and heart diseases are on raise. A survey was conducted in the course of six calendar years, 1996-2001, 5491 new cases of work related disease were reported by a 1-in-12 random sample of occupational physicians throughout the UK. This represented an estimated total of almost 66,000 or 11,000 cases per annum of work related diseases. These cases were analyzed by sex, occupation and industry; and annual average incidence rates calculated in five main disease groups against a similarly classified denominator of 3.2 million employees served by the same physicians. The results shown that musculo-skeletal complaints were the main cause (49%) and skin (20%), respiratory or stress diseases (21%) were next in importance. There was a wide range in incidence rates depending upon the occupation or industry.[8] The study findings about majority of workers (71.67%) expressed neurological problems like upper limb numbness and pain in back etc. are consistent with the findings of the Reporting of Injuries Diseases and Dangerous Occurrences regulations (RIDDOR) report which reported that the cramp and tendon inflammation and injury to back are the common problems in pharmaceutical industry.[2] The findings of the present study revealed that there was increase in knowledge among workers after administration of STP which is similar to the findings of in a survey which conducted and implemented training programme for new pharmaceutical workers. The results of the training programme were the involvement of students and new specialists in investigation and tackling labour protection problems, and their active involvement in OSH matters. Comparatively small number of occupational accidents, retention of worker health, improvement of professional skills and work efficiency were reported among workers of the industry.[7] The present study showed that years of experience and educational status are related to increase in the knowledge of industrial workers which is similar to the result of a cross-sectional study involving 153 factory workers of UAE. In this study the variables years of education, receiving information about the job-associated hazards, and attending a training course about occupational safety were the most important predictors of the workers' knowledge about the occupational hazards.[9] A report of observations in many countries, particularly developing countries, reveal that common constraints to the effective implementation of adequate control strategies include insufficient awareness, education and political will, shortage of adequate human and financial resources, deficiencies in information and in communication among professionals and institutions, inadequate preventive approaches, as well as failure to involve workers and their representatives directly in problem-solving processes. [10] A group of 12 scientists reaffirmed that 20 pharmaceutical agents belong on the International Agency for Research on Cancer (IARC's) list of definite human carcinogens. Thus many pharmaceutical agents are carcinogenic to the human body. [11] Preventive measures concerning functional occupational health and safety programs are essential to safeguarding the health and safety condition of workforce There is need to increase knowledge about these risk factors.[12] Thus, the study conducted had a increase in the knowledge and expressed practice of pharmaceutical industry workers.

V. Conclusion

The present study had certain limitations that the sample size was small of 60 and the tool used in the study was structured questionnaire so the free responses of the sample were restricted. The results of the study showed a significant increase in the knowledge and expressed practice of the workers after the administration of structured teaching programme in the experimental group as compared to control group. There was positive relation between the knowledge and expressed practice scores and the variables education and work experience had an association with the knowledge and expressed practice scores. The present study has recommendations that study can be replicated on a large sample of different units of industry. Even comparative study to show effectiveness of various teaching methods can be assessed and even attitude dimension can also be assessed.

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