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2nd International Conference on Occupational & Environmental Health

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2nd International Conference on Occupational & Environmental Health

Editorial

International Concerns on Occupational and Environmental Health

The 2nd International Conference on Occupational and Environmental Health with an apt theme of "Mainstreaming of Occupational & Environmental Health" was organized by Department of Community Medicine, Maulana Azad Medical College, New Delhi, in collaboration with OHS-MCS, National Institute of Health & Family Welfare, Center for Community Medicine, AIIMS, New Delhi Municipal Corporation, Vardhman Mahavir Medical College, Lady Harding Medical College and others on 26-28 September 2014 in New Delhi.

This conference envisaged the role and acceptance of Occupational and Environmental Health by mainstreaming into all the stakeholder branches, and advocated the need for advancement of this well established preventive clinical branch in many of the developing countries. The sub themes covered were mainstreaming at policy and planning, education, implementation, industrial and informal sectors, and rehabilitation. It was certain that Mainstreaming of Occupational & Environmental Health would have enormous impact on the ways of health care delivery system of a country.

This was the 2nd International conference on occupational and environmental health, the subject which needs a contemporary vision in India. The venue was NDMC Convention Center, Connaught Place, New Delhi.

The first day of the conference inauguration commenced with the welcome address by Dr. G. K. Ingle, Director Professor & Head Community Medicine, Maulana Azad Medical College New Delhi. It was followed by lamp lightning. Dr. Jagdish Prasad, Director General Health Services, Ministry of Health & Family Welfare, Government of India was the chief guest. In his speech, he emphasized that Occupational & Environmental health is a neglected area, and the health department should have one designated cell under the ministry to look after the activities related to the subject. The conference souvenir was also released by him. Dr. Satendra, Executive Director, NIDM delivered his address as the Guest of Honor. A vote of thanks was given by the organizing secretary, Dr. Ashish Mittal.

After the tea break, the first scientific session was "Mainstreaming at planning and policy level" (plenary session). The chairpersons for this session were Dr. J. K. Das, Director, NIHFW, New Delhi, and Mr. D. C. Anand, Former District Judge and working as member judicial VAT Appellate Tribunal. The first speaker for this session was Dr. Paek Domyung from Korea. He spoke on the topic "Health and safety progress in Korea, Brief history and lessons". This enlightening talk was followed by the Mr. Swaminath, a retired IRS staff. He expressed his views on "Current policy and planning issues on workers health and safety and remedial measures". The rapporteurs for this session were Dr. Tanu Anand, SR, MAMC, and Dr. Akanksha Tomar, JR, MAMC. Session was concluded with discussion on topics during the session.

In the next "Special Session themed"Tobacco cessation at workplace" was chaired by Dr. G. K. Ingle, Director Professor & Head, Community Medicine, MAMC. The first speaker for this session was Dr. R. C. Jiloha, Director Professor Psychiatry, GB Pant Hospital. He spoke on "Epidemiology of tobacco use and its pharmacological management". The next speaker Dr. Rakesh Chadda, Professor, Psychiatry, AIIMS delivered a paper titled "Non-pharmacological management of tobacco use". The rapporteurs for this session were Dr. Dinesh Kataria, Professor in Psychiatry, LMHC, and Dr. Neha Gupta, SRF, MAMC. This session followed discussions among the audience and the speakers.

The session "Mainstreaming at implementation level" (Plenary Session) was chaired by Dr. P. K. Sharma, MOH, NDMC. The first speaker for this session was Dr. Amod Kumar, St. Stephen Hospital. His talk was on "Occupational environment: An ongoing calamity". The next speaker was Dr. U. C. Ojha, Director Institute of Occupational and Environmental Health who spoke on "New initiative in OHS by ESIC and vision ahead". The last speaker in the session was Dr. O. P. Kansal, Advisor Injection Safety, B D who spoke on "Mainstreaming of occupational & environmental health in implementation level". The rapporteurs for this session were Dr. Tapas, JR, MAMC, and Dr. Anuradha Chauhan, JR, MAMC.

The session on "Mainstreaming at research & education level (Plenary Session)" was chaired by Dr. Brahm Prakash from CMD, Northern

Railways. The first speaker was Dr. Tor Erik Danielsen, Oslo, Norway who delivered a paper titled "Changes in Europe - Specialist training in Norway – Status and trends". The next speaker, Ms. Inakshi Naik from NIOH, South Africa. gave an overview on "Training of Occupational Health Professionals for Delivery of Occupational Health Services in South Africa". The last speaker for this session was Dr. P. K. Sishodiya (Rtd Director, NIMH) emphasizing the "Role of academic and research institutions in Occupational & Environmental health". The rapporteurs for this session were Dr. Urvi Sharma, SR, MAMC, and Dr. Sunita, JR, MAMC.

After the scientific sessions, there were three parallel sessions for oral paper presentations. The theme of these sessions were " Epidemiology of environmental diseases – I" which was chaired by Dr. Nagesh, Director Professor, LHMC, New Delhi, and Dr. Anil K. Gupta, Associate Professor & Head, Planning NIDM and rapporteurs Dr. Urvi Sharma, SR, MAMC, and Dr. Rajkamal, JR, MAMC. The next theme was "Epidemiology of environmental diseases - II" which was chaired by Dr. O. P. Rajoura, Associate Professor, Com Med UCMS, Delhi and the rapporteurs were Dr. Deepshikha, JR, LHMC, and Dr. Sriram, JR, MAMC. The third theme "Epidemiology of environmental diseases – III" was chaired by Dr. Anubha Mandal, Professor, DTU, and Dr. A. K. Bagga, Scientist D, ICMR, New Delhi and the rapporteurs were Dr. Jitender Kumar Meena, JR, MAMC, and Mr. Rahul Anand, Student, DTU.

Following the days of scientific sessions, a cultural program was organized by the students and participants. It was well appreciated by everybody for the active participation of students their extracurricular activities and talents displayed.

The second day of the conference started at 9:00 am with parallel poster and oral paper presentations. There was a poster paper presentation session titled "OH of health workers". The chairpersons were Dr. S. V. Singh, Professor, MAMC, and Dr. Neeta Kumar, Scientist D, ICMR, New Delhi. The rapporteurs were Dr. Charu, SR, MAMC, and Dr. Amit, JR, MAMC. The theme of oral paper presentation session was "Children and adolescent workers; women, work & health (vulnerable population)". The chairpersons were Dr. Sunil Juneja, Dean DMC, Ludhiana, and Dr. Harish Pemde, Professor Pediatrics, LHMC, New Delhi. The rapporteurs were Dr. Deepak, LHMC, and Dr. Amit, JR, MAMC. The next paper session was titled "OH of Health Workers -I". The chairpersons were Dr. Vibha, Director Professor, LHMC, New Delhi, and Dr. Rajesh Kumar, Professor, MAMC, New Delhi. The rapporteurs were Dr. Anuradha Chauhan JR, MAMC, and Dr. Anshul Goel, JR, MAMC. The final paper session was titled "OH of health workers - II". The chairpersons were Dr. T. K. Jena, Director School of Health Sciences, IGNOU, and Dr. Prasuna J., Professor, LHMC. The rapporteurs were Dr. Drishti, MAMC, and Dr. C. Vankumha, JR, MAMC.

The free paper sessions were followed by plenary session titled "Mainstreaming in MSMEsector". The chairperson was Dr. Suneela Garg, Director Prof., MAMC. The first speaker was Mr. Satish Sinha, Associate Director, Toxic Link. He talked on "Occupational health challenges in the unorganized sectors in India". The next speakers were Mr. Ravi Prakash and Mr. Pradeep Naryanan, Praxis, New Delhi. Their topic was "Down the Drain". The last speaker was Mr. Bechu Giri, President of AITUC Haryana. He threw light on "Role of trade unions in workers' health and safety demand". The rapporteurs were Ms. Seema Rani, Assist Prof, Jamia Hamdard, and Dr. Meenakshi, Max Hospital.

There was a workshop for NDMC Sanitation Engineers. The inauguration was done by Dr. P. K. Sharma, MOH, NDMC. A brief introduction was done by Dr. Ramesh Kumar, CMO, NDMC. Dr. Mahinda from Australia talked about the "Health problems among sanitary staff". Dr. Jugal Kishore, Professor, MAMC presented on "Prevention of ergonomic problems in workers". Dr. Ashish Mittal, CEO OHMCS expressed his views on "Prevention of occupational and environmental health problems". The rapporteur was Dr. Kalika, JR, MAMC.

The next plenary session titled "Mainstreaming in MNCs". The chairpersons were Mr. Omkar Sharma, Regional Labor Commissioner, Shram Shakti Bhavan, and Dr. Sukumar, Adani Ahmedabad. The first speaker in this session was Dr. Niti Paul, CMO, HCL. She delivered a paper titled "Mainstreaming of occupational health in corporate sector" followed by Dr. S. K. Tyagi, CPCB, New Delhi who spoke on "Air Pollution trend in Indian cities and regulatory mechanism". The next speaker was Dr. Nereshni from Ampath, South Africa who delivered a talk titled "Chemical exposures and guidelines to Biological Monitoring". The last speaker of the session was Mr. R. Sreedhar, Environics, New Delhi. He talked about "Miners health". The rapporteurs were Dr. Shantanu Sharma, JR, MAMC, and Dr. Pooja Ahlawat, JR, MAMC.

In a special scientific session titled "Technology in health sector", the chairpersons were Dr. S. K. Rasania, Dir Professor & Head, Community Medicine, LHMC, New Delhi, and Dr. Lim Jack Fang, Ministry of Health, Malaysia. The first speaker was Dr. Punita Sodhi, Professor Ophthalmology, MAMC. She talked about "Using Different techniques to diagnose color blindness in workers". The next speaker was Dr. B. N. Mirsa, Dept. of Community Medicine, R D Gardi Medical College, Ujjain, MP who spoke on "Mainstreaming equipment fallacy for efficient health care' – sphygmomanometer at the eye of the storm". The last speaker of the session was Mr. Vikas Verma, Consultant Engineer who talked on "Time to dissect smart phones". The rapporteurs were Dr. Drishti, JR, Community Medicine, MAMC, and Dr. Isha Goyal, JR, LHMC.

Plenary session "Mainstreaming in Informal Sector" was chaired by Dr. R. S. Tiwari, Retired Labor Commissioner, and Dr. R. S. Rajput, RLI, DGFASLI. The first speaker was Mr. Mahinda Seneviratne, Australia. He gave an idea on "Capability building to deliver OEH services in the informal sector". The next speaker was Ms. Charu Garg, IHD, New Delhi who raised the question in her talk titled "Are we moving towards universal health care for informal workers in India?". The next speaker was J. John, CEC, New Delhi,and Dr. Vinayaraj V. K. He talked on "Behind the glitter: A study of occupational health hazards in the home-based bangle works in Firozabad and brass works in Moradabad". The last speaker was Mr. Mukesh Gulati, Executive Director, Foundation for MSME Cluster. He spoke on "Occupational Health and safety of foundry workers". The rapporteurs were Dr. Pallavi Boro, JR, MAMC, and Dr. Akanksha Tomar, JR, MAMC.

A panel discussion on a topic named "Industry commitment & resources to achieve OEH goals" took place with the panelists Dr.Tor Erik, Ms. Inakshi Naik, Mr. Mahinda Seneviratne and Mr. Mukesh Gulati.

Towards the end of day program, there were parallel paper presentations. The first free paper session was titled "Risk assessment". The chairpersons were Dr. Sandeep Kaushal, Dean, DMC&H Ludhiana. The rapporteurs were Dr. Shweta Arora, SR, LHMC, and Dr.Varun Kumar, VMMC. The next free paper session was titled "Lifestyle diseases and psychosoical factors at work place". The chairpersons were Dr. Harjinder Kaur, Director Principal, SGRD College of Nursing, Punjab, and Dr. Charan Singh, Public Health Specialist, DHS. The rapporteurs were Dr. Naveen J. Prabhu, JR, Community Medicine, MAMC, and Ms. Bharti, Rufaida College of Nursing, Jamia Hamdard. The final free paper session was titled "Mental health at workplace". The chairpersons were Dr. Dinesh Kataria, Professor, Department of Psychiatry, LHMC, and Dr. Manish Goel, Associate Professor, LHMC. The rapporteurs were Dr. Neha Gupta, SRF, MAMC, and Dr. Madhan, JR, MAMC. A poster session titled "Occupational &health related issues: Air & water pollution, noise, toxic metal exposure". The chairpersons were Dr. M. M. Singh, Professor, MAMC, and Dr. Ashu Khanna, Consultant, Occupational Health. The rapporteurs were Dr. Disha Meena, JR, MAMC, and Ms. Ummi, Rufaida College of Nursing, Jamia Hamdard.

The third and the last day of the conference started with parallel paper presentation sessions. The poster session was titled "Occupational eye problems; Occupational & Environmental diseases; Occupational accidents & injuries; OH laws". The chairpersons were Dr. Vikrant Mohanty, Asso. Prof., MAIDS, and Mrs. Nirmala Singh, Vice Principal, College of Nursing, RML Hospital, New Delhi. The rapporteurs were Dr. Mohit Batra, JR, MAMC, and Dr. Piyush, JR, MAMC. The free paper session was titled "Innovative practice in OH: Promoting health and wellbeing at work". The chairpersons were Dr. Ramesh Kumar, CMO, NDMC, and Dr. Manish Chaturvedi, Professor, Sharda University. The rapporteurs were Dr. Sumeena MAMC, and Dr. Neha Jain, LHMC. The next free paper session was titled "Environment related issues". The chairpersons were Dr. K. Madan Gopal, Senior Technical Expert, Indo-German Social Security Programme – IGSSP, and Dr. Manish Goel, Associate Professor, LHMC. The rapporteurs were Dr. Uday Bhaskar, JR, MAMC, and Dr. Sakshi, LHMC. The last free paper session was titled "Miscellaneous". The chairpersons were Dr. S. K. Bhasin, Professor, UCMS, and Dr. Ranjan Das, Professor, Com Med, LHMC. The rapporteurs were Dr. Kalika, JR, MAMC, and Dr. Rishabh Anand, MBBS student, MAMC.

The final scientific session was on "Mainstreaming of rehabilitation of OEH affected people". The chairpersons were Mr. C. K. Tyagi, NHRC, New Delhi, and Mr. Sanjiv Pandita, AMRC Hong Kong. The first speaker was Dr. Apo Leong, Senior Adviser to Asia Monitor Resource Centre (AMRC) who talked about "Rehabilitation policy in Hongkong". The next speaker was Mr. Sanjay Parikh, Advocate Supreme Court,followed

by Mr. Jagdish Patel, Director PTRC, Vadodara. He presented on "Mainstreaming of rehabilitation of OEH affected people: Relief & rehabilitation; care & support". The rapporteurs were Dr. Anshul Shukla, MAMC, and Dr. Ruchira, JR, MAMC. Following the sessions, there was a short tea break.

The closing ceremony, after an extensive and successful three days program, was proceeded by closing remarks by Dr. G. K. Ingle, Director Professor & Head, MAMC. The best paper awards were distributed by Dr. Deepak K. Tempe, Dean, MAMC, and Dr. L. S. Chauhan, Director NCDC, Ministry of Health & Family Welfare, Govt. of India. The rapporteurs were Dr. Tanu Anand, SR, MAMC, and Dr. Tapas, JR, MAMC. In the concluding remark, the scientific chairperson expressed his satisfaction with the quality of scientific content, intellectual contribution from the occupational health professionals as well as participation from the students of community medicine, nursing, environmental science, social works etc. He recommended that participants should do more scientific research to guide policy changes for industries and government so that occupational health delivery can be based on evidence. India is an emerging economic power, and occupational health should be integral component of overall health. Speakers from Norway, Hong Kong, Nepal, South Africa, Malaysia, and India expressed their views on how occupational health can improve through mainstreaming with all sectors. Some of the best practices were also presented which can be benchmarked. The examples of this are high standard and efficiency of occupational and environmental health system in South Korea and Singapore. The commitment of Ministry of Health & Family Welfare, Government of India for safety and health of workers in all occupations was sought. It is also realized that mainstreaming of occupational health would be the most effective strategy for overall development of the nations. The conference was a great success in achieving its goal and we thank all the participants and sponsors for their cooperation and support in this endeavor.

Dr. Jugal Kishore
Ms. Inakshi Naik
Scientific Committee Chairpersons

A Study on Needle Sticks Injury among Nursing Staffof a Tertiary Care Hospital of Haryana

Debjyoti Mohapatra[*], *Vikas Gupta*[*], *J. S. Malik*[**]

Abstract

Background: **Needle stick injury is one of the most common forms of occupational hazards in a hospital setting. HIV, HBV and HCV are the three most common infections that can be propagated through this route. Nursing staffs of the hospital are the most vulnerable group to this form of occupational hazards.**

Methods: **The study was carried out in Pt. B. D. Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana. The hospital employs almost 350 female nurses at various levels. 172 nurses were selected by judgmental sampling to calculate the prevalence of needle stick injury in the past five years and also the awareness of the staff.**

Results: **The prevalence of needle stick injury was about 63%.The most common mode was during IV access/ IM injections followed by recapping of needle.The heavy load of patients was the main reason attributed by about 60% of the participants having needle stick injury followed by wrong technique and own carelessness. The use of gloves during IV access and other procedures was seen in only 63%participants.**

Conclusion: **The present study showed the prevalence of needle stick injury to be quite high. Proper training of health care providers regarding techniques to prevent needle stick injuries is the need of the hour.**

Keywords: **Needle sticks injury, nursing staff, burden of work, HBV.**

Introduction

Health- care workers are at an increased risk of infection with blood- borne pathogens because of occupational exposure to blood and other body fluids. Needle stick injury is the one of the most common types of occupational hazard exposing the health care provider to these blood borne pathogens. Three of the most important infections that can spread through needle stick injuries are HIV, HBV and HCV. Among the three infections, the chance of transmission of HIV is lower as compared to HBV and HCV.[1]The dreaded part is the fact that HIV and HCV do not have an effective vaccine till date. To compound the problem, HIV is hundred percent fatal. HCV and chronic HBV also have a high case fatality rate. Moreover, the treatment of these diseases comes at great financial cost which adds to physical and mental burden of the patient.

In a country like India which has a rapidly ticking population clock, the health system always suffers from paucity of manpower.[2] The healthcare providers are almost always overburdened.

The nursing staff is one of the most important pillars of direct patient care. But this also makes them vulnerable to occupational hazards like needle stick injuries. In fact, they are the most susceptible group among all heath care providers to suffer needle stick injury.

The objective of this study was to estimate the prevalence of needle stick injury among the nursing staff of a tertiary hospital and outline the causes and factors influencing it.

Methods

The study was conducted in Pt. B. D. Sharma, PGIMS, Rohtak, Haryana. This is the most

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important government sector tertiary care hospital and caters to the health needs of the entire state. The inpatient of this department has 1700 beds. This was a cross sectional study conducted during the months of May and June 2014.This hospital employs about 350 nurses and also acts as a teaching and training institute for nursing courses. The nurses to be included in the study were selected by judgmental sampling technique. All the nurses posted in the casualty, inpatient's department of medicine, surgery, psychiatry, gynecology and obstetrics including labor room, orthopedics and pediatrics were selected for the study. This was done reflecting on the heavy burden of in patents treated in the following departments. Only those participants who had worked continuously for the past six months in any of these departments of this tertiary care center were recruited as study subjects. A pretested interview schedule was prepared to test the awareness of nursing staff regarding needle stick injury and to elicit the major factors associated with needle stick injury.

Verbal permission to conduct the study was taken from Heads of the respective departments. Verbal permission was also taken from each individual participant.

Statistics

Collected data was recorded and entered in the MSExcel master sheet. Data was tabulated and analysis was carried out using SPSS (Statistical Package for Social Studies) version 20.0 as per objectives of the study. Categorical variables were analyzed using Chi- square test whereas quantitative variables will be represented using mean and standard deviation. Significant difference will be assumed where the difference will be <0.05 at 95% confidence interval.

Results

Majority of our participants were in the age group of 30-34 years (40.7%), followed by 35-39 years (20.2%) age group. The mean age of our participants was 32.87 years (table 1). Among total participants, 109(63.37%) participants had at least one instance of needle stick injury in the past five years (chart 1).

Age group (in years)	Frequency (percentage)
20-24	10 (5.8%)
25-29	33 (19.2%)
30-35	70 (40.7%)
35-40	39 (22.7%)
40+	20 (11.6%)
Mean (SD) = 32.87 ± 5.08	

Table 1.Age group distribution among study participants

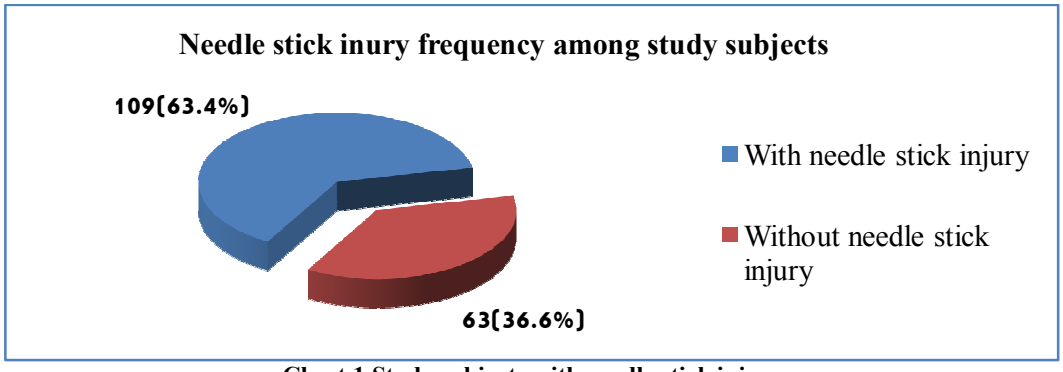

Chart 1.Study subjects with needle stick injury

Majority of the nursing staff was aware of the three major diseases that can be transmitted through needle stick injury (85%), but the grading of chance of transmission of the three infections was not known to a significant number (52%). Most of the participants felt all the three had equal chances of transmission after a needle stick injury. Majority of the respondents (92%) were aware that blue bag is used for sharp disposals (table 2). Only 13 participants admitted reporting an incident of needle stick injury to their superiors. The first aid used by most of them after a needle stick injury was washing with soap and water, using spirit, dettol or both. Six participants had to take post exposure prophylaxis (table 3).

Awareness regarding	Frequency of awareness (percentage)	Not awareFrequency of unawareness (percentage)
Three main diseases spread by needle stick injury	146 (85%)	26 (15%)
Chances of transmission (HBV>HCV>HIV)	90 (52.3%)	82 (47.7%)
Blue bag used for disposal	158 (91.8%)	14 (8.2%)
Recapping not to be done	56 (32.5%)	116 (67.5%)
Awareness of all the above parameters	**Not aware of all the parameters**	
53 (25.6%)	119 (74.4%)	

Table 2.Awareness among study participants

To analyze the factors that could be responsible for needle stick injury, we asked the participants who reported with NSI the possible reasons they thought were responsible for the injury, a whopping 64 of the respondents with needle stick injury thought that it was the excessive burden of work that was somehow directly or indirectly responsible for needle stick injury. A significant number also admitted that it was due to their own carelessness that was responsible for the injury (table 3). Most of the needle stick injury happened during the use of the needle to access intravenous lines or administering intramuscular injection. Recapping, which was rampant in the inpatients department was the second major cause. A considerable number of participants (54%) with NSI admitted that they were unaware of patient's status at the time of injury (table 3).

Reasons	Frequency (percentage)
Over burden of work	64 (58.7)
Self- negligence	27 (24.7)
Patient's irritability	11 (10.0)
Others	7 (6.4)

Table 3.Reasons attributed to needle stick injuries by the study subjects

When did the injury occur	Frequency (percentage)
During intravenous access, intramuscular injection	62 (56.9%)
Recapping	33 (30.3%)
Protruding from waste box	6 (5.5%)
Others	8 (7.3%)
Response after injury	
Washed with soap and water	42 (38.5%)
Applied dettol or any other disinfectant	31 (28.4%)
Washed with soap and water and also applied dettol	23 (21.1%)
Washed with water alone	11 (10%)
Did nothing	2 (1.9%)
Immunization status (HBV)	
YES	82 (75.2%)
NO	23 (21.1%)
Do not know	4 (3.6%)
Informed the concerned authority	13 (12%)
Took post exposure prophylaxis	6 (5.5%)
Was aware of patient's status at time of injury	51 (46%)
Wore gloves at the time of procedure	47 (43%)

Table 4.Characteristics of recent needle stick injury in study subjects

Discussion

The prevalence of needle stick injury was quite high. We had taken history only of the preceding five years so as to get relevant information and prevent any sort of recall bias. Laishram et al. had reported a 28% prevalence of needle stick injury.[3]

In a study conducted by Salekar et al., 37.4% of nurses had reported needle stick injury in the previous one year.[4] Sharma et al. in a tertiary care hospital of New Delhi reported prevalence of needle stick injury to be 79.5%.[5] That study was conducted among health care professionals comprising of doctors including interns, nursing staff and even nursing students. The fact that we had no student or trainee in our study could account for the relative low instances of needle stick injury. Also, we had taken history of only the previous five years. Most of the participants were aware of the three major diseases that can be spread by needle stick injury. It is natural that a person exposed to the constant threats is also aware of the risk. It is also a fact that a recent curriculum of nursing student has been focusing on this aspect. But it was surprising that very few were aware that HBV has much more chance of transmitting infection compared to HIV.

Saini et al. had reported knowledge about three main blood borne pathogens transmitted through NSI to be present in 74% of students of a rural dental college.[6] With high stress being laid upon proper BMW especially those of sharps, the high level of awareness regarding sharp disposal including needles is evident. A majority of participants' response to NSI was to immediately wash with soap, water and/ or apply antibiotics. Similar results were also reported by Lashiram et al. It was surprising that only 13 participants reported the incidents of needle stick, though a needle stick injury register has been maintained since 2010. Most of the participants were either not aware of the presence of registry or did not consider it necessary to report in the registry. Six subjects took post exposure prophylaxis (4 for HBV and 2 for HIV). Majority of our respondents attributed over burden of work to be directly or indirectly related to the needle stick injury. It is understandable because this is the most important referral center in the state of Haryana and is always overloaded with patients. Self- negligence was the next most common cause. According to similar findings reported by Sharma R et al., 50% of NSI were attributed to fatigue due to overload of work. Jayebhai et al. had also found overburden of work to be related to the incidence of needle stick injury.[7]

Most nursing staff admitted that needle stick injury was at the time of intravenous or intramuscular access and their manipulation in the patient. Recapping and injury from recapping was also responsible in some cases. A significant number were not aware of patient's status at the time of injury. Muralidhar et al. had found blood withdrawal to be the most common activity causing needle stick injury among health care professionals.[8] Laishram et al. reported about 70% of NSI occurring while giving intravenous or intramuscular injections. Around 35% of the participants were not wearing protective gloves at the time of injury. This is in stark contrast to the findings of Laishram et al., who reported that a whopping 86% were not wearing protective gloves while they suffered needle injuries.

The present study revealed that needle stick injury has a high prevalence among nursing staff. The nursing staff is overburdened with work and reducing this burden could be of prime importance in bringing down episodes of needle stick injury. Stress on proper training coupled with better and innovative engineering techniques and work practice control could lead our nursing sisters out of this dark tunnel.

Limitations

We selected our study population from the heavily burdened indoor departments. This could have resulted in overestimation of the prevalence.We excluded some less burdened areas like ICUs.

Conclusion

The study revealed that needle stick injuries are quite common among nursing staff. In a resource limited setting of a tertiary care government hospital of India where nurse:patient ratio is low, overburden of work was the main cause of needle stick injury. Improvement in manpower can address this issue to an extent.

Acknowledgements

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Air Pollution and Health: A Review of Measurement Techniques

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Abstract

Air pollution is one of the significant causes of loss of healthy life years due to illness originating from indoor and outdoor air pollution sources like burning of biomass, vehicular emissions, etc. In the presented study, review of various methods used to assess health risks in terms of mortality and morbidity has been described. The use of precise instruments is essential for monitoring of health determinants causing serious health effects in urban regions. Data obtained from monitoring can be fed into the mathematical models in order to get the overall impact. These models are fed with specific concentration value for specific compounds, and they provide calculated number of population at risk. The main problem in using such models is the inability to calculate health risks for every pollutant. To validate the results obtained from mathematical models surveying needs to be synergies with the results. In air pollution impact assessment studies, public perception is one of the important components which these mathematical models do not incorporate, hence we recommend integrated assessment models for such studies. Perception based surveys generate huge data set and require statistical tools like SPSS, STATA for further analysis. It is essential to carry out exposure assessment studies as well to determine the pollution source and its impact on health in a more holistic way. Knowledge of these factors will help us to take measures to reduce pollutant concentration and recommend alternative solutions.

Keywords: **Air pollution, Health Impacts, Exposure Assessment, Aerosol Measurement Techniques, Risk Assessment Methodologies.**

Introduction

Atmospheric aerosols are defined as a collection of liquid or solid particles suspended in air. It typically ranges from 1 nm to 100 µm. Aerosols play a very significant role in affecting our surroundings as they pollute the atmosphere and the air that we breathe. Atmospheric aerosols cause severe effects on health and hence are important to the study. Some of these particles when inhaled can have serious repercussions on the respiratory and cardiovascular systems. When air containing these particulates is inhaled, the pollutants get directly transferred to the lungs and are further carried around the body by blood.[6] Increasing air pollution has led to the rise in number of cases registered for Asthma, Chronic bronchitis, Chronic Obstructive Pulmonary Disease (COPD), Emphysema, and Lung cancer (Physicians for Social Responsibility, 2009).

Numerous studies show that due to urbanization, there is a rapid change in the Land Use/ Land Cover in megacities with addition of more concrete each day than the previous. Due to this, urban heat islands are formed, thereby creating patches of area with higher temperature than the surrounding areas. This heat gets trapped in that particular area and leads to heat stroke amongst its inhabitants. Prolonged hot and humid conditions cause more stress as the body cannot dissipate heat through evaporation leading to even more discomfort. This effect of heat on human body due to temperature and moisture content is referred to as 'heat-stress index'. Primary and secondary aerosols combined with high temperatures have been associated with lung cancer and heat stroke.[7]

In order to assess the effects of aerosol on human health, we need to understand different measurable properties of aerosols like particle size, number, mass, composition etc. Mostly particle size is used to study the behavior of aerosol particle. To characterize these properties of aerosols, different methodologies are used to measure the levels of aerosol and the mortality caused due to them.[15]

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Two main measures used by Environmental Protection Agency (EPA, 1997) to quantify aerosols in atmosphere with respect to air quality and health effects are Total Suspended Particulate (TSP) and Particulate Matter (PM). The TSP measures all particles suspended in air. They are mostly dust particles and do not have serious health implications. The PM, on the other hand, includes particles smaller than 10µm and is easily respired through the nasopharynx area and cause several respiratory disorders.[17]

The aim of this article is to assess human health effects due to air pollutants by considering various factors such as increased mortality and morbidity based on air quality standards. According to World Health Organization (WHO) guidelines, even at lower concentrations, morbidity and mortality occur if the conditions are prevalent for extended periods. On the other hand, if higher concentrations are present for a short duration, morbidity and mortality can still occur. A disadvantage to this kind of study is that air quality data is not available for all the compounds and also there is a constant increase in pollution level. Therefore, while considering the level of pollutant, we are assuming it to be the lower limit.[4]

Amongst the various methodologies described in this article, most of them are mathematical models and consider specific values for each pollutant. Some of them include Risk of Mortality/ Morbidity due to Air Pollution (Ri-MAP), Greenhouse gases and Air Pollution Interactions and Synergy (GAINS), Smith's method, Schwela's method; others are Air Q 2.2 software, Dust Track Aerosol monitor 8520, TSI 3080 Differential Mobility Analyzer (DMA), GRIMM Spectrometer, and Nanoscan SMPS. Various studies are done at cellular level such as sputum cytology, hematology study, and immunological study (not mentioned here) while other non-cellular surveying includes spirometry and questionnaire method.

Methods used for measuring Aerosols

The most common technique to measure particle mass concentration involves *filtration*. Filters are weighed under controlled temperatures and relative humid conditions before and after sampling and mass concentrations are determined for increase in filter mass and volume of air sample. Its limitation is that handling of filter media leads to uncertainties.

DMA or *Differential Mobility Analyzer* sizes particles by their electrical mobility. It first neutralizes the aerosol and then uses an electrical mobility principle to classify and strip out a very narrow, predictable size. Due to the accuracy of this instrument, it is used as a standard aerosol instrument and therefore used for testing and validating new instrument's performance.[15]

Dust Track Aerosol Monitor 8520 provides reliable exposure assessment by measuring particle concentration, corresponding to PM_{10}, $PM_{2.5}$, and $PM_{1.0}$. It measures aerosols in a wide range of surroundings from indoor air pollutants to ambient air pollutant[13].

GRIMM Spectrometer permits an individual particle size selection and consequently proper aerosol properties. The optical particle counters rely on the amount of incident light scattered at 90° by a particle to measure particle number concentration by optical particle size (www.grimm-aerosol.com).

Nanoscan SMPS has four components that together measure aerosol particles in air. It has a cyclone that removes larger particles entering the instrument. The unipolar particle charger charges nanoparticles more effectively than a bipolar charger. To select specific particle size, radial DMA is used for better resolution. Isopropanol-based CPC is used to accurately count the particles (www.tsi.com).

Methods used in measuring health impact

Ri-MAP i.e. Risk of Mortality/ Morbidity due to Air Pollution is utilized in estimating human health effects of air pollutants in urban areas by calculating the number of excess cases registered for different types of respiratory and cardiovascular diseases and deaths. It takes international air quality standards as a standard value for concentration of each particulate matter in atmosphere. It can be used for various pollutants like SO_2, NO_2, and TSP. Its advantage is that it specifically takes into account the effects of individual pollutant. Its major limitations are:

- Air quality data is limited (i.e. not available for all the compounds),
- It always takes into account the lower limit of concentration and does not take the increased concentration value,
- We have to assume uniform exposure due to air pollution throughout the study.

According to Gurjar, the model uses values of relative risks and baseline for different pollutants from WHO.[4]The following is the equation for assessment of risks to population due to a specific particulate matter:

$$RR(c) = \frac{C - T}{\{10 \times (RR - 1) + 1\}}$$

Where,

C – Ambient air concentration of a pollutant

T – Threshold level of pollutant as per WHO norms

RR – Relative risk for selected health outcome

c – Category (industrial / residential)

Air Q software is an Air Quality Impact Assessment (Air Q 2.2.3) software that is used to quantify effects of exposure to air pollution and estimate life expectancy reduction. It was proposed by WHO European Centre for Environmental health, Bilthoven Division. The assessment is based on the assessment of certain population attributable to exposure to a given atmospheric pollutant. It calculates the following:

- The effect of short- term changes in air pollution (based on risk estimates from time-series studies).
- The effects of long- term exposure to air pollution (using life- tables approach and based on risk estimates from cohort studies) (www.who.com).

In Smith's Method, the mean risk of death per unit increase in the concentration of ambient particles is applied to population at risk using information about risk estimate and levels of pollution. Risk estimate is derived from urban studies on ambient air pollution and yields a range of 1.2 - 4.4% increase per 10µg/m^3 PM_{10}. The levels of pollution are obtained from studies of mean particle concentrations indoors in urban and rural settings in developed and developing countries. Its major drawbacks are that it uses lowest risk estimate; the risk is halved above 150 µg/m^3, PM_{10} levels are 50% of total suspended particles.[2]

Schwela's method determines the number of people at risk on the basis of numbers exposed to annual mean levels of suspended particle matter exceeding the WHO guidelines. Analysis is done using air pollution data desired from Global Environmental Monitoring Strategy (GEMS) and Air Management Information System (AMIS) and estimated increased mortality associated with pollution. The number of people at risk is determined on the basis of numbers exposed to annual mean levels of suspended particle matter exceeding the 1987 WHO guidelines. The mortality rate per 100,000 is determined without influences of air pollution (levels below WHO guidelines).The estimate of increase in mortality attributable to air pollution is taken as 100µg/m^3 suspended particle matter.[2]

GAINS i.e. Greenhouse gases and Air Pollution Interactions and Synergies developed by International Institute for Applied System Analysis (IIASA), Austria estimates $PM_{2.5}$ concentration. The model "adjusts for urban increment" for major urban agglomerations. The model considers emissions of CO_2, CH_4, NO_x, N_2O, TSP, PM, SO_2, Volatile Organic Compounds (VOCs). The GAINS model consists of information displayed on the activities causing emission, evolution of emissions, emission control costs, and impact on human health. The model can follow the path of emission from source to their impacts and also provides estimates of costs for emission control strategies.[3]

According to *Guttikunda and Goel method*, health impact can be measured using following equation:

$$\delta E = \beta \times \delta C \times \delta P$$

Where,

δE -Number of estimated health effects (various end points for mortality and morbidity).

β -The concentration- response function, which is defined as the change in number of cases per unit change in concentration per capita.

δC - The change in concentrations (change in concentrations modeled above a threshold value of 20µg/m^3).

δP -The population exposed to the incremental concentration δC, defined as the vulnerable population in each grid, of age less than 65 years.[5]

The *WHO method for Global Burden of Disease Assessment* determines the population exposure to $PM_{2.5}$. It involves applying appropriate concentration response functions, estimating baseline mortality and finally estimating number of deaths that can be attributed to air pollution.

The model can be expressed as

$$PAF = \frac{[P \times (RR-1)]}{[P \times (RR-1)+1]}$$

Where,

PAF – Population Attributable Fraction

P – Exposure expressed as $PM_{2.5}$ concentration

RR – Relative risk for exposed and non-exposed population[3]

Disability Adjusted Life Year (DALY) is a measure of disease burden consisting of two basic components- YOLL (mortality effect) and YLD (morbidity effect). The major benefit of using DALY is that it can combine and compare different kinds of health effects. The DALY can be compared with the other disease burdens through the results of the Global Burden of Disease studies. The main problem with DALY is that some morbidity outcomes, like hospital admissions, are not directly transferable to any specific diseases, and therefore, all the common morbidity outcomes, associated with air pollution, cannot be expressed as DALYs.[10]

Other Methods

Questionnaire Method takes into account people's perspective about their surrounding air quality and its impact on their health. Typically Likert scale is utilized in answering questions. Amongst many questions asked, few are- the medical history of the family, incidence of any respiratory problem in the past few years, and if present, then did it require any medical attention, household income, yearly expenditure on medical treatment, etc. Major limitation of this method is that perception of people is relative and needs to be validated with actual data of air quality in the region and epidemiological studies.

Spirometry is used to measure the bronchial hyper responsiveness using an instrument called spirometer. The technique measures the air flow through the lungs and deduces the broad range of diseases associated with improper respiratory capacity. It is used to check for any obstruction in the airway (like in case of asthma).

Health Impact Assessment (HIA) method (fig. 1) is a practical approach used to judge the potential health effects of a policy, program or project on a population. Recommendations are produced for decision- makers and stakeholders, with the aim of maximizing the proposal's positive health effects and minimizing its negative health effects (www.who.com).

Integrated Environmental Health Impact Assessment method (fig. 2) assesses health-related problems deriving from the environment, and health-related impacts of policies and other interventions that affect the environment. It takes into account the complexities, interdependencies and uncertainties of the real world.[1]

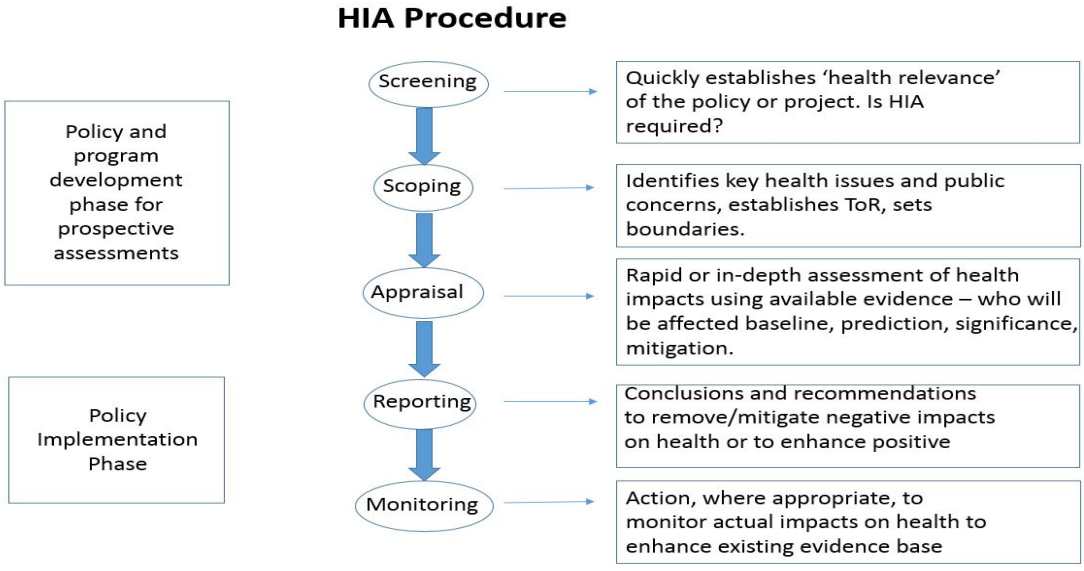

Figure 1.Policy development and implementation of HIA procedure (WHO)

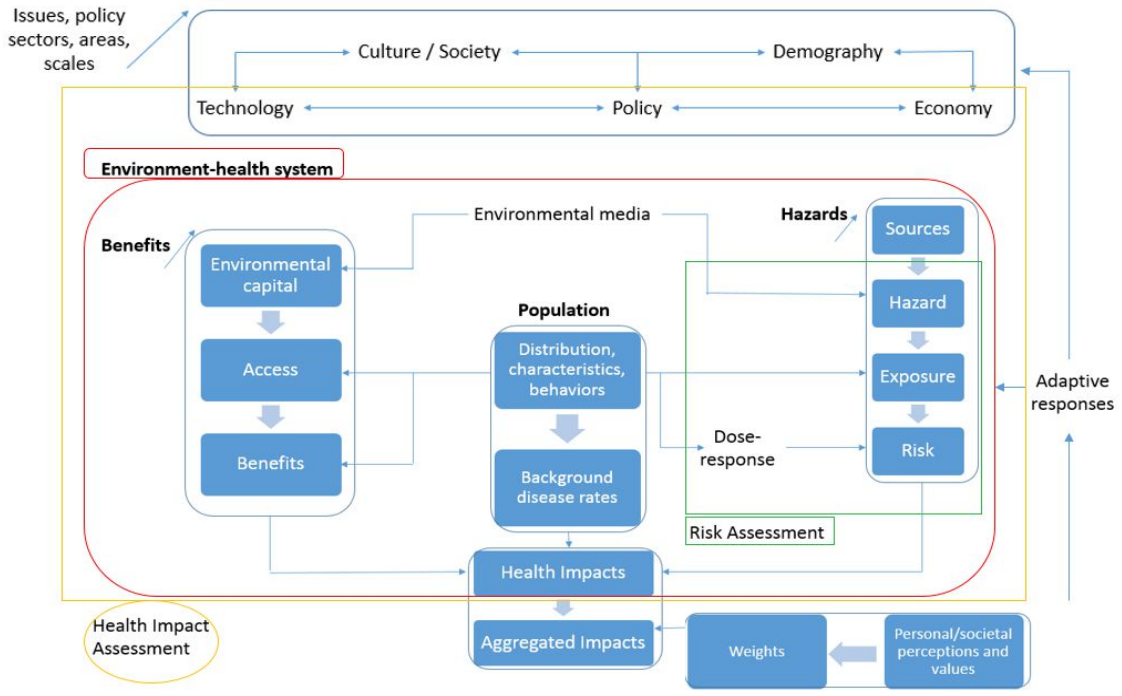

Figure 2.Integrated Environmental Health Impact Assessment[1]

Conclusion

There are various methodologies available to assess the impact of air pollution on health but all these methodologies are constantly evolving. Moreover, data collection to complete the assessment frameworks is also a very tedious task. There are various steps for evaluating the health risk assessment for a population which include: locating the emission source, determining the concentration of pollutant and its dispersion rate, population exposure, and finally the impact on health which is a function of concentration and time. All these steps require costly and time taking instrumentation. Further meteorology such as seasonal variations also plays an important role in this process. For example, asthma patients suffer more attacks during winter season than summer because the concentration of pollutants is higher during lower temperatures.

Soaring air pollution emissions are becoming a major concern for megacities like Delhi. Their inhabitants are vulnerable to air pollution induced adverse health impacts. Control of exposure conditions must be made to ensure an accurate estimation of inhaled dose and subsequently, the best possible correlation between the concentration of material presented and the biological response at cellular level. The regulatory authorities are also putting great efforts to minimize the effect of pollutants on the urban population by constantly monitoring the criteria pollutants.

Population is generally exposed to a mix of pollutants, both indoor and outdoor air, possibly associated with synergistic effects which we cannot consider using single methodology. Hence, the results obtained from such studies need to be matched with other supporting data such as historic and published records.

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An Epidemiological Cross-sectional Comparative Study of Morbidity Profile in an Automobile Manufacturing Unit

Rajat Kumar Saha[*], *Rakesh Sharma*[**]

Abstract

***Introduction*: Occupational etiology as a determinant of morbidity risk factor is often correlated but difficult to signify. An automobile manufacturing unit was chosen for study with the aim to study the socioeconomic, demographic & occupational profile of 2 groups- 1) workers & juniormanagement & 2) senior management, to identify & assess the morbidity factors influencing them, to make comparison of the factors between the two groups & deduce inference & to suggest recommendations for controlling them.**

***Method*: The study design used was a cross-sectional simple random sampling study done over a period of 12 months in 2013-14. The sample sizes were 923 & 229 respectively.**

***Study inclusion criteria*: All permanent workers working for more than 2 years, willing for check-up. Group 1- up to Manager grade & group 2- senior manager & above.**

***Exclusion criteria:* Workers not willing to participate.**

***Study process:* Informed consent, structured interview, clinical check-up with documentation & data analysis by MS Excel 2007 software.**

***Results*: Average age for the two groups were 40.05 ± 9.54 years & 46.9 ± 6.22 years respectively, literacy level (more than secondary level) 30% & 100% respectively, experience 15.3 ± 3.1 years & 6.7 ± 2.4years, job profile- work in hazardous areas & sedentary in group 1 while more of sedentary nature but supervisory in hazardous areas in group 2, co-morbid factors like addiction 21 ± 5% & 9 ± 2.74%,obesity 49 ± 9.4% & 65 ± 6.29%, hypertension 20 ± 5.5% & 23 ± 10.25% , diabetes mellitus 4 ± 2.2% & 8 ± 4.5%, high stress levels 5 ± 2.3% & 24 ± 7.9%, dyslipidemia 4 ± 2.4% & 22 ± 6.97%, with sedentary lifestyle 6 ± 2.3% & 21 ± 5.3%, other morbidities related to work profile like musculoskeletal disorders 55 ± 9.8% & 10 ± 5.3%, allergic/ inflammatory manifestations including skin disorders (viz. dermatitis) 14 ± 5.1% & 4 ± 2.7%, eye complaints (viz. soreness, redness, watering, itching etc.) 32 ± 9.4% & 29 ± 3.6%, respiratory symptoms (viz. cough, phlegm, chest tightness, breathlessness) 21 ± 6% & 4 ± 2.5% respectively.**

***Conclusions*: Morbidities & health risks related to allergic, inflammatory or infective etiology due to physical, chemical or biological hazards were more significant in the first group but those related to psychosocial hazards viz. occupational stress & lifestyle disorders were predominant in the senior executive group. Thus, control measures aimed at reducing the impact of risk factors & morbidities are to be precisely defined keeping in mind the distinct differences between the 2 groups & their responsible factors.**

***Keywords:* Epidemiology, automobile manufacturing unit, morbidity profile, cross-sectional.**

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Introduction

Occupations are often associated with the spectrum of morbidity risk factors. Often there are various morbidities interlinked with specific job profile groups. An automobile manufacturing unit setting was chosen for study in an attempt to demarcate certain factors specific to defined study groups. The aim & objective of the study was: to assess the spectrum of morbidities observed among 2 groups, to study the socioeconomic, demographic & occupational profile of the 2 groups- 1) workers & junior management,& 2) senior management, to identify & assess the morbidity factors influencing them, to make comparison of the factors between the two groups& to infer & suggest recommendations for controlling them.

Material & Methods

For the study, ethical clearance was taken on priority. The workplace chosen for the study was an automobile manufacturing industry with various sub- sections viz. paint shop, weld shop, frame assembly, engine assembly, machine shop, gear section, plating unit, press shop, DG house, R&D section, OHS unit, HR, admin etc. Workforce in group 1 was 5000 and in group 2, it was 1000. The job profile in group 1 consisted of work mainly in hazardous areas, but also had sedentary profile with a job duration of 8 hrs./day in either of 3 shifts: A, B, C. Group 2- job was more of sedentary nature but supervisory in hazardous areas with a job duration of 8 hrs./day in G shift. The study design used was a cross-sectional simple random sampling study done over a period of 12 months in 2013-14. The sample sizes were 923 & 229 respectively. Group 1 consisted of people up to Manager grade & group 2 consisted of people of position of senior manager & above. The study inclusion criteria used all permanent workers working for more than 2 years & willing for check-up. The exclusion criteria included workers not willing to participate. Informed consent was taken from all, and a structured interview was conducted. Clinical check-up was done along with documentation & data analysis was done using MS Excel-2007 software. Non parametric test (Chi square test) for nominal data was used with test of significance & assessment of p-value was done. $p<0.05$ was considered very significant & $p>0.05$ was considered as not significant.

Results

Table 1 summarizes the demographic, socioeconomic status & certain occupational profile data with comparison of the 2 study groups and derivation of p-value. The occupational profile described in the table is mainly related to lifestyle management. Tables 2 & 3 describe comparative profile data related to job profile of the 2 groups & morbidities related to risk factors which are more often infective or inflammatory in etiology. The p-value has been calculated for the 2 groups in the respective tables too. In table1, as per significant p-value (<0.05), the difference in the comparative data was significant for certain factors like addiction, obesity, high stress level, sedentary lifestyle, dyslipidemia & diabetes mellitus. However, for hypertension $p>0.05$ was seen. In tables 2 & 3, significant p-value was perceived while doing data comparison for musculoskeletal complaints/ disorders, allergic/ inflammatory skin disorders viz. dermatitis and respiratory symptoms (cough, phlegm, chest tightness, and breathlessness). For eye complaints (soreness, redness, watering, and itching), the difference was insignificantly noted. Table 4 shows the control measure recommendation prioritization for the 2 groups. Various characteristics of study groups are shown as a bar diagram representation in chart 1 while the epidemiological study of morbidity profile has been depicted in charts 2 & 3.

Study Factors	Group 1	Group 2	*p* value
Average age (years)	40.05 ± 9.54	46.9 ± 6.2	
Literacy level (more than secondary level)	30%	100%	
Work experience (years)	15.3 ± 3.1	6.7 ± 2.4	
Addictions (smoking/ alcohol/ tobacco)	21 ± 5%	9 ± 2.74%	2.15138E-05
Obesity	49 ± 9.4%	65 ± 6.29%	2.1802E-05
High stress levels	5 ± 2.3%	24 ± 7.9%	3.37828E-21
Sedentary lifestyle	6 ± 2.3%	21 ± 5.3%	1.06602E-12
Dyslipidemia	4 ± 2.4%	22 ± 6.97%	2.40885E-20
Hypertension	20 ± 5.5%	23 ± 10.2%	0.352128732
Diabetes mellitus	4 ± 2.2%	8 ± 4.5%	0.011159332

Table 1.Epidemiological study of morbidity profile

Study Factors	Group 1	Group 2	*p* value
Job profile: In hazardous areas & moderate to heavy	75%	25%	
Non hazardous & sedentary	25%	75%	
Musculoskeletal complaints/ disorders	55 ± 9.8%	10 ± 5.3%	7.12688E-35
Allergic/ inflammatory skin disorders viz. dermatitis	14 ± 5.1%	4 ± 2.7%	2.78162E-05

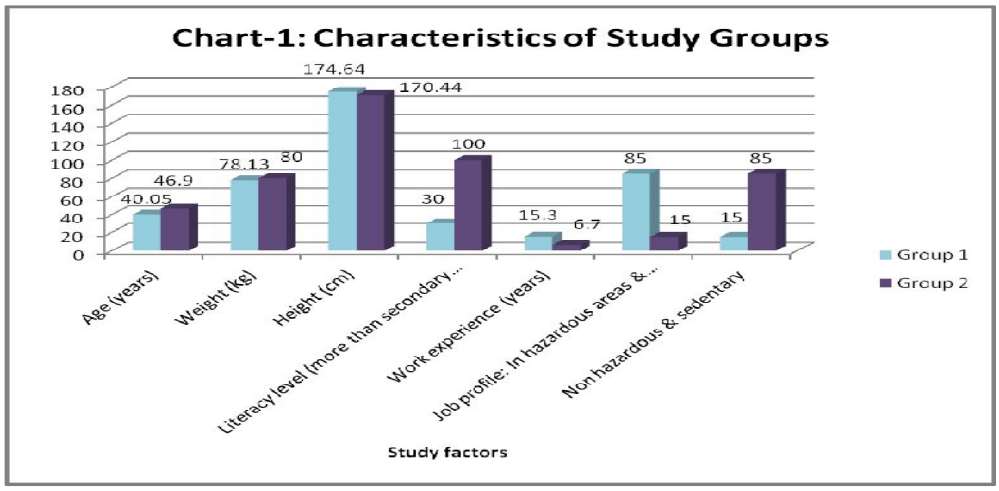
Table 2.Epidemiological study of morbidity profile

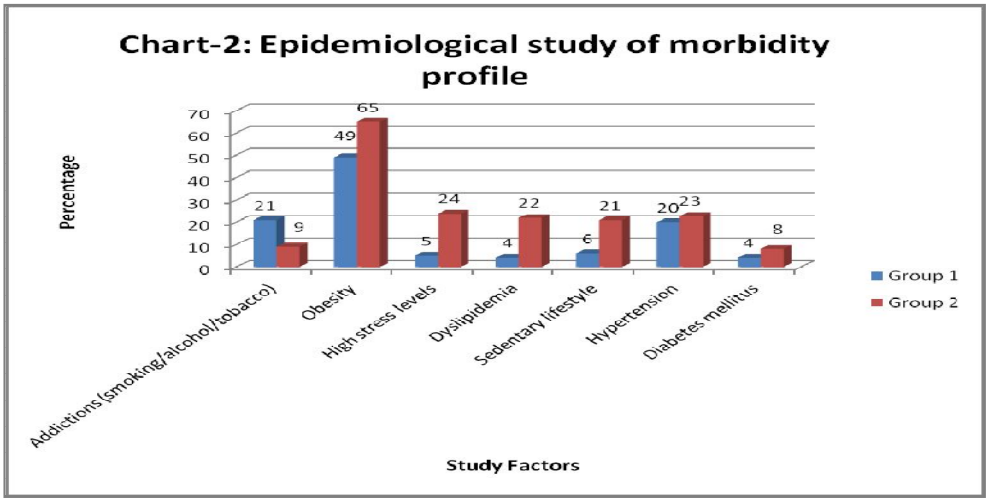
Study Factors	Group 1	Group 2	*p* value
Eye complaints (soreness, redness, watering, itching)	32 ± 9.4%	29 ± 3.6%	0.359177
Respiratory symptoms (cough, phlegm, chest tightness, breathlessness)	21 ± 6%	4 ± 2.5%	1.46252E-09

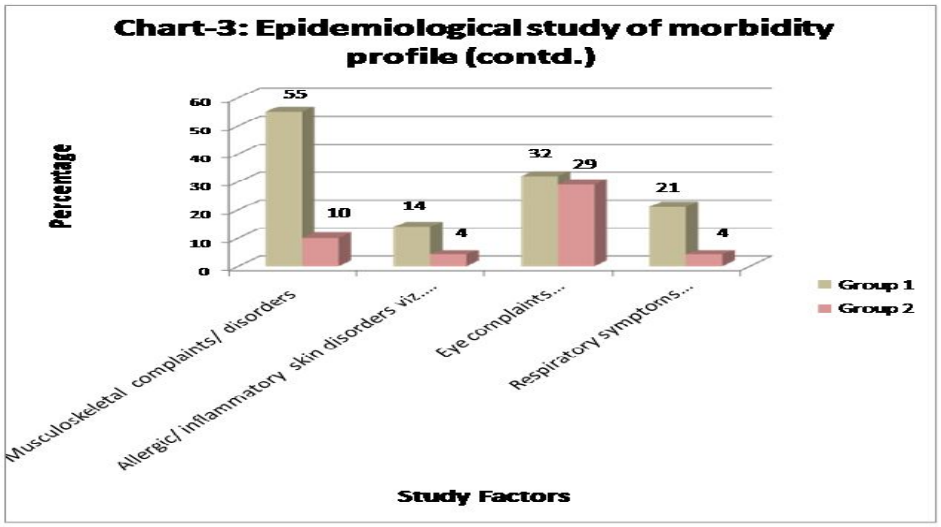
Table 3.Epidemiological study of morbidity profile

Study Group	Control measures recommended & prioritized
Group 1	De- addiction program, Health conservation programs, Ergonomics sessions, Basic occupational health & Safety training programs, Health camps, Periodic medical check- ups
Group 2	Lifestyle modification programs, Yoga, Diet counseling, Specific awareness training programs, Executive health check- ups

Table 4.Control measure recommendation prioritization for 2 groups







Discussion

From this study, it is quite evident that there are certain morbidity factors which are more significant for group 1 & some for group 2. But although, infective and inflammatory etiology are associated with group-1, eye complaints (soreness, redness, watering, and itching) are not very significantly different in the 2 groups; the reason for which, should be the associated computer vision syndrome for group 2. Hypertension as a morbid factor was not significantly different for the 2 study groups, reason for which may be, the stress factor prevalence in both the groups equally.

Conclusion

Morbidities & health risks related to allergic, inflammatory or infective etiology due to physical, chemical or biological hazards were more significant in the first group, but those related to psychosocial hazards viz. occupational stress & lifestyle disorders were predominant in the senior executive group. Thus, control measures aimed at reducing the impact of risk factors, & morbidities are to be precisely defined keeping in mind the distinct differences between the 2 groups & their responsible factors.

Recommendation

De-addiction program, health conservation programs, ergonomics sessions, basic occupational health & safety training programs, health camps, and periodic medical check-ups were recommended for group 1, while lifestyle modification programs, yoga, diet counseling, specific awareness training programs, and executive health check-ups were recommended for group 2.

Acknowledgment

The author wishes to thank the Management & departmental heads, employees & safety department, & own departmental head, & OHS staff.

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An Epidemiology of Reported Needlestick Injuries among Health Care Workers in Sabah Health Government Facilities from 1999 – 2008

J. F. Lim[*], *J. Safree* [*], *A. Richard* [*], *M. Leonard* [*], *G. Andrew* [*], *E. Thomas* [*], *N. Iskandar*[*], *A. Rodney* [*], *J. Adrian* [*], *G. Simson* [*]

Abstract

Introduction: **Health care workers (HCWs) are at a high risk of occupational exposure to blood and body fluids of patients, resulting in possible transmission of blood- borne pathogens such as hepatitis B virus, hepatitis C virus and human immunodeficiency virus. The information on epidemiology of needle stick injury among HCWs is useful in recommending safer work practices.**

Materials and Methods: **All cases of NSI reported within the period 1999 to 2008 from public health care facilities to the Sabah State Health Department were identified and analyzed accordingly. NSI is defined as any injury caused by hollow- bore needles or suture needles regardless of whether they are contaminated by blood/ body fluids or not. Health care worker is defined as Ministry of Health staff, trainees and health facilities support service workers. The software used for data analysis was SPSS version 15.0.**

Results: **A total of 378 cases of NSI were notified after considering NSI definition. Majority of HCWs involved in NSI were from the younger age group (20-29 years old, 61.9%), female gender (76.1%), Kadazan Dusun Murut ethnicity (33.5%), nurses (41.1%) and those who had worked for more than one year (66.6%). The place of occurrence was mostly in Kota Kinabalu district (25.3%), hospital setting (90.5%) and in- patient wards (60.8%). Of this in– patient ward, 64.5% was in medical and surgical wards. About 60% of NSI occurred during the morning shift (7am-2pm) and mostly among the nurses (54.0%). The duration of seeking treatment from injury was mostly within 24 hours (83.3%). The mechanism of accident happens while performing disposal activity (35.3%) and followed by any clinical procedure involving needle (31.1%). Other mechanism of accident was recapping (17.6%) and jolted/ accident (16.1%). Of all the reported NSI, 53.1% involved intravenous procedure. The body part involved in injury was mostly the right finger (57.1%). Almost all the needles were contaminated with blood or body fluid (90.0%). Post injury management, 73.5% were given first aid treatment and 99.4% were not awarded any medical leave. Existing control measures for NSI were standard operating procedure (SOP) (47.9%), training (36.9%) and PPE (10.5%).**

Conclusion: **NSI commonly occurred among nurses, those in the younger age group and those working in medical/ surgical ward. Working during morning shift seems to predispose nurses to NSI. Since most NSI occurred during intravenous procedure and disposal activity, safer work practices should be emphasized to minimize these injuries. Further study in hospital and primary health care setting will determine the details of contributing factors of NSI.**

Keywords: **Needle Stick Injuries, Health Care Workers.**

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Introduction

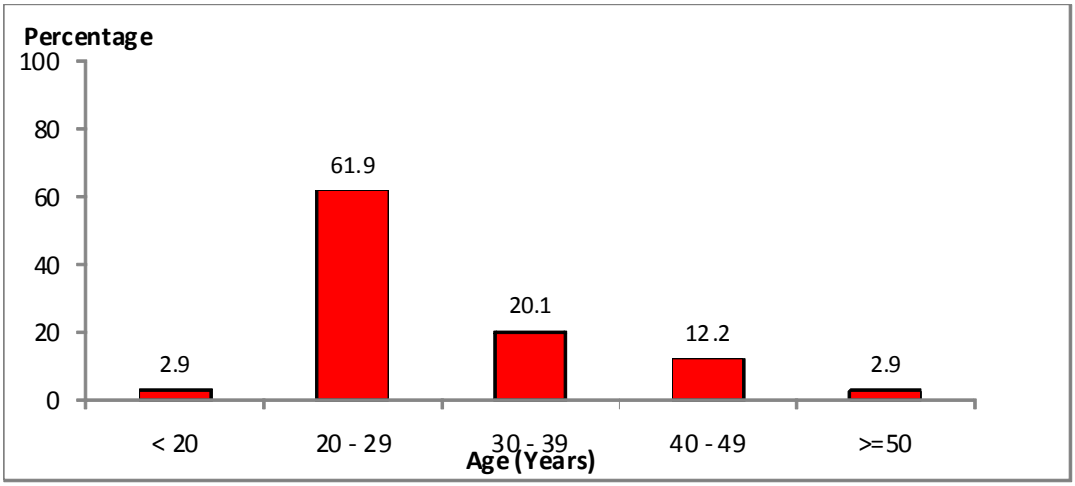
Health care workers (HCWs) are at a high risk of occupational exposure to blood and body fluids of patients, resulting in possible transmission of blood- borne pathogens such as hepatitis B virus, hepatitis C virus and human immunodeficiency virus. At present, there being no cure for the mentioned diseases, suffering and ultimately death will be the price to pay for their ignorance.[1] In Malaysia, data collected by Occupational Health Unit, Ministry of Health from 1998-2005, showed needle stick injury (NSI) was the major cause of injuries among HCW with a total of 74.9% of all injuries notified. In Sabah, a similar trend was observed where NSI was the commonest injury reported among HCWs in public health care facilities. Therefore, the information on epidemiology of needle stick injury among HCWs is useful in recommending safer work practices.

Materials and Methods

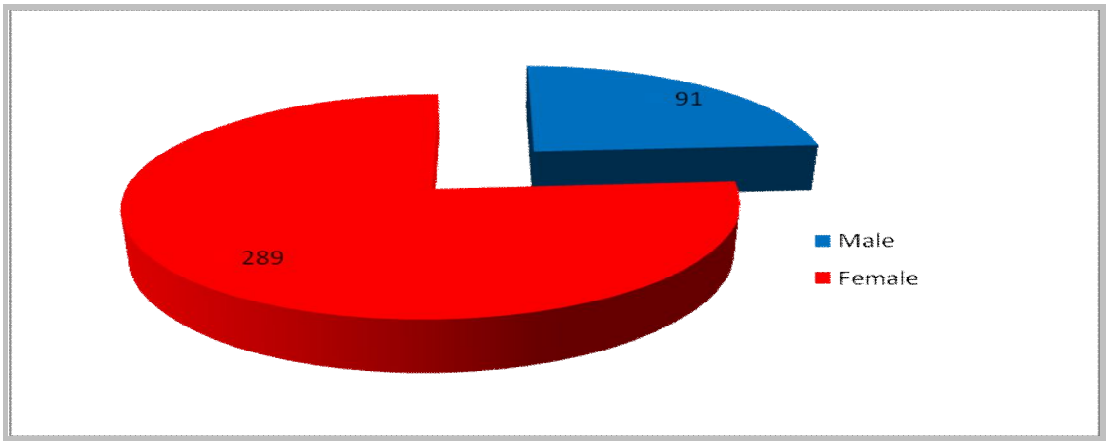
All cases of NSI reported within the period 1999 to 2008 from public health care facilities to the Sabah State Health Department were identified and analyzed accordingly. As required by the Ministry of Health, all injuries occurring among HCWs during work must be notified to the State Occupational Health Unit within 2 weeks using the Workers Environmental Health Unit (WEHU A1 & A2) form. All the forms were compiled by years of notification. The data on NSI from these forms was entered into a computer database. NSI are injuries caused by suture needle and hollow bore needle and does not include injuries via scalpel blades, lancet and glass pieces or by other means regardless of whether they are contaminated by blood/ body fluids or not.[12] Health care worker is defined as Ministry of Health staff, trainees and health facilities support service workers. SPSS version 15.0 was the software used for data analysis.

Results

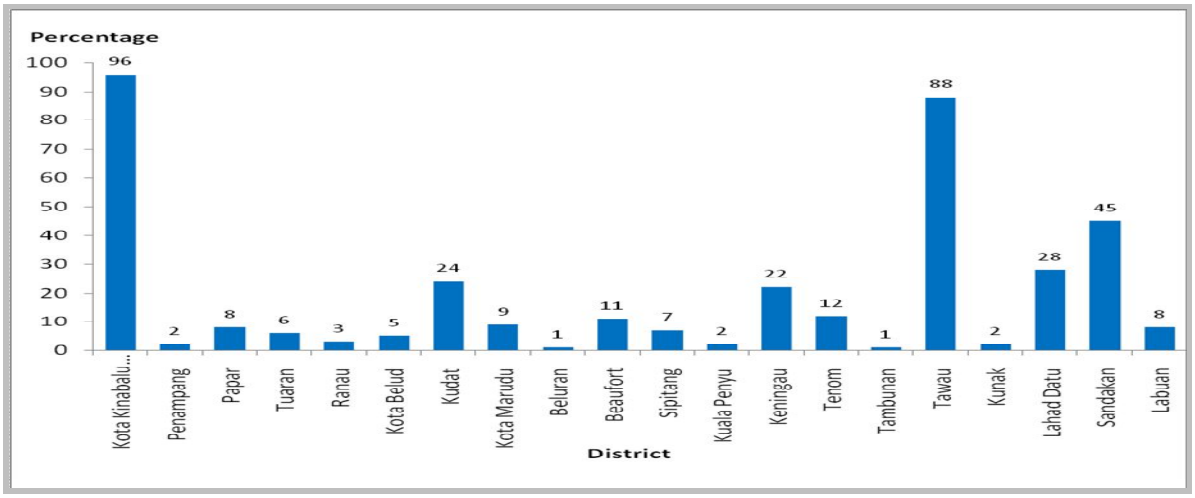
A total of 380 cases were analyzed based on the definition of NSI.



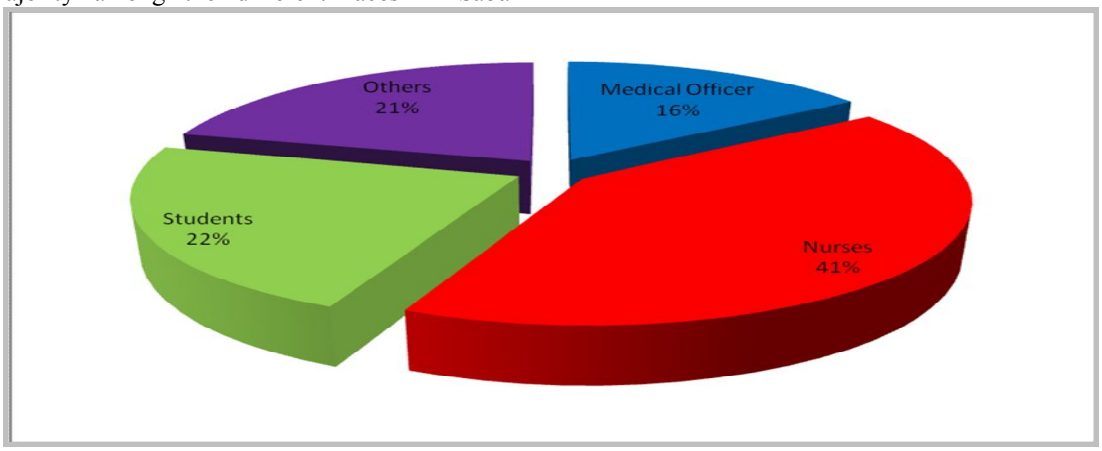
The majority of HCWs involved in NSI were from the younger age group (20-29 years old, 61.9%).



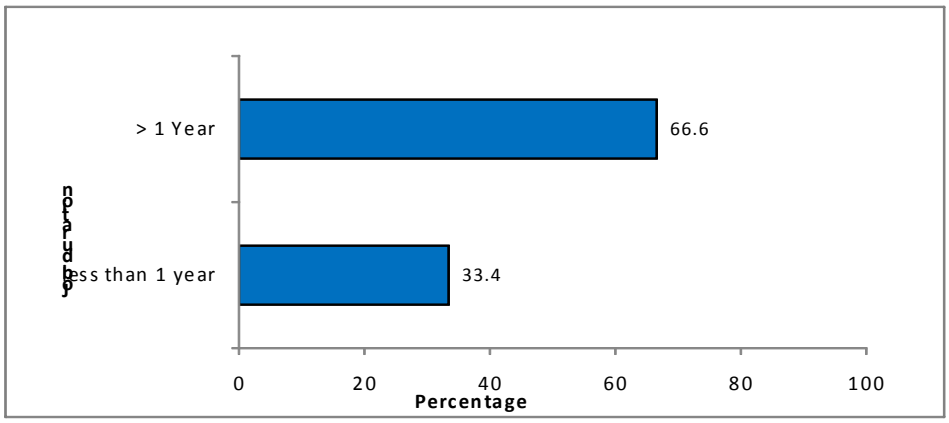
The majority of those injured were of female gender (76.1%) taking into account maximum people who take admission into nursing colleges are females.



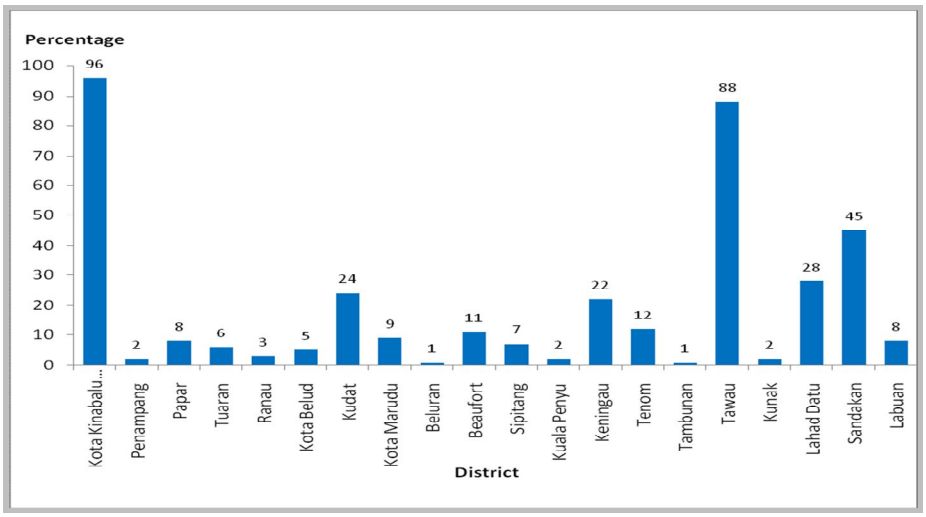
Kadazan Dusun Murut (KDM) ethnicity forms the majority among the different races in Sabah (33.5%) and Malays at 20%.



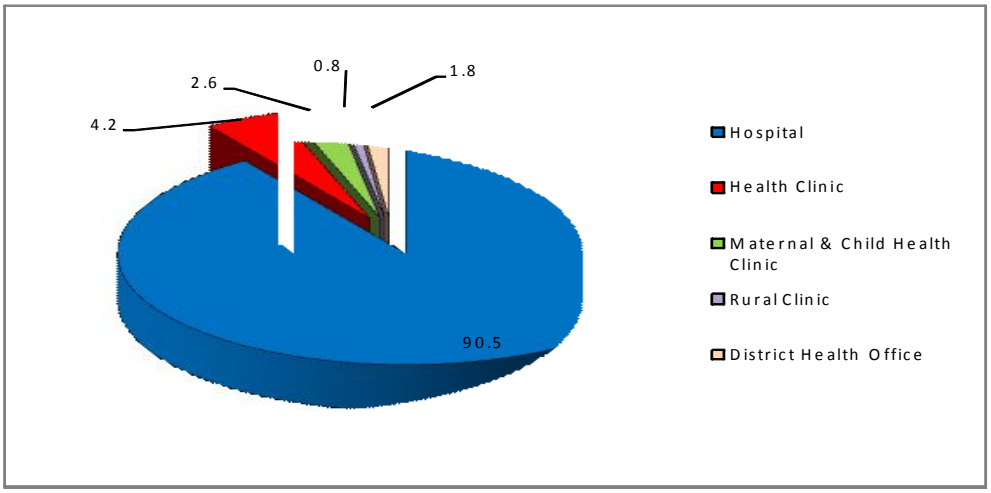
Nurses (41.1%) are the main group frequently injured followed by students (22%) and doctors (16%).



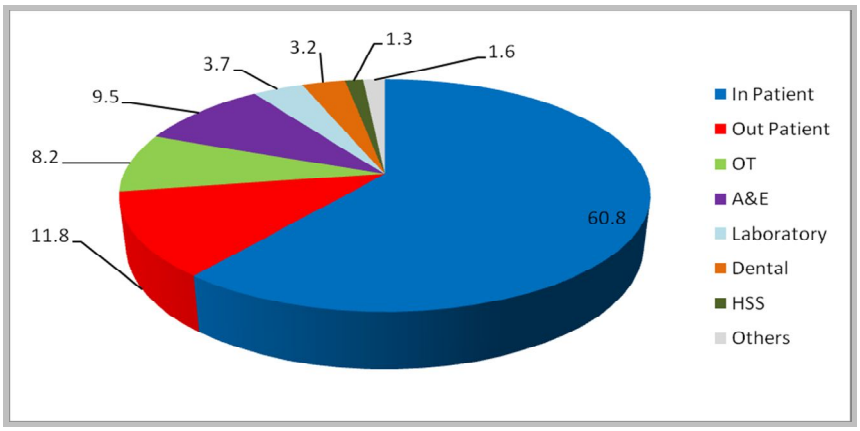
One third (33%) of those injured worked for less than a year while 67% had worked for more than a year.



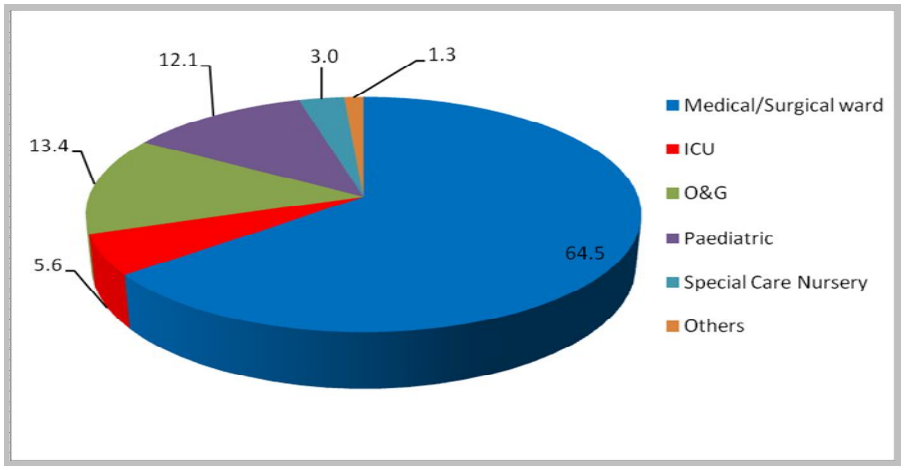
The majority of reported NSI was received from Kota Kinabalu district (25.3%) while Tawau had 23% followed by Sandakan (12%). These are the major towns in Sabah and they all have a general hospital and numerous other health facilities.



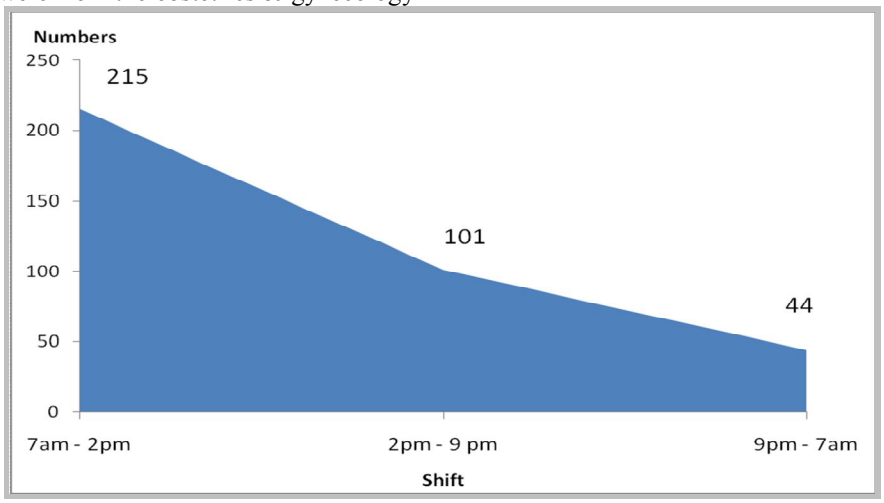
90.5% of the total NSI cases were received from the various hospitals. The rest of the cases was reported from the other health facilities like the district health clinic (4.2%) and maternal & child health clinic (2.6%).



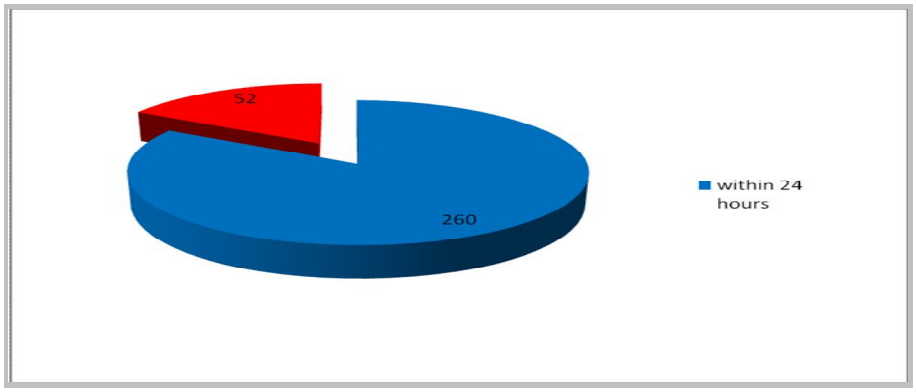
Injuries frequently occur in the in- patient wards (61%) while 12% were from the out- patient unit and the rest from the accident & emergency unit (10%).



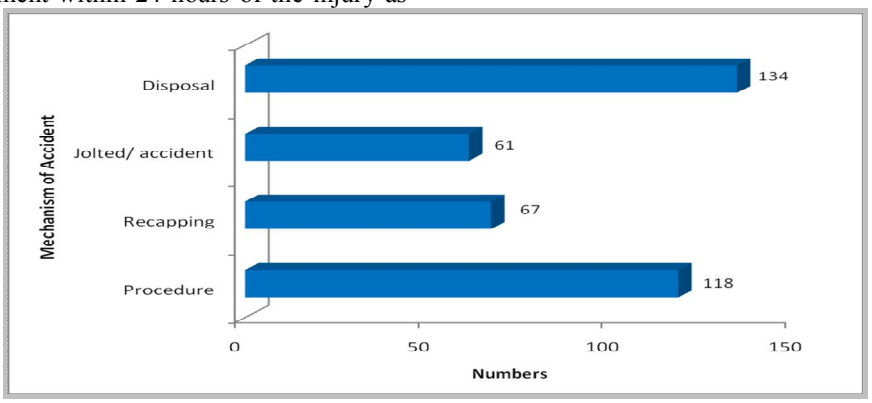
Of the cases from the in- patient wards, a total of 65% were from the medical and surgical wards, while 13% were from the obstetrics & gynecology unit. 12% of the cases of NSI were from the pediatric ward.



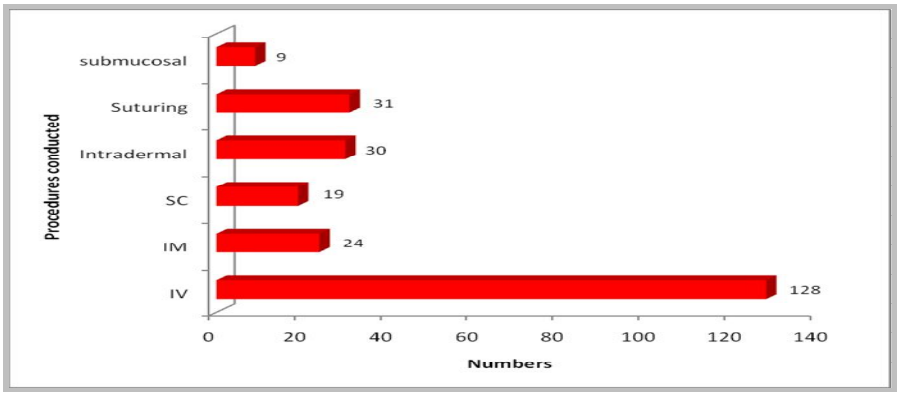
The morning shift (7am-2pm) recorded 60% of the NSI cases and involved mostly nurses (54.0%). Only 12% of the cases occurred in the night shift (9pm-7am).



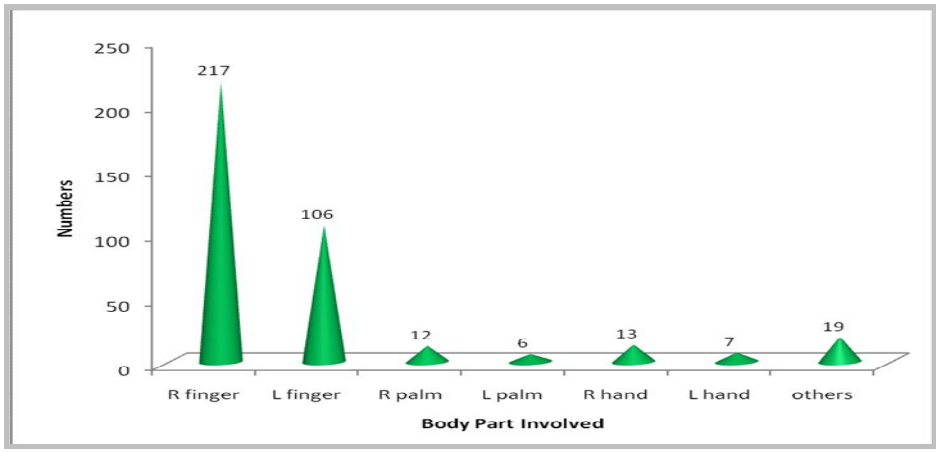
The majority (83%) of those who were injured sought treatment within 24 hours of the injury as compared to only 17% who were treated later.



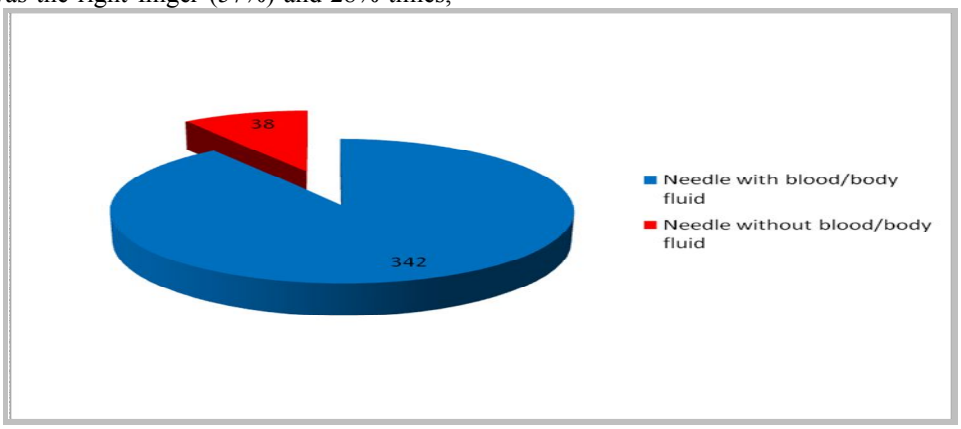
The mechanism of accident for NSI was while performing disposal activity (35%) and was followed by clinical procedures involving the use of needle (31%). Other mechanism of injury was due to recapping (17.6%) and jolted/ accident (16.1%).



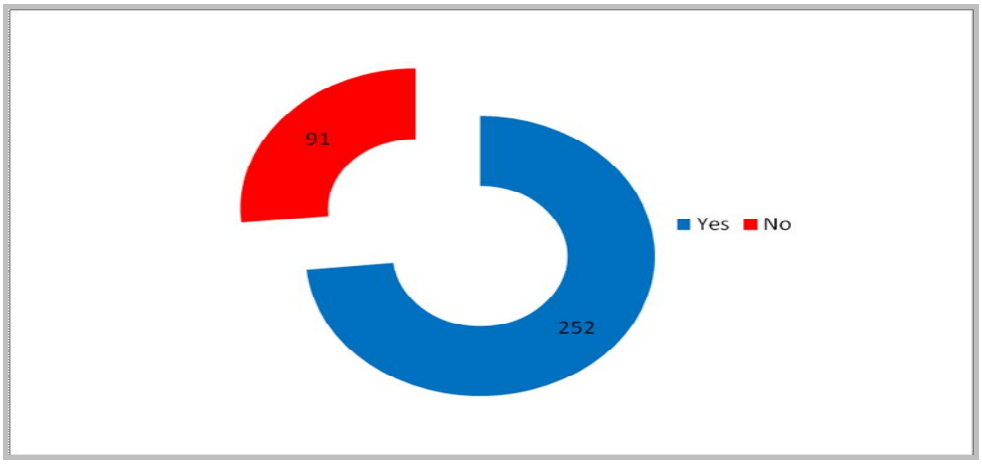
Of all the reported NSI, 53% occurred during intravenous procedures, 13% while suturing and 12% due to intra dermal injections. A total of 83% was due to the act of giving injections.



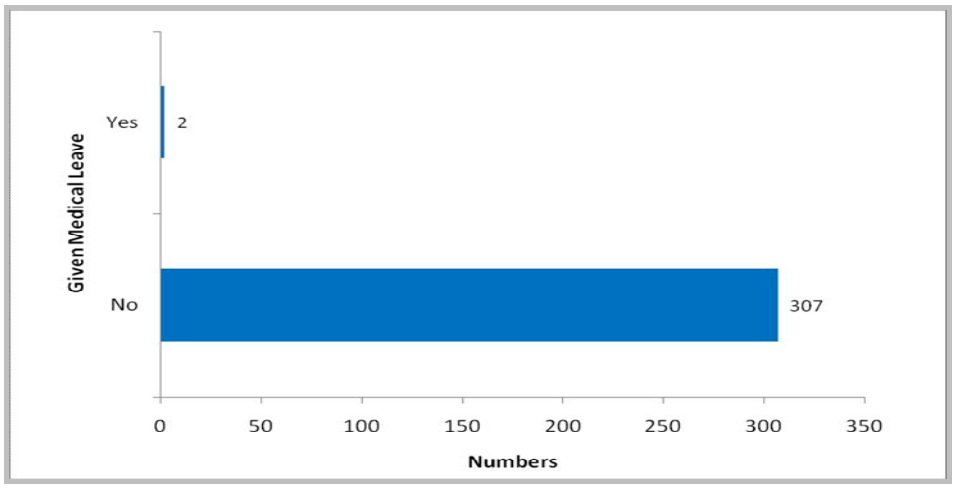
The body part which was most involved in the injury was the right finger (57%) and 28% times, injury occurred in the left finger.



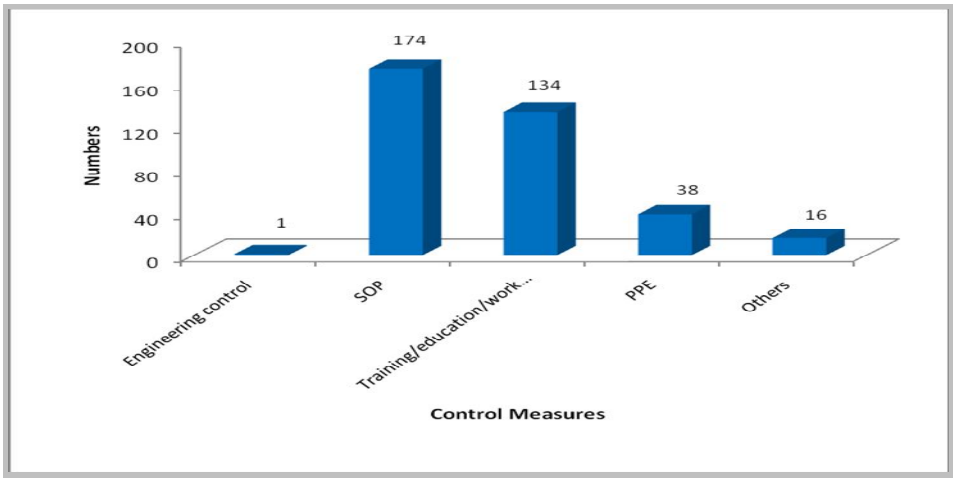
90% of the needles were contaminated with blood and/ or body fluids, while in 10% cases, the needle was clean.



In post injury management, 73% were given first aid treatment and 27% did not get first aid immediately after the injury.



99% were not given medical leave for the injury.



48% had a standard operating procedure (SOP) as control measure for NSI, while training (36.9%) and PPE (10.5%) were the other measures used to minimize the risk of NSI in the workplace.

Discussion

Workers in the health care are at risk of occupational exposure to blood borne pathogens including human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and other potentially infectious agents. The primary route of occupational exposure to blood/ body fluids borne pathogens is through accidental injury while managing patients. The group of HCWs who are most exposed are the nursing staff followed by other HCWs who use and manipulate sharps. From the data analyzed, NSI was mostly seen in the younger age group. This age group was probably assigned to do the needle- related task and they form the backbone of the facility workforce. Most nurses also graduate in this age group from the nursing colleges and will be posted to health facilities directly upon their graduation. A study in a Greek hospital reported that the highest rate of incidence per year was between 21-30 years old (5.6%) and the majority of NSI was among female HCWs and nurses. This was due to the nature of the job mostly done by female HCWs and nurses 2.8% and 3.2% respectively.[3] NSI was noted to be higher among HCWs who had worked for more than a year. Therefore, NSI is more likely to happen among those who are young and had worked for more than a year. This result may be due to the HCWs' inexperience, lack of supervision or the burden of work. In one study, it was shown that junior staff was at a higher risk of NSI.[2] In a similar study in Singapore, it was noted that junior staff and students are more prone to needle stick injuries as compared to senior staff.[8] In Sabah, most of the cases were in Kota Kinabalu district probably because of the number of the health facilities in place as compared to other districts. It may also be due to awareness in the notification of NSI. NSI mostly occurs in hospital

setting, in- patient ward and medical/ surgical wards. Studies by Shanks & Al-Kalai in Saudi Arabia also revealed similar finding.[4] They postulated that probably a difficult practical procedure was performed by these HCWs. NSI was found to be common during morning shift. Most HCWs work during that period as compared to afternoon and night shift. Study by Pournaras et al. revealed most NSI occurred in the morning shift (7am – 3 pm), taking into consideration the number of HCWs is about twice that of each of two other shifts.[3] In NSI management, almost all NSI cases sought treatment within 24 hours. This means that HCWs are aware of the danger of NSI and its consequence. This was also shown by Chia HP et al. where he noted that 35% of HCWs reported at least one needle stick injury and the awareness of risk of contracting diseases from needle stick injuries.[7] The mechanism of accidents leading to NSI was mostly due to disposal activity and assigned procedures. A study in Lebanon revealed that the incidents were attributed to procedural intervention (29%), disposal (18%) and recapping (11%).[6] Chia HP et al. also noted in their study that the commonest mechanism of injury due to needle stick occurred during procedures and recapping.[7,8] Recapping of needles by hand was found to be as high as 54%. Weatherly KS et al. in their study also observed that nursing staff comprises of health care workers in most institutions and therefore is at a higher risk and injury usually occurs during procedures.[5] In this analysis, the most common procedure resulting in injury was intravenous procedures like branula insertion. Control measures like health education and training should be emphasized in this particular procedure and for all high risk maneuvers. Wooley PD et al. (1991) recommended in their study, that correct techniques of venesection with emphasis on either avoiding recapping needles or recapping safely is essential early in the medical curriculum and needs regular repetition to reduce the incidence of NSI. In this study, the right finger was mostly injured even though a study by Shanks & Al-Kalai[4] revealed that the commonest injured area (46%) was the palmar surface of the distal forefinger of the non- dominant hand. This study assumed that the injury happened while disposing the needle with right finger into the sharp bins and getting the injury. Contaminated needles with blood or body fluid (BBF) will increase the risk of blood borne diseases. Post- injury management by receiving early first aid treatment indirectly will reduce the BBF risk. Existing control measures were inadequately implemented. Under reporting of NSI also cannot be avoided.

Conclusion

NSI commonly occurred among nurses, those in the younger age group and those working in medical/ surgical ward. Work during morning shift seems to predispose HCWs to NSI. Since most NSI occurred during intravenous procedure and disposal activity, safer work practices should be emphasized to minimize these injuries. Health education and training would be able to increase the awareness and encourage safe work practices among health care workers. This was shown in a study by Froom P et al. who noted that a short lecture on the subject among a group of medical students was important in decreasing the risk of injury from needle stick.[9] From the study, it was noted that 98% of the participants had not attended any formal training on the subject. Jones DB in a similar study also noted that 74% of the respondents had not been adequately taught on the subject.[10] The study has shown the importance of health education and training in increasing the knowledge and bringing about attitude changes in the way a work is carried out to avoid needle stick injury. Further study in hospital and primary health care setting will determine the details of factors contributing to NSI.

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Changes in Europe Specialist Training for Occupational Medicine in Norway– Status and Trends

Tor Erik Danielsen[*]

Specialist Training

What is going on in Norway?

There are 288 approved specialists in occupational medicine in Norway. However, 50% of them are retired or not active in the field.

The number of doctors in occupational health services (OHS) in Norway has decreased from 500 in 2000 to 280 in 2012. These numbers have both been converted to full- time positions. Now, 53 % of the workforce is covered by OHS. This coverage has been quite stable during recent years.

There is a quite strong trend in OHS from using employed personnel to contract relationships with external services, so OHS are commonly out-sourced.

In the last five years, there has been an increased capacity in the five regional hospital departments. So, overall, current specialist candidates in occupational medicine have increased.

Undergraduate Training

The curriculum in Occupational Medicine for medical students involves 50-70 hours of teaching in occupational medicine in two of the medical schools in Norway (Trondheim and Bergen). The two other schools in Oslo and Tromsø, as a contrast, only have 4-10 hours of teaching in our field.

The overall capacity in Norwegian Medical Schools has more than doubled from 1990 to 2010 (310 to 650 candidates/ year).

The number of Norwegian students in foreign medical schools has increased even more from 550 in 1994 to 2750 in 2010, and also to build capacity, 16 % of doctors in Norway have foreign origin (3650).

Current Status for Specialist Training

The National Medical Association facilitates specialist training in Norway. Currently, there are 44 recognised specialities in Norway. Occupational medicine is regarded as one of the three specialities under primary health. For each specialty, there is a specialty committee who is responsible for the content of the training and for the accreditation of hospitals for graduate medical education. The Norwegian Directorate of Health is granting approvals for new specialists. The Medical Societies work closely with the institutions involved.

Postgraduate training in occupational medicine obviously has specific requirements.

The requirements for residency are five full years with at least one year as a company doctor (OHS) and one year at a yearly approved educational institution in occupational medicine restricted to five hospitals and the National Institute. The positions must be minimum 50% of full- time.

Up to one year may be replaced by research, residency in the relevant specialties / disciplines, work in health management, or in general practice.

Additionally, there is a supervision program over two years and 120 hours (twenty meetings of six hours). This program is based on a general practice model to improve practical skills. This program includes a supervised project paper.

Additionally, the specialist candidates must complete formal courses in eleven specified subjects over 300 hours.

The subjects are: law, leadership and management, research methods, environmental medicine, work-related muscular / skeletal problems, psychosocial and organizational factors in the workplace, psychosomatics, toxicology, lung diseases, dermatology, and neurology.

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Apart from this, the candidates need 55hours of optional courses with a broad spectrum of subjects.

After the candidates have completed the formal program, there is no final exam.

The candidate forwards an application for approval with some additional documentation of skills, and attestation forms for specified procedures and tasks. Currently, there is no system for recertification for occupational medicine.

Current Activities in Norway

The Norwegian Board for Occupational Medicine is working for academic positions at the medical schools for the remaining hospital departments and at the National Institute. The potential shifts of tasks for doctors in OHS are also monitored. Also, there is work going on for an introduction of mentorship for young doctors in the field of occupational medicine.

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Disaster Relief Workers: Health Issues

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Abstract

Introduction: **Disaster is defined as any occurrence that causes damage, ecological disruption, loss of human life or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area. Internationally, major disasters occur frequently, but for one country, they are unusual events. It causes severe health damage to that country. In this scenario, our rescue teams/ relief workers risk their own lives to save the life of others.**

Methods: **The concerned topic was searched on internet in different databases with abstract or full free text available in English in previous five years.**

Results: **This group is more vulnerable than general population to various accidents even death in relief process and also health problems such as post traumatic stress disorder, mental health risks, heat disorder, radiation exposure, respiratory problems, skin and mucous membrane problems, digestive problems, eye irritation and fatigue etc. In developed countries, their problems are dealt with great zeal, but unfortunately, in our country, we fail to address the health issue of these workers in spite of having the most important role in disaster management by providing physical and rehabilitative services to survivors. It has been proven that work output of these workers is enhanced if their health issues are taken care of properly.**

Discussion: **We want to acknowledge the health concerns of rescue teams with possible solutions.**

Keywords*:* **Disaster, rescue/relief workers, post traumatic disorder, rehabilitation.**

Introduction

India is vulnerable in varying degrees to a larger number of disasters. More than 58.6% of landmass is prone to earthquakes of moderate to very high intensity, over 40 million hectares (12%) of its land is prone to floods and river erosion, close to 5700 kms out of the 7516 kms long coastline is prone to cyclones and tsunamis, 68% of its cultivable area is vulnerable to droughts, and its hilly areas are at risk from landslides and avalanches. Moreover, India is also vulnerable to chemical, biological, radiological and nuclear (CBRN) emergencies, and other manmade disasters.[1]

Disaster is defined as "any occurrence that causes damage, ecological disruption, loss of human life or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area".[2] As we can see from the definition, that response from outside is required, so here comes the role of disaster relief/ rescue workers who work day and night neglecting their own health to provide rescue services to the disaster affected population. They include National and State disaster response forces (NDRF, SDRF), Military forces, Paramilitary forces, Disaster medical assistance teams, Red Cross volunteers, and Nurses or local volunteers. Internationally, major disasters occur frequently but for one country they

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are unusual events. All residents of that country in their own capabilities try to help the victims. Government of that country also utilizes its whole manpower to deal with the disastrous situation so as to save the life of its citizens, but in the midst of all these, we all miss one vulnerable group which also requires attention and that is disaster relief/ rescue workers. We in this article want to address the reasons for their vulnerability, their health issues, importance of addressing them and ways to tackle them.

PubMed and Google scholar were consulted. The search only included articles published in English in previous 5 years. Key words involved were disaster, rescue/ relief workers, post traumatic disorder, rehabilitation etc. Articles were selected by reading titles and abstracts.

Why Vulnerable?

Disaster relief workers are vulnerable to different health problems because of many reasons. They deal with the disastrous situations very often where their occupational routine includes the provision of emergency medical assistance to severely injured people, searching for and recovering victims from life threatening situations which expose them to dust, chemicals, toxic fumes, radiations etc. They suffer greatest exposure to the injured, the dying and the dead, human remains (many from their own colleagues) and potential life threatening situations.[3] They work day and night for long hours without any rest.[4] Their job requires intense emotional demands because they have to deal with the bereaved and angry family members. Another reason of their vulnerability is the lack of training and medical care. An Australian study reported that only 27% of rescue workers felt that existing training programs had adequately prepared them for deployment, only 42% and 15% received medical checkup and psychological assessment prior to deployment respectively.[5,6] Along with these, extreme weather conditions, hunger, sleep deprivation, and fatigue not only reduce their functional capacity but also make them susceptible to various health problems.

Health Problems among Disaster Relief Workers

a) During disaster: They suffer from skin and mucous membrane problems (50%), respiratory symptoms (38%), digestive (29%) and nervous symptoms (22%).[7] On 11th March, 2011, the Great East Japan earthquake and Tsunami that followed caused severe damage along the coastline and damage to the Fukushima Daiichi nuclear power plant, which resulted in radiation exposure to the relief workers[8] and heat disorders which usually occur in 45-60 years of age occurred at the age of 30-40 years in them[9]. Three studies quoted that workers involved in rescue, recovery and cleanup operations during World Trade Centre collapse were exposed to large fumes of dust, pulverized materials, and products of combustion resulting in various respiratory symptoms like asthma (27.6%), sinusitis (42.3%) and decline in lung functions.[10,11,12] The Carmel cohort study reported 77% eye irritation, 71% fatigue, 60% cough, 53% headache, 47% runny nose,27% shortness of breath, 22% wheezing and 19% chest pain.[4] Along with these health issues, their occupation endangers their lives. 44 rescue workers lost their lives in the Carmel forest fire in Israel.[4]

b) After coming back: Most important health issue post deployment is the mental health, out of which post traumatic stress disorder (up to 40%) is the commonest, followed by depression, anxiety and panic disorder.[3,7,12-21] One study pooled the worldwide current prevalence of post traumatic stress disorder among all types of disaster rescue workers which is much higher than the general population and it is reported to be 10%.[13] Rescue, recovery, rehabilitative and restorative work makes them stressful and that leads to mental health issues in them. Fatigue is also very common post deployment.

Situation of Rescue Workers in India

Nature causes havoc frequently in India resulting in a long list of large scale disasters like J & K floods 2014, Uttarakhand floods 2013, Kosi floods 2008, Gujarat earthquake 2001 etc. Our rescue workers are always in front to save people as reported in Times of India on 25th October 2014- "Between life and death they extend a helping hand". There are various studies on victims of disasters in India and they are completely taken care of, but rescue workers who are our life saviors are not given any importance, as we are not able to find any study on disaster relief workers. In developed countries, their problems are dealt with great zeal, but unfortunately, in our country, we fail to address the health issues of these workers in spite of having the most important role in disaster management by providing physical and rehabilitative services to the survivors. Guidelines are formed by NDMA[1] for both natural and manmade disasters as well as for training of workers, but no study exists in India to tell about the implementation status of these guidelines and to what level workers are satisfied

with their training. NDRF consists of 10 battalions of Central Armed Police Force. Each battalion provides 18 self contained specialist search and rescue teams of 45 personnel each, including engineers, technicians, electricians, dog squads, medics and paramedics accounting for a total of 8100. But as per NDMA, only 6021 workers have received training for natural disasters, 3456 workers have acquired CBRN training, 4200 are heli- borne trained, 5720 are trained for water rescue and 61 are foreign trained.[1] There is no provision of post deployment health camps for rescue workers, unlike United States, where their health issues are dealt with there and then only. NDMA has guidelines and indicators of psychosocial support and mental health services (PSSMHS) for disasters but only with the objective of improved psychosocial well being of affected population, and not for disaster relief workers.[1]

Ways to Tackle their Health Issues[3,5,6,14,22-26]

As first responders, relief personnel even without prior disaster education, proceed to the area of disaster and may get injured. So networking, education and disaster awareness should be advocated among these workers. Attention should be given to their basic needs like food, shelter, hygiene etc. There should be medical and psychological support for team members. Another issue to handle is communication with their family members because they also suffer from work–family conflict which leads to stress. Training should include the practical aspects of deployment. Organizational support, pre & post deployment medical checkup, psychological counseling after coming back, good team functioning are recognized to be important factors for health of these workers as they give them strength to cope up with the situations and they can resume their work early with good functional output.

Conclusion

Health support for disaster victims is of highest priority, however, the health of relief personnel who act as frontline workers has often been neglected. Now it's high time to attract attention towards the health issues of rescue workers as they are our life saviors.

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Health Status among Biscuit Factory Workers in Greater Noida, Uttar Pradesh: A Cross Sectional Study

Pinki Roy[*], *Rupali Roy*[**], *Sidhyartha Mukherjee*[***]

Abstract

Background: **Today the trend in all countries is towards industrialization. As industries are developing, occupational diseases are becoming more prominent.**

Purpose: **The purpose of this study is to see the effect of different environmental hazards like sugar dust, flour dust, vibratory sieves, effect of ammonia, skin diseases of oven operators, cuts and burns at mixing section, effect of noises at mixers, compressors, generators, blowers of ovens etc. on the health status of the biscuit factory workers.**

Objective of the Study: **To study the socio-demographic and health profile of the employees and to find the association between the various hazards and risk factors.**

Materials and Methods: **A cross sectional study was done among the factory workers of Anmol Biscuit factory, Greater Noida, Uttar Pradesh. A sample size of 250 was taken by simple randomization. Duration of study was for one month from 1st June to 1st July, 2014. Pre validated semi open ended questionnaire was used for data collection. The performa included information about socio demographic profile, present health status, nutritional status, general physical examination, anthropometric measurements, and systematic examination.**

Results: **Among all the occupational hazards, thermal hazard was the most common (20%) and association between thermal hazards and use of protective equipment is statistically significant (Chi-square 0.029, P value<0.05, at 1 d.f.). The associations between duration of the employment and types of hazards have found to be statistically insignificant (P value>0.05 at 2 d.f.).**

Conclusion: **Most of the biscuit factory authorities do not invest much in the safety measures and protective equipment for their workers. These short term benefits might prove counterproductive in a long term.**

Keywords: **occupational environment, hazard, protective equipment.**

Introduction

As defined by the World Health Organization (WHO): "occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards".[1]

Occupational health is a multidisciplinary field of healthcare concerned with enabling an individual to undertake his occupation, in the way that causes least harm to his health. Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the

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protection of workers in their employment from risks resulting from factors adverse to health.[2,3]

Various types of hazards are present inside the biscuit factory, like thermal hazards because of presence of ovens, and chemical hazards because of the chemicals used in this factory (e.g.: ammonia),[4] Again, airborne flour dust may cause rhinitis, throat disorders, bronchial asthma (baker's asthma) and eye diseases; sugar dust may cause dental caries.[5,6,7]

The purpose of this study is to see the effect of different environmental hazards like sugar dust, flour dust, vibratory sieves, effect of ammonia, skin diseases of oven operators, cuts and burns at mixing section, effect of noises at mixers, compressors, generators, blowers of ovens etc. on the health status of the biscuit factory workers.[8,9,10]

Aim and objectives of this study were:

1. To study the socio-demographic and health profile of the employees.

2. To find the association between the various hazards and risk factors.

Through medical examination of the employees, association between various hazards and risk factors has been established. This study helped in studying the socio demographic and health profile of the employees.

Material and Methods

A cross sectional study was done among the factory workers of Anmol Biscuit factory, Greater Noida, Uttar Pradesh. Total number of employees in this factory is 450. We have tried to include about 50% of those employees in our study. Total sample size in this study was 250. Before conducting this study, we had taken written permission from the authorized concerned person. Again individual written consent was taken from all the study subjects of the biscuit factory. Data collection for the study was done from 1st June to 1st July, 2014. Pre validated, semi open ended questionnaire was used for data collection. The performa included information about socio demographic profile, present health status, nutritional status, general physical examination, anthropometric measurements and systematic examination. Doctor of Sharda Medical College is doing examination of an employee of the biscuit factory .(fig. 3) We also tried to find out if there were any effects of thermal, chemical hazards, effect of fumes etc. The data was entered in Microsoft Excel and analyzed using SPSS version 17.0.

Results and Discussion

All of the study population in this study was male, and most of them (54%) had completed their higher secondary education and intermediate education. Types of workers are presented in fig. 1. In this study, 68% people had no history of addiction, whereas the remaining 32% were addicted either to smoking, tobacco or alcohol. Types of addiction are depicted in fig. 2. Among all the occupational hazards, thermal hazard was the most common (20%) and the association between thermal hazards and use of protective equipment is statistically significant (Chi-square 0.029, P value<0.05, at 1 d.f.). In systematic examination, only one employee had hypertension and 3% employees had dermatological problems. Regular health checkup was done only among 25% employees. Pre placement medical checkup was missing. The associations between duration of the employment and different type of hazards found statistically insignificant (Chi-square 2.11, P value>0.05, at 2 d.f.).

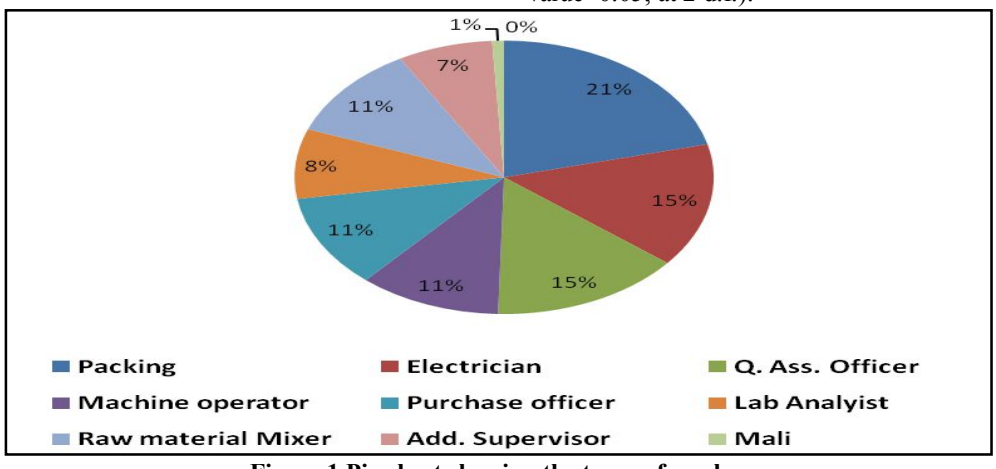

Figure 1.Pie chart showing the types of worker

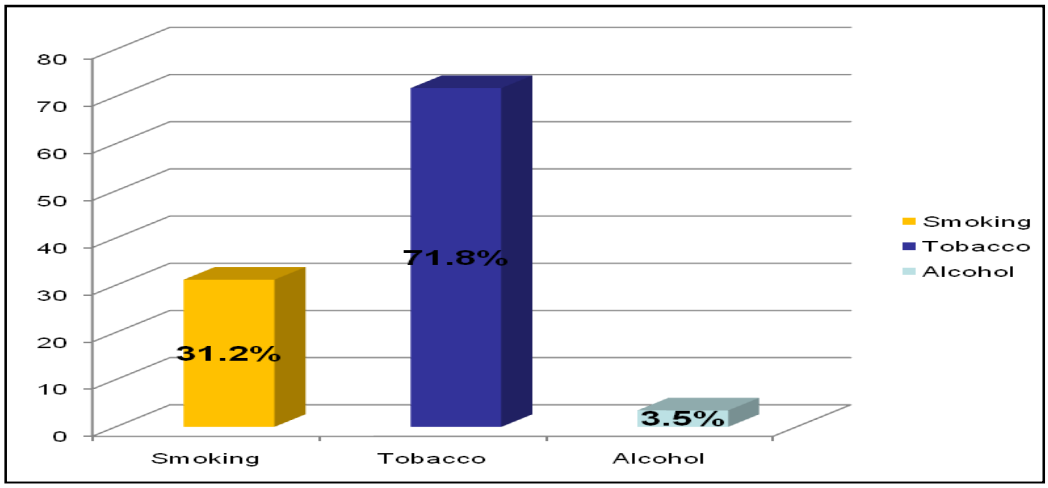

Figure 2.Bar chart showing the types of addiction

It has been observed that employees at different work stations are faced with different types of hazards because the outputs produced are different at each stage of development. A similar type of study was conducted in a food industry, Zimbabwe to see the impact of occupational health and safety on worker productivity, where it was observed that thermal hazards were the same as in biscuit factories. They also stand with the same conclusions.

Conclusions

Most of the biscuit factory authorities do not invest much in the safety measures and protective equipment for their workers. These short term benefits may be proven counterproductive in a long term.

Proper safety measures should be adopted by using Food Safety Programs like ISO2200. ISO14000, OHSAS18000 for safety of its personnel and property.

We will be doing more studies in different factories in Greater Noida and will focus more on the health hazards due to environmental factors at the work place. Our next study will be in the steel industry in Greater Noida, Uttar Pradesh.

Acknowledgement

We are highly thankful to the authority of the Anmol Biscuit Factory, Greater Noida for their support to conduct this study and to the factory employees who have been very co-operative during the entire study.

Figure 3.Doctor of SMS&R, Sharda University examining the biscuit factory employee

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Innovative Practices in Occupational Health at a Large Scale Petrochemical Industry – Task Based Health Risk Assessment

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Abstract

Introduction: **All the medical examinations for the workers in an industry are based on prevailing occupational health stressors at work place and their predictive illnesses. Task Based Health Risk Assessment (TBHRA) is an innovation in occupational health services at Reliance Industries Limited by combined input of industrial hygienist and occupational health physician. It is done at the working platform of the workers which helps in mitigation of occupational health hazards and prevention of work related illness/ injury.**

Aims and Objectives:

1. **To assess the occupational health hazards as per the individual's task.**
2. **To measure the hazard exposure risk profile of the individual and to rectify it with the help of control measures.**
3. **To make exposure data linked to each employee or group of employees available during medical surveillance.**
4. **To provide a healthy working environment by preventing the occurrence of the diseases among the employees.**

Methodology: **Occupational health hazards are measured through various qualitative and quantitative risk assessment tools during the walk through survey of the individual plant area. As per the duration & frequency of the task performed by the worker at a particular location, mapping and analysis of all health hazards are done, like noise, heat stress, indoor air quality, ergonomics, vibration, radiation, illumination & chemical exposure etc. A comprehensive report is prepared with all recommendations, which is shared with the respective plant for corrective measures. The exposure data linked to each employee with the detailed analysis is uploaded in the "Health Management System" & individual worker is assessed at the time of Periodic Medical Examination. Based on his exposure risk profile & medical record, further advice is given and follow up is maintained.**

Results & Discussion: **Employees at Hazira manufacturing division, Reliance Industries Limited are mapped as per the job performed & the risk exposure profile is linked with the "Health Management System" which is monitored during the medical surveillance. Various implementations related to Health & Environment are carried out as per the recommendations of Task Based Health Risk Assessment (TBHRA) study.**

Conclusion: **Identifying and preventing the development of occupational health hazards as well as strengthening the occupational health services by implementation of Task Based Health Risk Assessment (TBHRA) is the most successful step for any industry to create conducive work environment for healthy work force.**

Keywords: **Health Hazards, Health Management System (HMS), Medical Surveillance, Task Based Health Risk Assessment (TBHRA).**

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Introduction

All the medical examinations especially periodic medical examination for the workers in an industry are based on prevailing occupational health stressors at work place and their predictive illnesses. Task is the activity performed by a worker at the working location for a specific duration & frequency. Considering the worker's task, risk assessment is done with the help of industrial hygiene practices and various health hazards are mapped. Health of that worker is monitored periodically during the time of medical surveillance with the risk exposure profile linkage of that individual worker. A Task Based Health Risk Assessment (TBHRA) is an innovation in occupational health services at large scale petrochemical industry (Reliance industries Limited) by combined input of industrial hygienist and occupational health physician. It is done at the working platform of the workers which helps in mitigation of occupational health hazards and prevention of work related illness/ injury. TBHRA is mainly aimed to assess the occupational health hazards as per the individual's task and to provide exposure data linkage of each employee or group of employees during medical surveillance to occupational physician. It helps in providing a healthy working environment by preventing the occurrence of the diseases among the employees.

Methodology

The study is done at an individual manufacturing site across Reliance Industries Limited. Industrial hygienist & occupational physician are going to start the activity by selecting one plant out of all major plants at a particular site. There is an opening meeting with plant head, plant engineer, plant safety team and occupational health team which includes chief medical officer, plant doctor and industrial hygienist for making a plan to conduct industrial hygiene survey and to schedule the required trainings. A Shop floor meeting with plant occupational health (OH) champion and location in charge is conducted to identify list of activities against each job position and list of employees at each area (Similar Exposure Groups) to prepare a TBHRA sheet as seen in fig. 1 & employees' data sheet as seen in fig. 2 (provided at the end of the article).

A Plant walkthrough survey is conducted by industrial hygienist & occupational physician with plant OH champion and location in charge. Industrial hygienist takes all standard exposure measurements related to health hazards for chemicals, heat, dust, noise, indoor air quality etc. at all working locations of the worker. The measurements are taken at the time when the worker is performing various tasks. Also, the industrial hygienist places samplers for various types of personal sampling procedures for noise, chemical and dust. All measured values are entered by industrial hygienist in the TBHRA sheet. Various trainings are also conducted by industrial hygienist & occupational physician at the same time to make all the workers aware about the health hazards in their working areas.

Now the industrial hygienist categorizes the risk based on the findings of the hazard exposure levels identified in the field rounds. For hazards like heat and ergonomic, risk exposure rating is given as per the risk categorization, which is shown in the table 1 and based on that health risk scoring is done as shown in table 2.

For hazards like chemical, dust and noise, risk exposure rating is depending upon the calculated dose as shown in table 3 and their health effect rating is as per the severity of the hazard on human body as shown in the table 4. Based on both the values, health risk assessment matrix is calculated as shown in table 5 & fig. 3 (given at the end of the article).

Rating	Risk Categorization		
	WBGT	Ergonomics	
	^{0}C	RULA	REBA
4	Above TLV	7	>11
3		5-6	8-10
2		3-4	4-7
1	Below TLV	2	1-3

Table 1.Exposure Rating (Heat & Ergonomics)

Health Risk	Scoring
Very High	4
High	3
Moderate	2
Low	1

Table 2.Health Risk Score

Exposure Rating	Risk Characterization	
	Chemical/Dust	Noise (Dose)/TWA
4	> OEL	100%
3	50% - 100% OEL	50% - 100%
2	10% - 50% OEL	10% - 50%
1	< 10% OEL	< 10%

Table 3.Exposure Rating (Chemical/Dust & Noise)

Rating	Health Effects
4	Life threatening or disabling injury or illness; (e.g. Benzene)
3	Irreversible health effects of concern (NIHL)
2	Severe reversible health effects of concern (e.g.HTM like Chlorine, Ammonia)
1	Reversible health effects of concern (e.g. Nuisance dust)
0	Reversible effects of little concern, or no known adverse health effects

Table 4.Health Effects Rating

All the data is compiled in the TBHRA sheet. The observations are discussed with the plant safety representatives, environment team, supervisors, and managers to draw up possible engineering/ administrative solutions for identified OH hazards. Final TBHRA sheet containing complete data with risk exposure profile of the studied plant is prepared. A comprehensive report of the whole study is prepared with all recommendations, which is shared with Plant HOD, Plant OH Champion and OH Team on the day of closing meeting.

The most important step of this activity is the linkage of the obtained data with the medical software. Plant wise detailed TBHRA sheets are uploaded in the "Health Management System (HMS)" medical software having complete information of each employee. All the data of individual worker related to medical history & hazard exposure profile are now available within the HMS. An individual worker is assessed at the time of periodic medical examination.

Results & Discussion

Employees at Hazira manufacturing division are mapped as per the job performed at various locations & the risk exposure profile is linked with the Health Management System which is monitored during medical surveillance. All the data of individual employee including past history is assessed by occupational physician & based on that various recommendations are given. Table 5 shows the total number of plants covered till date under TBHRA study & total number of employees mapped with HMS system. Out of all mapped employees, 4.75% of employees were benefitted.

Plants at Hazira Manufacturing site	TBHRA completion status	Total Employees	HMS linkage done	Employees benefitted
30	28	3280	2610	124

Table 5.TBHRA status & HMS linkage at Site

Based on TBHRA activity, various recommendations were given to plant people & control measures were also taken by them, which were used to improve safety, health & environment at work place. Different administrative and engineering controls can be taken as projects at plant level. Till today, 76 projects are selected from the TBHRA activity at Hazira. Out of them, few are already implemented at various locations and others are in process. Table 6 & fig. 4 show the various health hazards identified during the study at various locations with recommendations & implementations.

The major benefits from these implementations are reduction in the exposure of health hazards to

the workers who are working at plant level, and also reduction in sick absenteeism as well as occurrence of illness and injuries at different locations.

Health Hazards	Identified after TBHRA	Recommendations given	Implementation done	Percentage
Chemical	18	18	06	33.33%
Dust	12	12	08	66.66%
Noise	54	54	21	38.88%
Heat Stress	32	32	14	43.75%
IAQ	07	07	01	14.28%
Ergonomics	48	48	19	39.58%
Illumination	22	20	07	35.00%
Vibration	00	00	00	00
Radiation	00	00	00	00

Table 6.Hazard identification & control

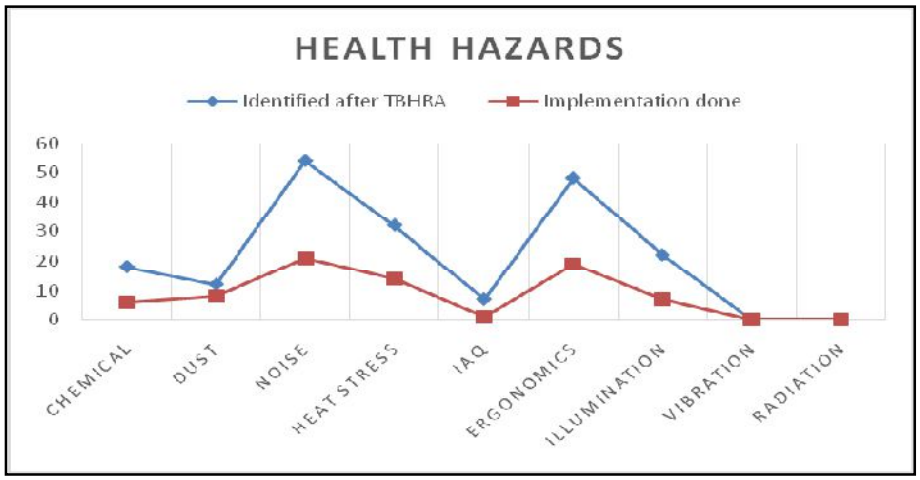

Figure 4.Health Hazards

Conclusion

Identifying and preventing the development of occupational health hazards as well as strengthening the occupational health services by implementation of Task Based Health Risk Assessment (TBHRA) is the most successful step for any industry to create conducive work environment for healthy work force. It can be implemented at service and office areas of an industry to identify & control the health hazards and to decrease the prevalence of life style diseases among the workers.

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3. Heat stress - ACGIH guidelines.
4. IAQ - ASHRAE 62 and 55.
5. Chemical & dust - NIOSH analytical method manual, OSHA's technical manual.
6. ACGIH TLV-TWA guidelines.
7. OSHA standards.
8. AIHA strategic guidelines.

TASK BASED HEALTH RISK ASSESSMENT (TBHRA)																		
Plant Name:																		
Sr. No	**Area**	**Job position**	**Task**	**Location**	**Duration**	**Frequency**	**Chemical (ppm or mg/m3)**			**Noise (dBA)**	**Heat Stress (WBGT)**	**IAQ**			**Ergonomics**	**Illumination**	**Vibration**	**Radiation (mSV)**
			Major or repeated important task	*Location details*	*Exposure Duration (10min, 30min, 1hour etc.)*	*Shift/Daily/ Weekly/ Monthly etc.*	*Name of chemical*	*Maximum recorded TLV result*	*TLV-TWA Limit (ACGIH)*	*AvgLeq Noise exposure at location*	*Heat Stress Level*	*CO2 ppm*	*RH %*	*Temp *C*	*RULA/REBA / N.L.I. Rating*	*Lux level Day/Night*		

Figure 1.TBHRA sheet

JOB TASK CODE															
Sr. No.	**Area**	**Field Operator**		**Panel Officer**		**Shift Engineer**		**Shift In charge / Shift Superintendent**		**Maintenance Technician**		**Maintenance Engineer**		**Plant Manager / HOD**	
		Employee Name	Employee Code	Employee Name	Employee Code	Employee Name	Employee Code	Employee Name	Employee Code	Employee Name	Employee Code	Employee Name	Employee Code	Employee Name	Employee Code

Figure 2.Employees' data sheet with job task code

Health Risk Assessment Matrix

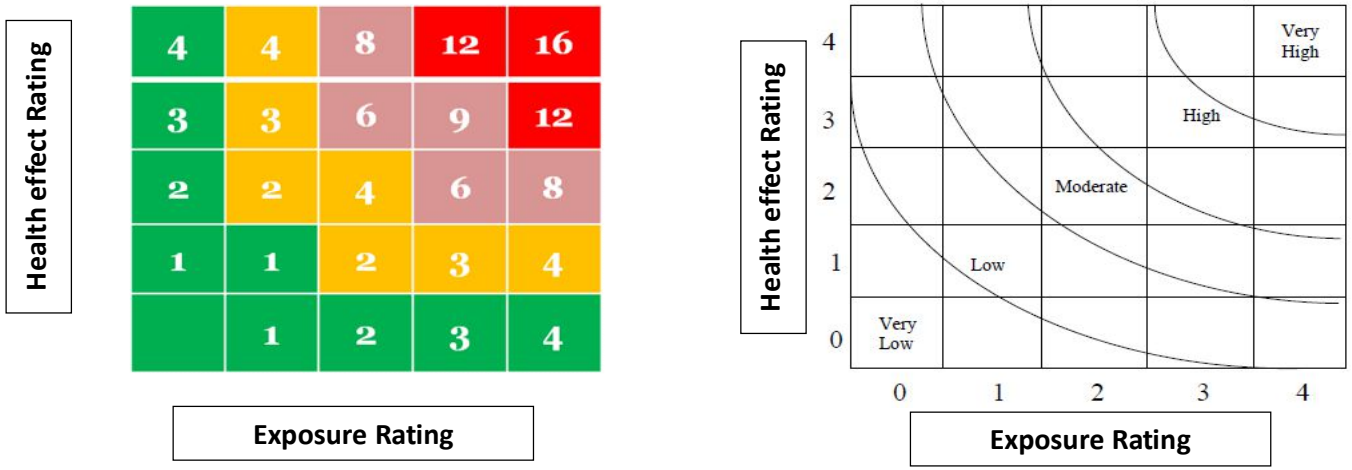

Figure 3.Health Risk Assessment Matrix

Iodine Content of some Commercial Table Salts in Kano – Nigeria as a factor affecting Dietary Iodine Levels

S. A. Kiyawa[*]

Abstract

Kano is the most populous state in Nigeria which is located in an area remote to the coast where most food with natural dietary iodine content is comparatively low. To complement this in the state and others, salt iodization was initiated and the program has been strengthened using potassium iodate (KIO_3) with the dosage of 50 microgram per gram. In this research, titrimetric analysis was used on ten different samples, each of five different commercially- sold table salt brands randomly bought from selling points for the analyses of their iodine level. The results were then compared with the WHO standard value. The study found that only sample B representing Mr. Chefs table salt has its average value (23.79 microgram per gram) below even the minimum value recommended by World Health Organization. The highest value of 50.23 microgram per gram was obtained for sample A representing Masa table salt. This is then followed by sample E representing Anapuna table salt (47.57 microgram per gram), sample D representing Dangote table salt (42.29 microgram per gram), sample C representing Royal table salt (33.30 microgram per gram)and D representing Dangote table salt (33.30 microgram per gram). It can be inferred that although the iodine content of none of the sample salts exceeds the recommended value, it is clear that only sample B falls below the WHO recommended value (30 – 50 microgram per gram), while the remaining samples are just within the range. Results were significant at 0.05 level. Recommendations were made.

Keywords: **edible salts, iodine content, Kano, Nigeria.**

Introduction

Table salts are minerals that are composed primarily of sodium chloride. It is essential for animal's life in small quantities, but if in excess, it is harmful to both plants and animals. Table salt is refined salt, which contains about 97% to 99% sodium chloride. It usually contains substances that make it free – flowing (anti –agents) such as sodium silicoaluminate or magnesium carbonate. Some people also add a desiccant, such as a few of uncooked rice in salts shakers, to absorb extra moisture and help breakup clumps when anti agents are not enough. Table salts have particle density of 2.165g/cm^3, and a bulk density of about 1.154g/cm^3.Salting is an important method of food preservation. Salt for human consumption is produced in different forms including unrefined, refined and iodized salts[1].Unrefined salt is the commercial pack of sea salt with different minerals, each giving a unique flavor. Natural sea salt harvested by hand, has unique flavor varying from region to region. Good unrefined sea salt does contain all the minerals and micro nutrients that are present in the sea (over 50 elements) that have been shown to support life and good health. However, sea salt does not contain vitamin. A complete nutritional approach, combined with proper fitness maintenance and stress management is most important. Also, no amount of sea salt can balance poor diet. Natural unrefined sea salt is nutritious and beneficial to health. It is much higher in vital essential minerals (especially magnesium)[2]. Refined salt is a dietary mineral composed primarily of sodium chloride that is essential for animal life but can be toxic to many land plants[3]. Iodized salt is the salt which has been fortified with the essential trace mineral, iodine. Many salt producers make iodized salt and it is readily available in most of the markets. Salt is involved in regulating the water content of the body. Iodine is an essential component of thyroxine (T4) and triiodothyronine (T3), and it

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must be provided in the diet. Inadequate iodine intake leads to inadequate thyroid hormone production, and all the consequences of iodine deficiency stem from the associated hypothyroidism. Iodine is essential daily in foods. Its insufficient and excessive intake can result in thyroid disease. The term "iodine deficiency disorders" (IDD) refers to the several consequences that iodine deficiency imposes on individuals. Important consequences include goiter, hypothyroidism, and intellectual disability[4]. When severe iodine deficiency occurs during pregnancy, it is associated with cretinism and increased neonatal and infant mortality.

In developing countries, iodine deficiency has been identified as one of the modifiable factors that have an adverse effect on child development[5]. It is a global public health problem and, in combating it, emphasis should be placed on diagnosis and correction at the level of the community rather than the individual. The International Council for the Control of Iodine Deficiency Disorders (ICCIDD) maintains a website (www.iccidd.org) with databases of information about iodine nutrition in different countries and an information reference desk.

Iodine Requirements

Iodide is essential for thyroid hormone synthesis. In order for the thyroid gland to synthesize adequate amounts of thyroxine (T4), approximately 52 mcg of iodide must be taken up daily by the thyroid gland. Severe iodine deficiency develops when iodide intake is chronically <20 mcg/day.

Although iodine can be obtained by consumption of foods that naturally contain it like fish, seafood, milk, kelp, some drinking water, and vegetables grown in iodine sufficient soil, the daily need is not attainable by most people because of the low economic status. The cheapest source therefore, is the ingestion of food containing iodized table salt. Dietary iodine is absorbed as iodide and rapidly distributed in the extracellular fluid, which also contains iodide released from the thyroid and by extrathyroidal deiodination of the iodothyronines.

Iodine deficiency is associated with goiter, hypothyroidism, cretinism, neonatal and infant mortality, learning disabilities in children[6].

Materials and Method

Sample Collection

Five different brands, each consisting of ten samples, were obtained from ten randomly selected wholesale points at Singa Market, Kano. The brands are labeled A, B, C, D and E as shown below:

Sample	Brand
A	Masa
B	Mr. Chefs
C	Royal
D	Dangote
E	Anapuna

Table 1.Commercial sample salts

Reagents Preparation

In the preparation of solution, chemicals of analytical reagent grade purity and deionized distilled water was used. 0.005M of sodiumthiosulfate ($Na_2S_2O_3$) was prepared by dissolving 1.241g sodium thiosulfate crystal ($Na_2S_2O_3 .5H_2O$) in one liter of water and stored in a cool dark place.2M sulfuric acid (H_2SO_4) was prepared by measuring out 106.52 cm^3 of the concentrated acid diluted with 893.4cm^3 of water to make 1000ml. Potassium iodide (KI) (10%) was prepared by dissolving 100g of KI in one liter of water and was stored in cool dark place.

The starch indicator solution was prepared. 1 g of starch was added into 10 ml of distilled water, shaken and poured into 100 ml of boiling, distilled water. This was then stirred thoroughly and boiled for a 1 minute. It was left to cool down. The precipitate formed was decant off the supernatant and use as the indicator solution.

Procedure

The method employed in this experiment is the iodometric titration. It is simple, fast, and requires small quantities of samples for analysis.10g of each sample was carefully weighed and poured into a 50ml measuring cylinder. Water was slowly added with continuous stirring to dissolve the salt completely and make the solution up to 50ml. 1ml of 2M sulfuric acid was added to the solution, which made the solution colorless. The flask was

closed with stopper and kept in a dark place for 10 minutes in a closed cup-board. 0.005M of sodium thiosulfate was poured into the burette and adjusted to zero level. The flask was taken out from the dark place after 10 minutes while shaking the flask. The solution was titrated against sodium thiosulfate from the burette. Titration was stopped as soon as the solution turned pale yellow. Few drops (1- 5ml) of 10% starch solution were added to the flask as an indicator. The solution turned deep purple and the titration was continued until colorless.

Results and Discussion

From the analyses of the ten (10) randomly selected samples for each of the five different table salts, only sample B representing Mr. Chefs table salt has its average value (23.79µg/g) below even the minimum value recommended by WHO. The highest value of 50.23µg/g was obtained for sample A representing Masatable salt. This is then followed by sample E, Anapuna table salt with average value of 47.57µg/g. Sample D, Dangote salt contained 42.29µg/g and sample C, Royal salt had 33.33µg/g.

On the basis of the above, it can be inferred that although the sample salts have their iodine content exceeding the recommended value, it is clear that only sample B falls below the WHO recommended value, while the remaining samples are just within the range.

SN	Iodine concentration (µg/g)				
	A	B	C	D	E
1	50.22	23.82	33.32	42.31	47.57
2	50.24	23.80	33.29	42.30	47.55
3	50.21	23.78	33.31	42.29	47.58
4	50.23	23.77	33.30	42.30	47.57
5	50.22	23.81	33.31	42.32	47.57
6	50.23	23.78	33.29	42.29	47.57
7	50.22	23.78	33.28	42.30	47.56
8	50.24	23.79	33.30	42.31	47.57
9	50.23	23.80	33.29	42.29	47.58
10	50.24	23.81	33.29	42.30	47.59
Mean conc. (µg/g)	**50.23**	**23.79**	**33.30**	**42.29**	**47.57**

Table 2.Iodine concentration in the Samples Salts

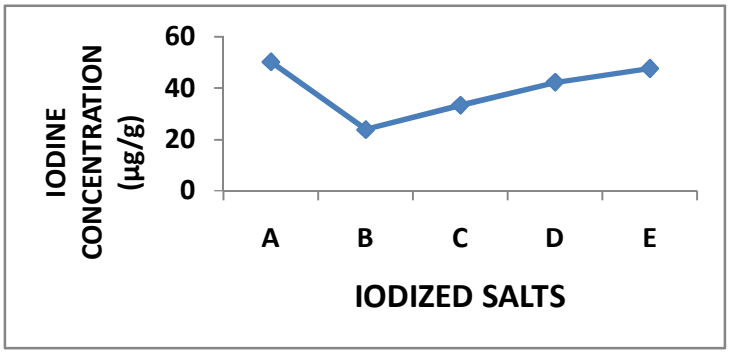

Figure 1.Graph of average iodine concentration in the salt samples

Conclusion

Iodine is one of the micro nutrients consumed by man. Most of the table salts analyzed in this experiment were purchased from market in Kano and most of the table salts have adequate content of iodine. Only sample B was found with the level recommended by World Health Organization.

Recommendations

1. Iodine deficiency being a global public health problem, emphasis should be placed on diagnosis and correction at the level of community rather than individual. Iodization of salt is the preferred method of increasing iodine intake in a community. The usual amount is between 10 and 50 mg of iodine/kg salt (sodium chloride) as potassium iodide or iodate. Alternatives for when salt iodization is impractical or delayed, include iodized oil (Lipiodol), iodized water, and iodine tablets or drops.
2. The government should ensure that all table salts are iodized and the quantity meets up

with the World Health Organization (WHO) recommended value.

3. There should be proper enlightenment of the public to purchase only iodized salts.

4. Companies that fail to iodize their salts should be prosecuted.

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Occupational Health Hazards among Teaching Community- A Questionnaire based Survey

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Abstract

Teachers' role is inevitable in spreading knowledge to pupils. These noble professionals are not exceptional to occupational hazards. The present study deals with the occupational health hazards among teacher's specifically vocal, physical and psychological hazards with respect to their workplaces. A total of 3258 questionnaires were distributed to 115 schools in Visakhapatnam to examine the prevalence of symptoms related to their occupation. Teachers facing voice problems like dysphonia (27%), vocal fatigue (19%), oral paresthesia (21%) and consistent incidence of voice symptoms like tired voice (54%), weak voice (43%) were observed in this study. Physical symptoms like cervical spondylitis (62%) were observed in high frequency than other physical symptoms like varicosis (34%), back pain(18%) and articular pains (42%). Few symptoms like pink eye infection/ conjunctivitis (9%), dryness of hands (73%), atopic dermatitis (22%) and contact dermatitis (34%) were noticed in teachers. Application of information and communication technologies, avoiding usage of chalk piece & black boards, use of collar mikes, more time lapse between lecture periods and no extra workload to teachers will minimize the impact of occupational health hazards among teachers.

Keywords: **Physical problems, teachers and vocal problems.**

Introduction

Occupation is the key factor which provides income and quality outcomes and also has positive impact on social, psychological and physical health, and well being. In spite of this, work and work environment is disturbing the well being, working capacity and even the life span of working individual. Occupational hazards are common in many occupational sectors. Noble professionals like teachers are also not exceptional to occupational hazards. Hazards are arising from psychological environment as well as working hours and physical agents. In teaching jobs, teachers are exposed to occupational hazards like vocal problems, respiratory, physical and psychological problems[5]. Teachers represent one of the major groups of professionals who use their voice as a primary job task. Teachers have been identified as being at increased risk of developing an occupational voice disorder because of the demand put on their voices professionally[4].This may be due to the prolonged usage of voices or exposure to other factors that make them strain their voices, such as working in a noisy atmosphere, in places where there is no any amplifying equipment and so on.

The main teaching work load like supervision duties, student paper work, preparation and evaluation, in addition to implementing the pathway programs like workshops, competitions, lack of enough material for preparation, lack of time period between the lectures affects the physical and psychological health of teachers. Dibbon's study showed that in addition to 27.5 hours of classroom teaching per week, teachers spend almost as much time again preparing lesson plans, correcting student work, collaborating with other teachers, meeting with parents and

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supervising students, for a total average of 52.32 hours per week[2]. The present study deals with the occupational health hazards among teachers, in particular, vocal and physical hazards, with respect to their workplaces.

Methodology

The study was conducted for a time period of six months from July 2013 to February 2014. A total of 3258 teachers with an age group of 24-60years from 115 schools participated. Consent from District Education officer was taken to do sampling in the schools. Before initiating the research work in the sampled schools, detailed information was given and written questionnaire (Annexure-I) were distributed to the participants. Filled in questionnaire were collected back after one week of distribution. Individual interviews of teachers were also conducted to have a clear picture about the work and their working environment. The questionnaire includes socio-demographic features, medical history, personnel and food habits. Further questions inquired about vocal problems, physical and psychological problems.

Personnel Information of the Participants (Teachers)

Among the 3258 participants, 1286 teachers were male and 1972 teachers were female. Out of the 1286 male participants, 482 were from primary schools and 804 were from secondary schools, where as in case of female teachers, 713 were from primary schools and 1259 were from secondary schools. Out of 3258 teaching participants, major participants belonged to the age group of 45-54 years (1241). Participants belonging to the age group of 35-44 years and 55-60 years were 853 and 667 respectively, and the least number of teachers were from the age group of 25-34 years. The teachers of the groups with maximum participants had an experience of 21-30 years and the teachers of the groups with least participants had an experience of 5-10 years. The information related to the personnel habits of male teachers like drinking, smoking, chewing of tobacco etc were also collected while assessing the occupational hazards. Out of 1286 male teachers, 617 had the habit of drinking and 423 had the habit of smoking. The data related to the characteristics of participants and personnel habits was shown in table1.

Characteristics of the participants	**Male (n=1286)**	**Female (n=1972)**	**Overall (n=3258)**
Primary school	482	713	1195
Secondary school	804	1259	2063
Age of the participants			
25-34 yrs	204	293	497
35-44 yrs	379	474	853
45-54 yrs	487	754	1241
55-60 yrs	216	451	667
Years of service of the participants			
<5-10 yrs	184	236	420
11-20 yrs	305	508	813
21-30 yrs	511	766	1277
>30 yrs	286	462	748
Personal habits of the participants			
Drinking	617	0	617
Every day	37	0	37
Once in 2 or 3days	76	0	76
Weekends	87	0	87
Once in a week	103	0	103
Once in a month	133	0	133
Once in a year	181	0	181
Smoking	423	0	423
<1packet per day	278	0	278
>1packet per day	145	0	145

Table 1.Characteristics of the participants

Results and Discussion

Vocal Problems in Teachers

Teachers form a major group of professionals, who use their voice as primary job task, and the prevalence of vocal problems in teachers based on gender bias is given in fig.1. Prevalence of tired voice (54%) and weak voice (43%) are the vocal problems observed in most of the participants. In comparison with female teachers (48.8% & 41.9%), male teachers (61.8% & 45.1%) are more prone to vocal problems like tired and weak voice. The reason might be the personnel habits like smoking and drinking, which may have an effect on vocal problems. The descending order of prevalence of vocal problems are tired voice (54%)>weak voice (43%)>Dysphonia (27%)> oral paresthesia (21%)>vocal fatigue (19%). The information is also correlated with the participant age groups. The prevalence of vocal problems like dysphonia (40.4%), vocal fatigue (39.4%), and weak voice (56.7%) are at elevated levels in the participants with age groups of 25-34 years. The participants with age groups of 45-54 years, and 54-60 years face high incidences of tired voice. The complete data is provided in the fig. 3. The participants belonging to the age group of 25-34 years are mostly the teachers with experience less than 5 years or that between 5-10 years. As they are new to their profession, they need to put more effort to manage their tasks and most of the younger teachers expressed that they need to put more stress on voice especially to manage the students in classrooms.

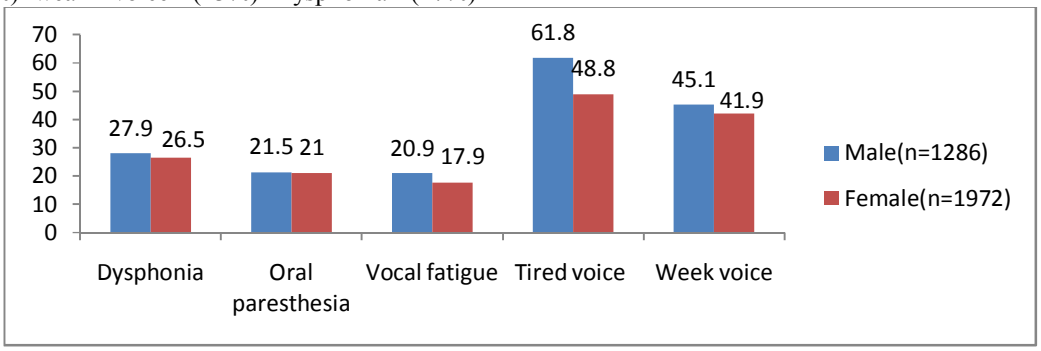

Figure 1.Percentage of prevalence of vocal symptoms of teachers based on gender bias

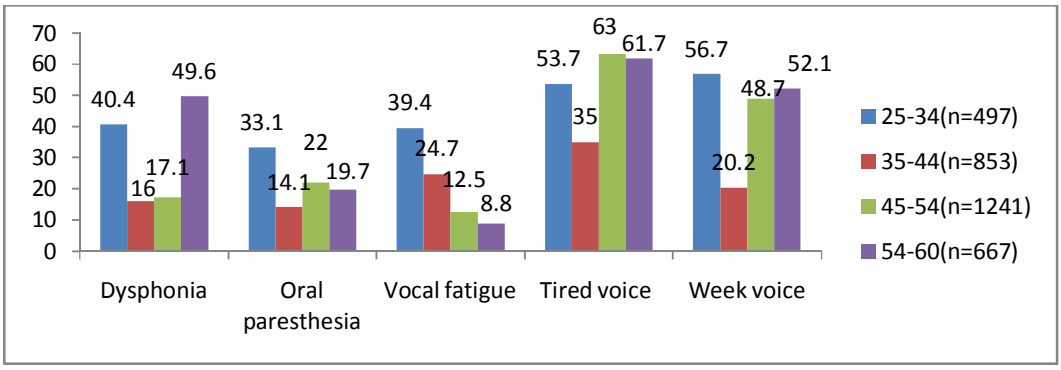

Figure 3.Prevalence of vocal problems of teachers based on the age group

Physical Problems in Teachers

Generally physical problems in teachers occur in secondary school due to hectic work load, lack of proper resources, poor environmental factors etc. The information was collected gender wise and as per the age groups. The data related to the physical problems in teachers (gender wise) is shown in fig. 2. According to the data, majority of teachers are prone to physical problems like dryness of hands (-73%), cervical spondylitis (62%), articular pains (42%), contact dermatitis (34%), atopic dermatitis (22%), back pain (18%), and conjunctivitis (9%) respectively. The prevalence of physical symptoms in teachers like cervical spondylitis (68.4%), articular pains (46.3%), varicosis (38%) was noticed in high numbers in females as compared to males, because females have to work at work place and at home. As per the data based on age groups, physical problems like cervical spondylitis were observed majorly, especially in the age group 25-34 years (75%), and varicosis, and back pain were high in the age group of 54-60 years (57%, 30.7% respectively). The problem like dryness of

hands was in almost all the groups, and the percentages of prevalence as per the age groups are 78.6% in 25-34 years, 52.5% in 35-44 years, 92.3% in 45-54 years and 25% in 54-60 years. The detailed information was shown in the fig. 4. The physical problems like dryness of hands occur due to regular usage of chalk pieces. Varicosis is majorly observed in the age group of 54-60 years due to excessive pressure on the legs.

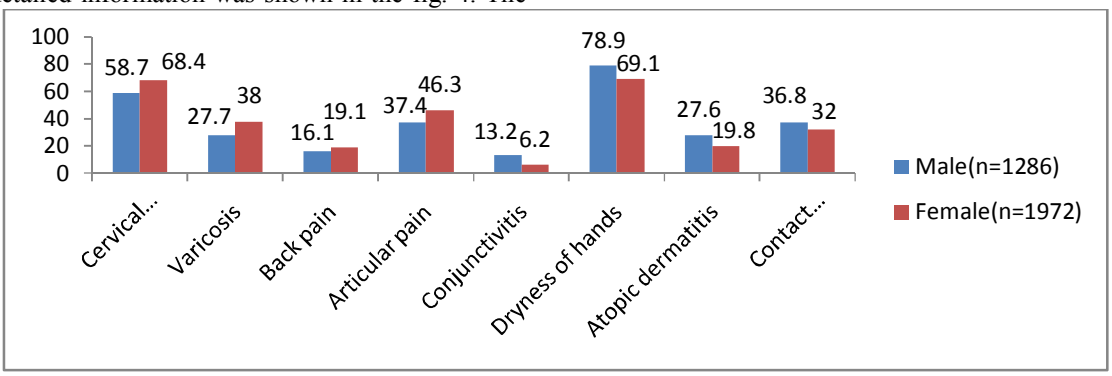

Figure 2.Percentage of physical symptoms of teachers based on gender bias

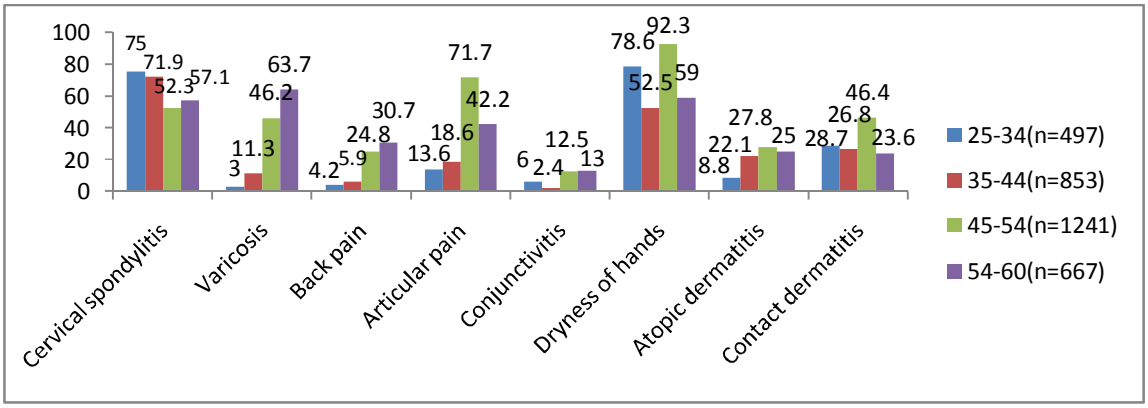

Figure 4.Prevalence of physical problems of teachers based on the age groups

Consistent Symptoms

Along with the prevalence of the occupational problems, the data was also collected on the frequency of consistent symptoms because the performance levels of the teachers depend on the period of prevalence of the symptoms. The consistency of symptoms may affect the performance and wellbeing of teachers. As per data 36 percent of teachers noticed the symptoms during the early hours of morning, 28 percent noticed the symptoms in the mid day after working for some time, and 28 percent teachers mentioned that there is no definite point of time of occurrence of consistent symptoms. Only 3percent teachers noticed a consistency in symptoms on weekends. The detailed data is given in fig. 5. Based on the overall data, appearance of symptoms occurs mainly in the working hours only.

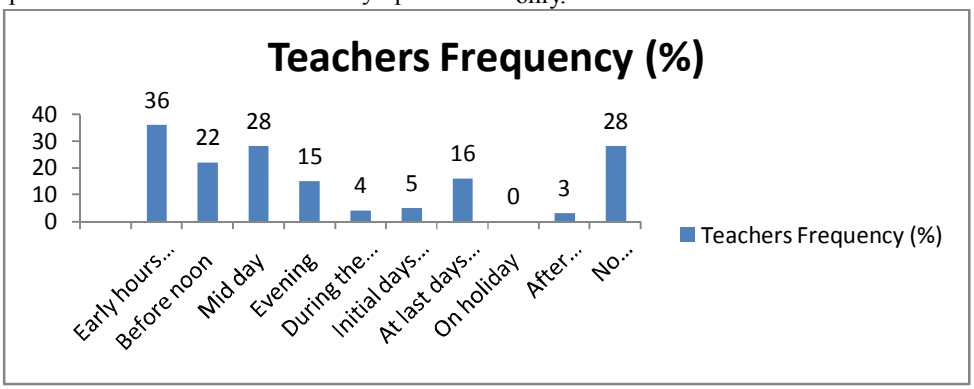

Figure 5.Consistency of symptoms in teachers (one can give more than two opinions)

Transient Symptoms

About 33% teachers mentioned that symptoms lasted for a longer period of time. About 21% teachers observed transient symptoms for a few hours and 17% teachers mentioned transient symptoms during vacation. Only 3% teachers observed transient symptoms for twenty four hours. The complete data is given in fig. 6. As per the overall data, maximum teachers complained about the consistency of symptoms mainly in working hours and lasting for a longer period.

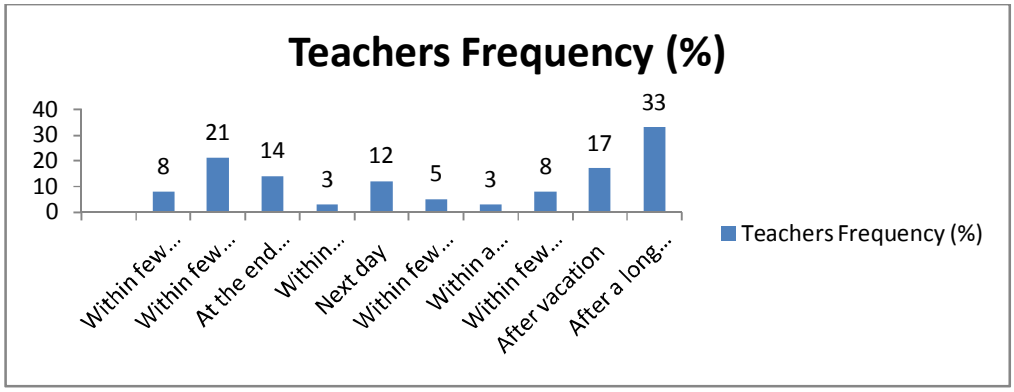

Figure 6.Transient symptoms in teachers

Conclusion

The study confirms that teachers are victims of vocal and physical problems. The vocal problems like tired voice and weak voice were high in teachers. The vocal problems in teachers mainly occur due to lack of knowledge on the basic anatomy and physiology of voice production, misuse of vocals like speaking with excess loudness level, speaking in excessively low and high pitch levels, speaking with excessive muscle tension in the larynx, throat etc. The physical problems like dryness of hands and varicose was noticed in most of the teachers. The physical problem of teachers occurs due to lack of resources, poor environmental factors, excessive work load etc. Finally, this study concluded that teachers are more prone to occupational hazards like physical and vocal problems which may affect their efficiency, well being etc. Application of information and communication technologies, avoiding usage of chalk piece and black boards, use of collar mikes, more time lapse between lecture periods and no extra workload to teachers will minimize incidences of the occupational health hazards among teachers.

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Annexure-1
Occupational health hazards among teaching Community -A Questionnaire based Survey

Dt_ _/_ _/__

I. School Particulars

Name of the school_____

Mode of school_____

Location of the school_____

Year of establishment_____

II. Personal Details of Teacher

Name of the teacher_____

(No need to mention if they want to be anonymous)

Year of appointment_____

Years of experience_____

Age_____

Height_____

Weight_____

III. Food Habits

Items	**Servings per day**
Tea	____ 0_____ 1-2_____ 2-5_____ more than5___
Coffee	____ 0_____ 1-2_____ 2-5_____ more than5___
Caffeinated soda	____ 0_____ 1-2_____ 2-5_____ more than5___
Herbal tea	____ 0_____ 1-2_____ 2-5_____ more than5___
Alcohol	____ 0_____ 1-2_____ 2-5_____ more than5___
Gutka pan	____ 0_____ 1-2_____ 2-5_____ more than5___

IV. Vocal Problems in Teachers

Vocal Symptoms	**Age groups**			
	25-34years	**35-44years**	**45-54years**	**55-60years**
Dysphonia	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Oral paresthesia	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Vocal fatigue	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Tired voice	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Weak voice	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B

Y means Yes
N means No
N.O.B means Not Observed

V. Physical Symptoms of Teachers

Physical symptoms	Age groups			
	25-34years	35-44years	45-54years	54-60years
Cervical spondylitis	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Varicosis	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Back pain	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Articular pain	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Conjunctivitis	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Dryness of hands	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Atopic dermatitis	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B
Contact dermatitis	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B	Y/N/N.O.B

Y means Yes
N means No
N.O.B means Not Observed

VI. Consistent Symptoms at a Particular Time

Time of appearance	Please mark your opinions here	
Early hours in the morning	Yes	No
Before noon	Yes	No
Mid day	Yes	No
Evening	Yes	No
During the weekend	Yes	No
Initial days of the week	Yes	No
At last days of week	Yes	No
On holiday	Yes	No
After holidays	Yes	No
No connection to certain point of time	Yes	No

Note: You can give number of opinions

VII. Transient Symptoms at a Particular Time

Time of disappearance	Please mark your opinions here	
Within few minutes		
Within few hours		
At the end of the school		
Within twenty four hours		
Next day		
Within few days		
Within a week		
Within few weeks		
After vacation		
After a long period of time		

VII.A. Are you currently the victim of above mentioned problems?

a. No b. Yes(if Yes please mention the particular problems below)

VII.B. Have you consulted a physician for the problems?

a. No b. Yes

VII.C. Are you currently under medication for the problems?

a. No b. Yes

Declaration

The details mentioned above are true to the best of my knowledge.

Signature of the Participant

----------The End----------

Thank you so much for your kind co-operation
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Occupations and Morbidity Pattern in a North Indian Site: Need for Focused Health Services for House Wife, Pensioners and Unemployed

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Abstract

Background: **Morbidity has factors related to occupational status, however information from community based study is seldom available in India. This article uses self reported morbidity in the community from one North Indian sites and effect of occupational status on morbidity.**

Methods: **An ICMR Task force study of health accounting, collected different health related parameters at baseline. Under the study thousand households (500 rural, 500 urban) were surveyed during 2012-13 by door to door survey using pretested questionnaire after availing written informed consent. This information reflects the distribution of demographic and occupation profile in relation to morbidities.**

Results: **Overall self reported morbidity prevalence was nearly sixteen percent (821 out of 5279, 15.8%). 766 individuals provided details, among them 530 (12%) were considered as corroborative evidence to support disease diagnosis. Nearly 32% suffered from communicable and 67% suffered from non-communicable diseases. Among different occupations, pensioners had highest morbidities (24.5%) followed by unemployed (20.5%) and housewives (21.4%).**

Conclusion: **Morbidity profile and effect of occupation/ work status is evident from the study. There is need of targeted services for these groups and periodic feedback or impact assessment from consumers themselves will be more authentic for appropriate policy formulation.**

Keywords: **Occupation, Morbidity, Health Account.**

Introduction

High disability and sickness absence observed in some occupations relates to occupation- specific consequences.[1] In view of connection between occupation, employment status and morbidity, there has been a need for focused policy planning and health service delivery, but seldom done in absence of information. To look into the pattern of distribution of morbidity among different occupations in the North Indian site, while conducting survey for one ICMR Task Force study- Health Account Scheme, information about occupation was compared with the morbidity profile in which 5279 participants were surveyed from rural (2781) and urban (2498) site respectively during the year 2012-13. This information might be of use for policy planning for need based service delivery.

Methods

A small village of Hardoi district, near Lucknow, North India was selected by random allocation. It comprised of 526 households (HH) to cover almost the whole village, 500 HH were surveyed. For Urban morbidity information, was gathered from a block of 500 HH from urban site nearby Lucknow district. Information was collected on various aspects of health status and occupation.

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Information of different occupations was categorized in 9 categories and was compared with self- reported morbidity observed in recall period of previous 2 months. Data was collected by door to door approach during April 2012 to Jan 2013. Pattern of morbidity in relation to occupation was analyzed using SPSS package version 19. Total 5279 persons of all ages were surveyed by team including medical doctor from 1000 households (500 rural, 500 urban). Among them, 821 participants (15.6%) expressed health problem/s (table 1). 767 participants shared detailed disease information and were able to produce some corroborative evidence of prescription slip/ written treatment/ tablet strips, test report/ pharmacy slips/ bills. 530 among them were comfortably sharing information about their occupations too. The final analysis for occupation and disease categories included, those were provided corroborative evidences of the written prescription/ test reports/ medicine bills.

Subgroup analysis was conducted to see pattern of distribution of communicable and non-communicable diseases among different occupations/ work profile.

Results

Overall 15.8% morbidities were reported by 821 persons from all age and gender groups combined. 12% were with some record/ corroborative evidence of disease.

	Rural (%)	Urban (%)
Total n= 5279	2718	2498
Male	1442 (51.9)	1292 (51.7)
Female	1339 (48.1)	1206 (48.3)
Age group (yrs.) distribution		
0 - 1	79 (2.8)	51 (2.0)
1 - 6	326 (11.7)	228 (9.1)
6 - 18	822 (29.6)	649 (26.0)
18 - 30	589 (21.2)	650 (26.0)
30 - 40	354 (12.7)	346 (13.9)
40 - 50	245 (8.8)	271 (8.7)
50 - 60	182 (6.5)	204 (8.2)
60 - 70	144 (5.2)	113 (4.5)
>70	40 (1.4)	40 (1.6)
Education		
Illiterate	705 (27.8) *	233 (10.0) *
Primary	695 (27.4)	538 (23.1)
Middle	485 (19.1)	423 (18.2)
High school	245 (9.7)	265 (11.4)
Intermediate	197 (7.8)	251 (10.8)
graduate/post graduate	187 (7.4) *	445 (19.1) *
Profession/honours	23 (0.9)	171 (7.4)
Occupation distribution		
Housewife	691 (28.2)	610 (26.5)
Student	947 (38.7)	897 (38.9)
Skilled work	22 (0.9)	36 (1.6)
Unskilled work	550 (22.5) *	158 (6.9) *
Business	59 (2.4)	149 (6.5)
Unemployed	82 (3.4)	74 (3.2)
Private Service	38 (1.6)	121 (5.3)
Government job	42 (1.7) *	175 (7.6) *
Pension	17 (0.7) *	81 (3.5) *
Positive for any Disease? n=821 (15.6% of total population)		
Yes	485 (17.4)*	336 (13.5) *
No	2296 (82.6)	2162 (86.5)
Single disease	460 (94.9)	293 (87.2)
Multiple diseases	25 (5.1) *	43 (12.8) *

Statistically significant *P value=<0.05

Table1.Demographic profile of the study population

Out of 5279 participants, 821 (15.6%) had morbidity in last 2 months on survey dates, out of which 485/2781 (17%) were in rural- site and 336/ 2498 (13%) in urban (Hardoi district). 571 (approx 70%) out of 821 people having complaints of one or more health related problems were having corroborative evidence of diagnosis or treatment or test report, hence were included in analysis to find out distribution of occupation and pattern of different morbidity prevalence. Occupation wise there were 28.2% housewives, 38.7% students, 0.9% skilled workers, 22.5% unskilled workers, 2.4% businessmen, 3.4% unemployed, 1.6% private job, 1.7% government job and 17% pensioners in rural community. There were 26.5% housewives, 38.9% students, 1.6% skilled workers, 6.9% unskilled workers, 6.5% businessmen, 3.2% unemployed, 5.3% private job, 7.6% government job and 3.5% pensioners in urban community.

Occupation (n)	**Communicable diseases, n (%)**	**Non communicable diseases, n (%)**
Housewife (366)	91 (24.9)	275 (75.1)
Student (114)	57 (50)	57 (50)
Regular work (7)	2 (28.6)	5 (71.4)
Irregular work (130)	60 (46.2)	69 (53.1)
Business (19)	8 (42.1)	11 (57.9)
Non- earning (43)	17 (39.3)	26 (60.5)
Private job (7)	4 (57.1)	3 (42.9)
Government job (35)	4 (11.4)	31 (88.6)
Pension (46)	6 (13.0)	40 (87.0)
Total (767)	249 (32.5)	517 (67.5)

Statistically significant P value=0.00

Table 2.Distribution of communicable vs. non communicable disease among different occupations

Difference of communicable vs. non-communicable disease among different occupations was statistically significant (p value = 0.00). More physically demanding the job is, lesser is the prevalence of non- communicable disease. Women were found to have double burden of diseases because of high prevalence of both communicable and non- communicable diseases.

In rural areas, communicable diseases were found to be more prevalent across different occupations in comparison to their urban counterparts (table 3). Overall morbidities are more among rural temporary jobs holders/ irregular laborers, however non- communicable disease are more in urban counterparts in all occupations.

Occupation (n)		**Communicable disease**	**Non- communicable disease**
Housewife (366)	rural, 183 urban, 183	61 (33.3) 30 (16.4)	123 (66.7) 153 (83.6)
Student (114)	rural, 84 urban, 30	49 (56.3) 8 (26.7)	39 (41.7) 22 (73.3)
Regular work (7)	rural, 3 urban, 4	1 (33.3) 1 (25)	2 (66.7) 3 (75)
Irregular work (130)	rural, 111 urban, 19	54 (48.6) 6 (31.6)	56 (50.5) 13 (68.4)
Business(19)	rural, 11 urban, 8	4 (36.4) 4 (50)	7 (63.6) 4 (50)
Non- earning (43)	rural, 28 urban, 15	12 (42.9) 5 (33.3)	16 (57.1) 10 (66.7)
Private job (7)	rural, 2 urban, 5	2 (100) 2 (40)	 3 (60)
Government job(35)	rural, 10 urban, 25	4 (40) 0	6 (60) 25(100)
Pension(46)	rural, 10 urban, 36	2 (20) 4 (11.1)	8 (80) 32 (88.9)
Total(767)	rural, 442 urban, 325	189 (42.8) 60 (18.5)	253 (57.2) 265 (81.5)

Statistically significant P value = (<0.001)

Table 3.Difference of rural vs. urban distribution of morbidities among different occupations

21.4% of housewives (n=278), 4.8% of students (n=4.8), 10.3% of regular workers, 7.2% of irregular workers and businesspersons, 20.5% of unemployed, 3.1% of private jobs, 9.7% of government job, and 24.5% of pensioners of the total 571 participants had morbidity.

Hence the prevalence of all categories of ailments was topped by housewives followed by unemployed and pensioners.

Discussion

Data were obtained from national health interview surveys[2] or similar surveys between 1986 and 1992. A lower than average prevalence of morbidity was found for higher and lower administrators and professionals as well as for blue collar workers, whereas a higher than average prevalence was found for skilled and unskilled manual workers and agricultural workers. Self-employed men found were in general healthier than the average population. Similar trends were observed in studies reported from abroad. A European study described morbidity differences according to occupational class among men from France, Switzerland, (West) Germany, Great Britain, the Netherlands, Denmark, and Sweden. Variation in morbidity prevalence in agrarian sector reported from different countries shows difference from that of skilled and semiskilled workers. Though, relative health of farmers differed between countries to country. The morbidity difference between manual workers and the class of administrators and professionals was approximately equally large in all countries. Consistently larger inequality estimates, with no or slightly overlapping confidence intervals, was only found for Sweden in comparison with Germany. A similar trend of morbidity in north Indian average town was observed in the present study, while, larger burden was evinced among housewives.

The size of inequalities in health was found to vary between countries in European studies. Studies conducted to assess whether there are variations amongst 11 Western European countries[3] with respect to the size, in self- reported morbidity between people with high and low educational levels evinced interesting trends. In general, there was a tendency for inequalities to be relatively large in Sweden, Norway, and Denmark and to be relatively small in Spain, Switzerland, and West Germany. Intermediate positions were observed for Finland, Great Britain, France, and Italy[4]. The position of the Netherlands strongly varied according to sex: relatively large inequalities were found for men whereas relatively small inequalities were found for women. It is remarkable that health inequalities are not necessarily smaller in countries with more egalitarian policies such as the Netherlands and the Scandinavian countries[5,6]. The current study based evidence of morbidity in relation to community based occupation furnished very important information from India.

The situation of developing nation like India, regarding disease based morbidity and its prevalence could be understood more comprehensively by undertaking studies focusing on community undergoing temporal changes, while implementing different educational and health programs. In order to get trend similar to that of European studies many more studies need to be carried out as that of the one being discussed in the present context.

While reassessing the international pattern of inequalities in mortality using an inequality index devised recently on the size of mortality differences associated with occupational status[7].

The smallest inequalities in mortality are observed for Norway and Denmark[9]. Larger inequalities are observed for Sweden (compared to Norway circa 1.5 times as large), England and Wales (2 times), Finland (4-5 times) and France (6-8 times). Our study also shows approximately two times higher morbidities among pensioners vs. others and among rural vs. urban (table 2).

India,being a developing nation, facing ridden with public health problems, various communicable diseases, malnutrition, poor environmental sanitation and inadequate medical care thereof[10]. Globalization and rapid industrial growth in the last few years has resulted in emergence of occupational health related issues. Present study showed less employment opportunity, unemployment and less manual work among a section of population shows high morbidity among classes[11,12].

There is dearth of community based data from India compels one to rely on census report. It is the major source of reliable information on employment and related issues. The general census in India is carried out every 10 yrs and the decennial trend reflects the status of morbidity and its prevalence and gender link to such prevalence or incidence for a long standing problem or issue. In case a short focused and indepth data is required to take any corrective or area specific temporal measure, one feels handicapped. Such

decennial data can only give material for long term planning and are not precise to throw light on specificity and sensitivity of any disease or morbidity pattern.

Though, the agencies like National Institute of Occupational Health, Industrial Toxicology Research Centre, Central Labor Institute are working on limited focused issues like asbestos and asbestos related diseases, pesticide poisoning, and silica related occupational hazards and illnesses. Apart from these, some sentinel studies have been undertaken to address morbidities across community from occupation point of view, however, representation of community as a whole is missing from researchable issues and publications. This type of study not only attempts to fill the gap but also highlights urgency of such information. This is essential for monitoring the impact of different focused health schemes and policies of Government.

Conclusion

There is a difference in the prevalence of overall morbidity in rural and urban population and among different occupations. A need of health education/ services targeted towards housewives, unemployed, unskilled and pensioners, that too more in rural areas, is evident from the observation.

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Personal Hygiene and Self-Reported Handwashing Practices among Food Handlers of a Medical College in Delhi

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Abstract

Introduction: **Food handlers play a major role in ensuring food safety as mishandling and disregard for personal hygiene on their part may result in food borne- illness outbreaks.**

Methodology: **Cross sectional observational study involving about 44 food handlers presently working were included. With structured proforma, details of socio- demographic data and self reported personal hygiene and handwashing practices were carried out.**

Results: **Majority of the study subjects had satisfactory or good personal hygiene. Significantly greater number of study subjects working as servers or helpers had a better status of hygiene as compared to the cooks. Personal income was significantly associated with the status of personal hygiene of the study subjects. Although majority of them were using soap for handwashing after defecation and micturition but only few were using it at the workplace. Although all of them were brushing/ cleaning their teeth, 50% were doing it only once in a day. Majority of them were taking bath in summers while 9% were not taking bath in winters. Majority of them were trimming their nails on a regular basis while 2.3% didn't cut their nails at all. Majority of them used to take medicine during diarrhea while only 2.3% used to take leave from work during illness. Most of them reported using towel to wipe the sweat. Most of them either covered their mouth or turned their face away from food while coughing/ sneezing. While 56.8% reported that they chased the stray animal, 20.4% said that animals never entered the premises, 2.3% had the habit of offering food to them.**

Conclusion: **There is a lot of scope for improving the standards of personal hygiene practices of food handlers. Important personal hygiene habits that help in prevention of contamination of food should be included in the content of health education sessions.**

Keywords: **Food handlers, personal hygiene, food-borne illness, health education etc.**

Introduction

Food- borne illnesses have an impact in both developing and developed countries. Although food is essential for life and growth, paradoxically it can be a source of food borne diseases which have been defined as "Diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food".[1]

Major risk of food contamination lies with the food handlers. Pathogenic organisms present in or on food handlers' body multiply to an infective dose when come in contact with food and could be a potential source of food poisoning to its clients. Indeed, the review by Guzewich and Ross of 81 foodborne illness outbreaks attributed to food contaminated by food workers found that 89% of these outbreaks involved the transmission of pathogens to food by workers' hands.[2]

For decreasing the burden of food borne diseases, the maintenance of food hygiene is important and is gaining both national and international

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importance. In India, the Bureau of Indian Standards (BIS) has formulated guidelines for maintaining hygiene of food, food handlers and food establishments that form as the basis for issuing the guidelines by various licensing agencies and regulatory bodies.[3-7]

In Delhi, the Municipal Corporation of Delhi (MCD)[8-9] and the New Delhi Municipal Corporation (NDMC) [10] have spelt out the conditions necessary for running food service establishments. World Health Organization (WHO) has also provided guidelines, strategies and recommendations for maintenance of hygiene of food, food handlers and food establishments.[1,11-14,]

Since the transmission of pathogens from food worker hands to food is a significant contributor to food- borne illness outbreaks, improvement of food worker handwashing practices is critical. Such improvement is dependent upon a clear understanding of current hand washing practices.

Few studies were conducted in past focusing the hygienic aspect of food handlers and eating environment. Therefore, this study was aimed at assessing personal hygiene and self- reported handwashing practices among food handlers of a medical college in Delhi.

Materials and Methods

The present cross sectional observational study was conducted between February to April 2014 amongst 44 food handlers working in 6 food service establishments located within the premises of a medical college in central Delhi. Our study included the food handlers who were presently employed. Data regarding socio- demographic profile, and general and clinical examination for personal hygiene was collected by using pre-tested and pre- designed proforma.

The status of personal hygiene of the food handlers was scored on the basis of twelve items (on the basis of criteria for 'employee hygiene' given by BIS[4,5] and WHO[11-13]) based on observations made during examination and self-reported practices as told during the interview. The classification of status of personal hygiene of the study subjects was done as follows:

Category	Score
Poor	0-6
Satisfactory	7-9
Good	10-12

The data was entered using MS Excel and analysis was done with the help of SPSS 16 version. Results were expressed as frequencies and percentages.

Results

A total of 6 food service establishments functioning within the premises were included in the study. 44 food handlers were taken including 9 cooks, 22 servers and 13 helpers. Mean age of the study subjects was 30.64 years with S.D. ± 10.6. All the study subjects were male. Majority of the study subjects (97.7%) were Hindu. 52.3% of the study subjects were married. 12.2% of the study subjects were illiterate and only 19.5% had received formal education only from primary to middle school level. Only 13.6% of the study subjects were getting income above Rs.10,000/- per month.

Characteristic	**Cook n = 9 (%)**	**Server n = 22 (%)**	**Helper n = 13 (%)**	**Total N = 44 (%)**
Age Mean ± S.D.	37.11 ± 6.85	29.82 ± 12.3	27.54 ± 7.9	30.64 ± 10.6
Sex -Male -Female	 9 (100.0) 0	 22 (100.0) 0	 13 (100.0) 0	 44 (100.0) 0
Religion -Hindu -Others	 9 (20.5) 0	 21 (47.7) 1 (2.3)	 13 (29.5) 0	 43 (97.7) 1 (2.3)
Marital Status -Married -Unmarried	 7 (77.8) 2 (22.2)	 10 (45.5) 12 (54.5)	 6 (46.2) 7 (53.8)	 23 (52.3) 21 (47.7)
Education Status -Illiterate -Primary to middle -10th and above	 1 (12.5) 1 (12.5) 6 (75.0)	 3 (14.3) 5 (23.8) 13 (61.9)	 1 (8.3) 2 (16.7) 9 (75.0)	 4 (12.2) 8 (19.5) 28 (68.3)

Personal Income per month*				
<5000	1 (11.1)	10 (45.5)	6 (46.2)	17 (38.6)
5000-10,000	4 (44.4)	11 (50.0)	6 (46.2)	21 (47.7)
>10000	4 (44.4)	1 (4.5)	1 (7.7)	6 (13.6)

* p-value = 0.037

Table 1.Demographic profile of study subjects (N=44)

Personal Hygiene		**Cook n = 9 (%)**	**Server n = 22 (%)**	**Helper n = 13 (%)**	**Total N =44 (%)**
Clothes	Clean	4 (44.4)	3 (13.6)	3 (23.1)	10 (22.7)
	Dirty	5 (55.6)	19 (86.4)	10 (76.9)	34 (77.3)
Cap	Yes	1 (11.1)	6 (27.3)	4 (30.8)	11 (25.0)
	No	8 (88.9)	16 (72.7)	9 (69.2)	33 (75.0)
Hair	Healthy/ Well combed	3 (33.3)	5 (22.7)	1 (7.7)	9 (20.5)
	Dandruff/ Not well combed	2 (22.2)	5 (22.7)	6 (46.2)	13 (29.5)
	Both Healthy & Well combed	4 (44.4)	12 (54.5)	6 (46.2)	22 (50.0)
Nails	Trimmed	5 (55.6)	19 (86.4)	9 (69.2)	34 (75.0)
	Not trimmed	4 (44.4)	3 (13.6)	4 (30.8)	10 (25.0)
Ornaments on hand	Yes	4 (44.4)	4 (18.2)	4 (30.8)	12 (27.3)
	No	5 (55.6)	18 (81.8)	9 (69.2)	32 (72.7)
Daily brushing teeth	Yes	9 (100.0)	21 (95.5)	13 (100.0)	43 (97.7)
	No	0	1 (4.5)	0	1 (2.3)
Daily Bathing	Yes	9 (100.0)	22 (100.0)	13 (100.0)	0
	No	0	0	0	0

Table 2.Personal Hygiene

Majority of the study subjects 77.3% wore dirty clothes. Although half of the study subjects had both healthy and well combed hair, but 29.5% had dandruff or not well combed hair. 75.0% of the study subjects were found with trimmed nails but still one fourth of them were found with the nails not trimmed. Majority of the study subjects in the present study reported that they were taking a bath and cleaning their teeth daily.

Hand Washing Practices		**Cook n=9 (%)**	**Server n=22 (%)**	**Helper n=13 (%)**	**Total N=44 (%)**
Wash Hands after defecation	Plain water/ either two	0	0	0	0
	Soap	9 (100.0)	22 (100.0)	13 (100.0)	44 (100.0)
Wash Hands after micturition	Plain water/ either two	4 (44.4)	7 (31.8)	3 (23.1)	14 (31.8)
	Soap	5 (55.5)	15 (68.2)	10 (76.9)	30 (68.2)
Wash Hands in kitchen	Plain water/ either two	0	1 (4.5)	0	1 (2.3)
	Soap	9 (100.0)	21 (95.5)	13 (100.0)	43 (97.7)
Dry hand after washing hands	Common towel, hair, clothes, newspaper, nothing	4 (44.4)	8 (36.4)	5 (38.5)	17 (38.6)
	Personal towel, heat from oven, disposable napkin	5 (55.6)	14 (63.6)	8 (61.5)	27 (61.4)

Table 3.Hand washing Practices

A high proportion of the study subjects in the present study reported about the practice of washing hands after defecation and micturition and in kitchen. Although many of them reported using personal towel for drying hands but still many were using common towel (38.6%).

Category	Scoring	Cook n=9 (%)	Server n=22 (%)	Helper n=13 (%)	Total N=44 (%)
Poor	0-6	4 (44.4)	1 (4.5)	1 (7.7)	6 (13.6)
Satisfactory	7-9	2 (22.2)	9 (40.9)	7 (53.8)	18 (40.9)
Good	10-12	3 (33.3)	12 (54.5)	5 (38.5)	20 (45.5)

Table 4.Scoring of Personal Hygiene and Hand washing Practices

Majority of the study subjects had satisfactory (40.9%) or good (45.5%) personal hygiene.

Discussion

Demographic Profile

The age of the study subjects in the current study was similar to that reported by other researchers from India.

All of the study subjects were males. Male dominance in food preparation occupation is possibly due to the cultural effect as mostly women are engaged in household work and the males have to go outside and work for meeting the financial needs of the family.

The level of education was low. Other findings of our study were same as the findings reported in India and other developing countries. [15]

Work Profile

Depending on the type of work the study subjects were engaged in during major part of their duty hours, they have been categorized as cooks, servers and helpers. Similar classification has also been reported in other studies. [15-17]

Only 13.6% of the study subjects were getting income above Rs.10,000/- per month. The low wages of the study subjects employed in the private establishments could be due to the lack of any fixed pay scales for them, which the government or co-operative society employees were having.

Personal Hygiene Status

Similar to other Indian studies [18-19], majority of the study subjects had satisfactory or good personal hygiene. However, the personal hygiene of cooks, who could be a potential source of infection due to direct handling of food, was observed to be significantly inferior in comparison to servers or helpers. This could be improved through health education.

Hand washing Practices

A high proportion of the study subjects in the present study reported about the practice of washing hands after defecation and micturition and in kitchen, which was similar to that reported in the study carried out by Oteri.[19] The use of soap for washing hands by food handlers has been reported to be higher by Oteri [19]and Sangole[20] as compared to the present study. The lesser use of soap (31.8%) for washing hands could be due to ignorance and not being aware about the possibility of contamination of hand after micturition.

Although many of them reported using personal towel for drying hands but still many were using common towel (38.6%) which could also be a possible source of contamination of hands as pointed out by Dumavibhat.[21]

Majority of the study subjects in the present study reported that they were taking a bath and cleaning their teeth daily possibly due to their positive attitudes for these practices. However, the actual practice could not be observed.

Conclusion

- There is a lot of scope for improving the standards of personal hygiene practices of food handlers.
- The important personal hygiene habits that help in prevention of contamination of food should be included in the content of health education sessions.

Recommendations

- Proper hand washing can significantly reduce the transmission of pathogens from hands to food and other objects. [2]
- These findings suggest that the hand washing practices of food workers need to be improved, glove use may reduce hand washing, and restaurants should consider reorganizing their food preparation activities to reduce the frequency with which hand washing is needed.

Acknowledgement

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Prevalence of Substance Abuse, Hypertension and Obesity among Security Men working in a Teaching Hospital in Delhi: A Cross Sectional Survey

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Abstract

Introduction: **Security men are subjected to a considerable degree of stress related problems due to their changing duty hours and difficult working environment. Chronic stress in them may lead to increased propensity to develop addiction for tobacco, alcohol and other psychoactive agents. In addition to this, certain other behavioral factors also make them prone to develop non-communicable diseases in future. Thus, it is important to find these lifestyle factors and associated morbidities at the earliest to take early interventions for their prevention and timely management.**

Objectives: **The study aims to assess the prevalence of hypertension, obesity, and tobacco and alcohol use among security men.**

Methods: **A total of 50 private security men working in a tertiary care teaching hospital in New Delhi were selected using convenient sampling method. Data was collected using a pre tested semi structured questionnaire consisted of items on socio-demographic profile, behavioral factors like substance abuse after taking informed consent. Anthropometric measurements like weight, height and blood pressure were also recorded. Data was analyzed using SPSS 17. Chi square/ Fisher's exact test was used to find significance of association between qualitative variables. P value less than 0.05 was considered significant.**

Results: **Mean age of security men was 52 years. The prevalence of smoking, chewing tobacco and alcohol consumption was 48%, 30% and 54% respectively. Alcohol consumption (p = 0.041) and smoking (p = 0.044) was significantly associated with migration. BMI was calculated which showed that 42% (n=21) were overweight and 6% (n=3) were obese. 16% (n=8) were found to be hypertensive.**

Conclusion: **Looking at the high prevalence of lifestyle disorders like tobacco and alcohol abuse, obesity and hypertension, it is recommended that innovative Behavior Change Communication (BCC) strategies should be undertaken for prevention, early diagnosis and management of non communicable diseases and its risk factors.**

Keywords: **Security men, Alcohol, Tobacco, Obesity, Hypertension, India.**

Introduction

As defined by World Health Organization, Occupational Health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards.[1] The goal of occupational health and safety is to foster a safe and healthy work environment. Health workforce consists of team comprising of medical, paramedical, administrative and support staff. For a team to work together efficiently, it is important that all members of the team are in sound physical and mental health. In this regard, health concerns of security staff, which is one of the important but neglected aspect that needs to be studied.

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Studies have shown that hospital employees are subjected to considerable stress and burnout.[2] Security men are subjected to a considerable degree of stress related problems due to their changing duty hours and difficult working environment. Chronic stress in them may lead to increased propensity to develop addiction for tobacco, alcohol and other psychoactive agents. Staying away from their families also adds to the burden. In addition to this, certain other behavioral factors also make them prone to develop non-communicable diseases in future. Thus it is important to identify these lifestyle factors and associated morbidities at the earliest to take early interventions for their prevention and timely management.

Though there are a lot of research articles related to occupational health, very little knowledge is available on workplace hazards and lifestyle factors among security guards. Given their stressful working conditions, there is a need to study the high risk behavioral factors and the burden of non communicable diseases in security guards. Keeping in view of above facts, present study was planned with the objective to estimate the prevalence of substance use, hypertension and obesity among security men working in a medical college in Delhi.

Materials and Methods

A cross-sectional study was conducted over a period of two months from July to August 2014 among security men working in a medical college in Delhi. All security men working in the institution constituted the study population. There were three private security units working in the medical college campus. Due to time constraints, one security unit was randomly selected for the study and a convenience sample of 50 security men were included in the study.

Data Collection and Study Tool

Data was collected from the security men by direct interview during their working hours after getting written informed consent. A pre tested semi-structured questionnaire was used to collect information on socio-demographic profile, working environment, lifestyle factors like smoking, tobacco chewing, alcohol use and dietary habits. Data was also collected on the type, duration and amount of tobacco and alcohol consumed.

Anthropometric measurements like height, weight, waist circumference, hip circumference were measured. Weight was measured using a digital weighing machine after removing the shoes with minimal clothing. A standard inelastic tape was used to measure the height, waist and hip circumferences. According to WHO protocol, the waist circumference should be measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a stretch-resistant tape and the hip circumference should be measured around the widest portion of the hip, with the tape parallel to the floor[3]. WHO STEPS states that abdominal obesity is defined as a waist–hip ratio above 0.90for males or a Body Mass Index (BMI) above 30.[4] BMI was calculated with the measured height and weight and the study subjects were classified into normal weight (18.5 – 24.9), overweight (25-30) and obese (>30).[5] Waist hip ratio (WHR) was calculated from the measured waist and hip circumferences. Blood pressure was measured using an aneroid manometer with standard cuff size. Two readings were taken in sitting position with an interval of five minutes and the average of the two values was taken. A systolic blood pressure of >140 mmHg and a diastolic blood pressure of > 90 mm Hg was diagnosed as hypertension.[6] Also, data on history of treatment of hypertension and compliance was collected. Privacy was maintained during all anthropometric measurements.

Data was analyzed using SPSS 17 and expressed in mean $\pm$ SD and proportion wherever applicable. Chi square/ Fisher's exact test was used to find the significance of association between qualitative variables. P value less than 0.05 was considered significant. Approval was obtained from the Institutional Ethics Committee (IEC). Purpose of study was explained to all the study subjects and written informed consent was obtained before enrollment.

Results

Socio demographic Profile

The mean age of the security men was 52 ± 5.6 years. As shown in table 1, 92% (n=46) of them were recruited after their service in the army, with their mean years of service being 30 ± 5.8 years. All of them were posted on an 8 hour shift basis, with their duty areas changing periodically. 96% (n=48) of the security men were married, 68% (n=34) used to stay with their family and 32% (n=16) stayed away from their family in the security guard quarters provided to them.

Characteristics	Frequency	Percentage
Age		
More than 50	29	58%
Less than 50	21	42%
Marital status		
Married	48	96%
Unmarried	02	4%
Residence		
Staying away from family	16	32%
Staying with the family	34	68%
Previous occupation		
Ex Army Men	46	92%
Other	04	08%

Table 1.Socio demographic profile of study subjects

Non Communicable Disease Risk Profile

The prevalence of smoking, chewing tobacco and alcohol consumption was 48%, 30% and 54% respectively. 20% (n=10) of them used to consume pure vegetarian diet and remaining 80% (n=40) had mixed diet.

As shown in fig.1, the prevalence of tobacco smoking was 48% (n=24), out of which 67% smoked bidis, 4% smoked cigarettes and 29% smoked both. Majority of the smokers had been smoking for >30 years (75%) and half of the smokers smoked >5 times a day.

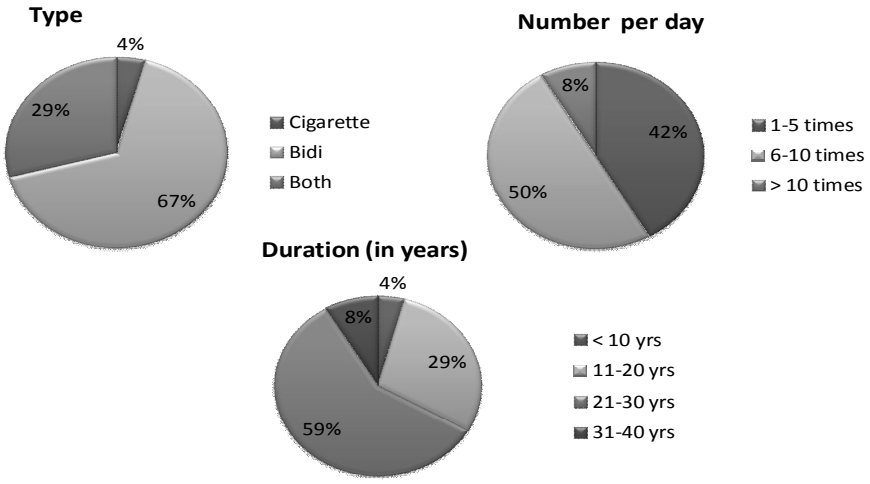

Figure 1.Characteristics of tobacco smoking among study subjects

As shown in fig. 2, the prevalence of tobacco chewing was 30% (n=15). Khaini was the most common type of tobacco chewed (73%) and nearly half of them had the habit of chewing more than thrice a day. Majority of them had been chewing tobacco for >20 years (53%).

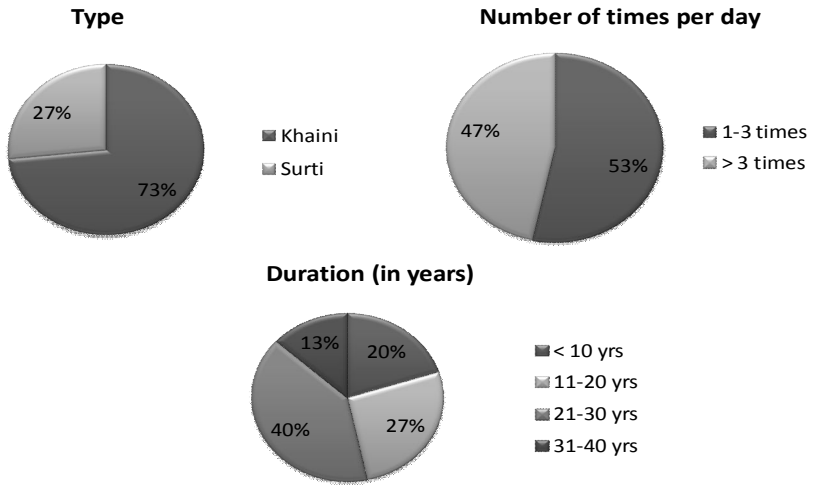

Figure 2.Characteristics of tobacco chewing among study subjects

As shown in fig. 3, the prevalence of alcohol intake was 54% (n=27), of which 7% reported daily consumption. 9% of the alcoholics were consuming alcohol for more than 20 years.

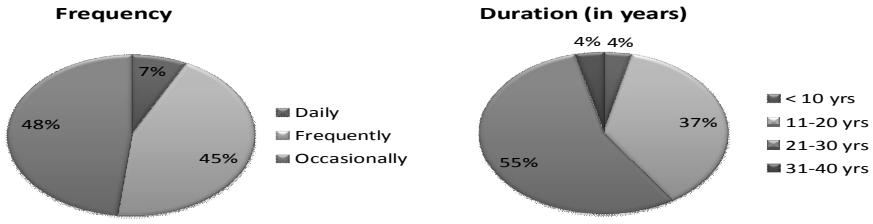

Figure 3.Characteristics of alcohol intake among study subjects

Anthropometry

The mean height and weight of the security men were 169.4 ± 6.3cm and 71.5 ± 8.5kg respectively. 54% (n=27) had Waist Hip Ratio (WHR) less than 0.90, 36% (n=18) had WHR of 0.90 to 1.0 and 10% (n=5) had WHR more than 1. BMI value of 18.5 to 25 was labeled as normal weight, 25 to 30 as overweight and >30 as obese. 42% (n=21) of the security men were overweight and 6% (n=3) were obese.

Hypertension

The prevalence of hypertension was found to be 16% (n=8) as shown in table 2, of which 3 security men were diagnosed as hypertensive during the study. Out of the 5 security men who were already known to be hypertensive, only 3 of them were compliant to anti-hypertensive treatment. All hypertensives were counseled for salt-restricted diet and lifestyle modifications and were referred for treatment.

Disease	Frequency	Percentage
Hypertension	8	16%
Overweight	21	42%
Obesity	3	06%

Table 2.Non communicable diseases profile among study subjects

Table 3 shows that staying away from the family was significantly associated with smoking (χ^2 = 4.06, df=1, p = 0.04), tobacco chewing (χ^2 = 7.72, df=1, p = 0.01), alcohol use (χ^2= 4.17, df=1, p = 0.04) and obesity (χ^2 = 4.98, df=1, p = 0.02). Smoking was found to be significantly associated with alcohol consumption (p = 0.01). Hypertension was significantly associated with being obese (p = 0.04) and alcohol consumption (p = 0.04).

	Smoking N (%)	Tobacco chewing N (%)	Alcohol N (%)	Hypertension N (%)	Overweight & Obesity N (%)
Age<50 yrs	7 (33.3)	7 (33.3)	9 (42.9)	2 (9.5)	9 (42.9)
Age>50 yrs	17 (58.6)	8 (27.6)	18 (62.1)	6 (20.7)	17 (58.6)
Married	22 (45.8)	14 (29.2)	25 (52.1)	7 (14.6)	24 (50)
Unmarried	2 (100)	1 (50)	2 (100)	1 (50)	2 (100)
Staying with family	13 (38.2)	6 (17.6)	15 (44.1)	4 (11.7)	14 (41.2)
Staying away from family	*11 (68.8)	*9 (56.3)	*12 (75)	4 (25)	*12 (75)

*p ≤ 0.05 (significant)

Table 3.Socio demographic determinants of non communicable diseases among study subjects

Discussion

In the present study, prevalence of hypertension came out to be 16% which was consistent with the results of a similar study published by Jain A et al. in a private medical college in Jaipur.[7] Although few studies[9,10,11] done on hospital support staff reported a higher prevalence of hypertension, the lower prevalence in our study could be attributed to the physical fitness and non-sedentary lifestyle in security men along with the fact that most of them were from Army background.

Prevalence of both smoking and tobacco chewing was higher than the prevalence reported in the other studies.[7,8] Prevalence of alcohol use (54%) was also higher than the other studies,[7] which may be due to the early exposure to alcohol during their service in the army.

An important aspect of drug compliance was found among security men with already diagnosed cases, that even some of them were not compliant to treatment. Significant association was found with staying away from family and substance abuse. Possible reasons could be lack of sources of entertainment and difficult working conditions.

This study was possibly limited by a couple of factors. First, blood pressure was analyzed only once. Therefore, hypertension prevalence based on the criterion of blood pressure increase at the moment of the measurement may be overestimated. However, most of the studies of this nature do not take blood pressure measurements on numerous occasions. A second limitation was small sample size and purposive sampling method.

Conclusion and Recommendations

Looking at the high prevalence of lifestyle disorders like tobacco and alcohol abuse, obesity and hypertension, it is recommended that innovative Behavior Change Communication (BCC) strategies should be undertaken for prevention, early diagnosis and management of non communicable diseases and its risk factors.

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Reproductive Profile: Women Bidi Workers of District Sagar of MP

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Abstract

For the present investigation, cross sectional data on different aspects of fertility was collected from 119 households of district Sagar of Madhya Pradesh. A semi structure schedule was used to collect information on age, sex, age at first birth, total number of live births, number of children died, number of surviving children, pregnancy experienced by mothers and reproductive wastage etc. It was found that 499 pregnancies were experienced by 112 mothers, out of which 4525 were total live birth, 68 were child loss and 47 were fetal loss. By using these variables, fertility was estimated, and rates and ratio such as Child women ratio, Crude birth rate, General fertility rate, Age specific fertility rate, General marital fertility rate, Gross reproduction rate, Total fertility rate etc. were calculated. Among bidi workers, the mean age of mother at first birth was found to be 21.31 ± 12.5 years. The crude birth rate (CBR) was found to be 24.6. Total fertility rate was 5.5, which is quite higher as compared to vital rate of Madhya Pradesh and Nation, whereas General fertility rate was 100 and General marital fertility rate was 138.2. The Gross reproduction rate was 2.69, whereas the highest ASFR was found to be 400 among mothers belonging to age group of 15-19 years. It was concluded that the studied population have higher fertility rate and requires further investigation to find out the reason behind it.

Keywords: **Birth rate, Fertility rate, Specific fertility rate, Reproductive rate.**

Introduction

Fertility is used to measure the rate at which a population adds itself by births and is normally assessed by the number of birth (Lewis & Thompson 1930). The growth of any population or group of people in a society or country entirely depends on fertility (Jain 2006). Fertility is dependent on socio economic condition, demographical factors, cultural aspects, biological characteristics such as heredity, health and disease, age at menopause, age at menarche, marital status, reproductive life span, age at first births of mother; physiological factors etc. The birth control methods and family planning have their perspectives spheres of influencing fertility. Some demographers have used the word "Natality" instead of fertility. A number of studies have been conducted in this field by various researchers and scholars: Dandekan & Dandekan (1953); Dandekan (1959); Ray & Burman (1961); Nag (1962); Das (1973); Thompson & Lewise (1965); Vidhyarti & Rai (1977), Sahu (1994); Jain (2006) have studied the fertility of Himalayan Population. Kshatriya, Gautam & Kapoor[11] have studied the fertility profile of Bhil of desert and Bhasin & Nag[4] have studied the fertility of Kashmiris etc.

Area and People

Madhya Pradesh is one of the largest states in India. It holds the 6th position in terms of population. It is a part of Central India which is surrounded by six states, Uttar Pradesh, Chhattisgarh, Maharashtra, Gujarat, Rajasthan and Bihar. It lies between $26^0 52'$ and $17^0 46'$ north latitude and $74^0 1'$ and $84^0 23'$ east longitude. Madhya Pradesh is known as growing state of India with a large population (7, 25,97,565: census, 2011). Madhya Pradesh is rich in raw material of country cigarette know as *Bidi.* The raw product which is used in manufacturing Bidi is Tendu leaves. Bidi manufacturing trend in Madhya Pradesh was established at the end of 16th century. The workers who are engaged in the manufacturing of *Bidi* are known as Bidi workers. There are different categories of Bidi workers viz. Collector of Tendu leaves, Bidi roller, Sattedar, Roster, Steamer and Packagers. All of them are constantly exposed to tobacco dust. Out of them, a large proportion of Bidi rollers are females. They are more exposed to tobacco dust, which results in multiple disorders on their health. The objective of the present study was to assess the fertility among Bidi rollers. To fulfill the objective, samples were drawn from district Sagar of Madhya Pradesh.

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Correspondence to: Dr. Arun Kumar, Department of Anthropology, Dr. H.S. Gour Vishwavidylaya, (A central university), Sagar-470003 (M.P.), India. ***E-mail Id:*** shubh01arun@gmail.com

Material and Methods

For the present investigation, *Bidi workers* of a village of district Sagar were selected. A total of 112 mothers of 119 households of the village Pathariya Jat were interviewed by door to door survey. A semi structured schedule was used for collecting information via interview and observation related to age of mother at first birth, pregnancy enumeration, total number of live births, total number of surviving children, total number of children who died, total number of abortions, still births and number of premature deliveries. Before data collection, consent was obtained from *Sarpanch* of village and head of households. They were convinced about the aims and objectives of the study. The schedule introduced was culturally validated. After collection of the information, it was analyzed using softwares such as SPSS and MS-Excel, and computed the rate and ratio of fertility; CWR, GFR, GMFR, TFR, GRR, CBR, ASFR, TFR as was done by Gautam[9] and Bhasin & Nag[4].

Result and Discussion

The age of mother at first birth is a very important parameter in demographical indicators and fertility performance. The age at first birth is used to determine the actively reproductive period and fertility rate. The distribution of mothers as per age at first birth is represented in table 1. It is apparent from the table that the largest proportion of mothers (64.2 %) gave births between 15-19 years of age and 33.03% at the age of 20-24 years of age. It indicates the prevalence of early marriage among bidi workers of district Sagar of Madhya Pradesh. Although there is a wide gap between the potential level of fertility (Fecundity) and actual performance of the potentiality (Fertility), readily it has to rely upon the latter for measuring the actual fertility performance. For obtaining the level of fertility in a population various fertility measurements have been calculated such as number of pregnancies experienced by mothers, numbers of live births, numbers of children surviving, child loss and fetal loss, as presented in table 2. It is apparent from the table that a total of 499 pregnancies were experienced by 112 mothers. These mothers have given birth to 452 children, out of which 384 survived and 68 died. They experienced 10 still births, 13 abortions and 24 premature deliveries. Fetal loss was 2.19% and child loss was 15.04%.

Age group	N	Percentage
15-19	72	64.2
20-24	37	33.03
25-29	2	1.78
30-34	1	0.89
Total	**112**	**100**

Table 1.Distribution of mothers according to age at first birth among Bidi workers of district Sagar (M.P.)

Fertility	Total	Average per Mother
Total number of mother	112	-
Total number of pregnancy	499	4.45
Total live birth	452	4.03
Total surviving children	384	3.4
Number of children died	68	0.60
Number of still birth	10	0.08
Number of abortion	13	0.11
Number of premature delivery	24	0.214

Table 2.Fertility history among Bidi workers of district Sagar (M.P.)

The fertility rates and ratio like GFR, ASFR, TFR, CWR, CBR, GRR and GMFR etc., are helpful in understanding the relation between the general condition and fertility level of individuals. The measure of fertility indicators among bidi workers of district Sagar of Madhya Pradesh is represented in table 3. It is apparent from the table that among Bidi workers, the CWR was 361.5 and it's comparatively low with other population of India, such as CWR of Khandha was 695.0.[15] Among Juhar Bhotia of Uttar Pradesh, it was reported to be 734.46[5] and among Kamar, it was 1141.31[3].

Fertility Indicator	Present study
Child women ratio	361.5
Crude birth rate	24.6
General fertility rate	100
General marital fertility rate	138.2
Total fertility rate	5.5
Gross reproduction rate	2.69

Table 3.Fertility rate & Ratio among Bidi workers of district of Sagar (M.P.)

Crude birth rate is another important indicator of fertility and is denoted by CBR. It is apparent from table 3, that the CBR among Bidi workers was 24.6, which is comparatively less than Bhil (43.5)[6]; Gonds (43.0)[14]; Abujhmariya (39.9)[13]; and Sahariya (43.76)[2], and others. The Crude birth rate of any population is influenced by standard of education, medical facility, communication system, environmental condition, family size etc. (Davis & Blkae 1956). Similarly the general fertility rate (GFR) computed was 100, which is higher than Lohar Gadiyas (76.17)[17]. The Age specific fertility rate (ASFR) is represented in table 4. It is apparent from the table that the ASFR of mothers of 15-19 years of age group was 400 and ASFR for mothers of 20-25 years of age group was 333.3, followed by 214.2 for mothers of 25-29 years. After that, it sharply declined to 43.3 among mothers of 30-34 years of age, 66.6 and 47.6 reprehensively for mothers of 35-39 and 40-49 years of age respectively. The highest ASFR was reported among Bidi workers belonging to 15-19 years of age group.

Age group	Number of women	Number of birth in last one year	Age specified fertility rate
15-19	5	2	400
20-24	15	5	333.3
25-29	14	3	214.2
30-34	23	1	43.3
35-39	15	1	66.6
40-49	21	1	47.6
Total	112	13	1105.1

Table 4.Age specific fertility rate among Bidi workers of district of Sagar (M.P.)

The total fertility rate is a single index of fertility. It is a more effective measure of summarizing the frequency of birth of a particular year. Among Bidi workers, the TFR was found to be 5.5 as compared to that among Lohar Gadiyas (4.60)[17]. It is lower than many of previous studied population such as Sahariya 6.70[2], Halba (5.89)[1] and Baiga (5.2) (Gautam et al. 2007). The TFR of present study was found to be higher than Kandh (1.44)[15]; Bhotia (1.34)[5], Thoti (1.84)[8] etc. It is apparent from the table that the gross reproduction rate was found to be 2.69 and this value is slightly lower than Sahariya of Madhya Pradesh. On comparing with previous studies, it was noticed that from present study, the last but most important fertility indicators general marital fertility rate (GMFR) was found to be 138.2 which was lower than previously studied population such as Sahariya (248.29) followed by Kandh (213.11)[15], but it was higher than Marcha Bhotia (119.44)[5].

Conclusion

Bidi workers are low wages earners, and lag behind in bio-demographical characteristics and fertility profile. On the basis of the present study, it can be concluded that they have higher fertility rate as TFR is 5.5 which is very high as compared to NFHS-3 for state and nation. Similar is the case with other indicators and they require further investigation to find out the reason behind it.

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Respiratory Health Effects of Exposure to Welding Fumes

Tor Erik Danielsen[*]

The ability to weld created an industrial "revolution" in the mid 20th century. Metals could be joined faster, cheaper, leaner, and stronger. The welding process is a method for joining pieces of metallic materials when heated to such high temperatures that the pieces merge and unite in pasty condition, often using filler metal or under pressure.

Much more than one million workers perform welding as professional workers and many more workers perform the process as a part of their jobs. The equipment is affordable and widely distributed.

We know that the welding process produces metal fumes and gases that may be harmful to the operator. The exposure composition is dependent on the welding work piece, the electrode and temperature. The particles formed in the welding process are often "ultra fine size range" (0.01-.10 microns), but they often form chains after the process and before reaching the operators' respiratory system.

There are obvious challenges in the assessment of causality. Health effects can therefore more often be attributed to the effects of exposure from one profession (welding) than from the specific exposures (welding fumes).

To assess exposure indirect methods can be used. That is by characterizing type of industry, end product, steel used, application of the end product, time period, training, working conditions in general, other exposures, and other exposed.

In Norway, gloves and glasses have in principle always been used. That is because they prevent acute effects.

In Norway, before 1970, respiratory protection was in little use.

At that time, a growing concern for chronic lung effects, gradually introduced respiratory protection.

Appropriate breathing equipment provides significant reduction in corresponding exposure (1:6). The effects of the exposure are depending on the type of smoke or gas, its physical and chemical properties, dose, exposure conditions, and vulnerability for the exposed.

Relevant respiratory diseases could be asthma, chronic obstructive pulmonary disease (COPD), metal fever, acute chemical or hypersensitivity pneumonitis, lung edema, infections, emphysema, siderosis, and lung cancer.

Asthma

It is known that exposure to welding fumes may cause reversible changes in lung function. There are few animal studies that have examined the effects of welding fumes on lung function. Epidemiological studies have shown an association between exposure to welding fumes and the development of asthma. In Norway, occupational asthma is reported frequently from the aluminum industry and among bakers, car painters, welders, metal workers, hairdressers, farmers, nurses and cleaners.

These all occupations have mixed exposure to various types of dust, fumes, gas or vapor. Up to 70% of asthmatics in the work may be worse at work and better when they are away from work. For only 15% of them were reported as occupational disease to the Norwegian Labor Inspectorate.

COPD

Many studies are conducted among welders of potential effects on obstructivity and gas diffusion. Some studies have shown an increased incidence of lung disease among highly exposed welders; especially among daily smokers.

Emphysema

Groups of welders are working with substances, which can cause emphysema. This effect has been found in studies on mortality by increased cause-specific mortality among welders. However, this is not well detected in groups with well- characterized exposure doses for welding fumes.

Siderosis

The pneumoconiosis called siderosis (welders' lung) is directly connected to significant iron oxide exposure. This is a reversible pneumoconiosis with no fibrosis or significant influence of lung function. A high incidence of siderosis could be an indicator of massive exposure to welding fumes.

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Lung Cancer

The association between lung cancer and exposure to welding fumes has been discussed in a lot of papers. Welders are often subdivided in welders at shipyards, welders working on stainless steel, and welders working with black or carbon steel.

All groups are potentially exposed to carcinogenic substances.

However there are limited, but developing evidence on carcinogenic effects from cell/ animal studies. Individual epidemiological studies show different results, but indicate 30% - 40% increase in the incidence of lung cancer among welders.

The results for the different subgroups are relatively comparable when summarized in meta- analysis. New welding techniques and work with other materials can potentially give relevant exposure to decomposition of plastic (such as isocyanides).

The status for respiratory health effects among welders with the technology in widespread use for more than 60 years is that we need more knowledge about chronic health effects, and more knowledge about potentially new health effects:

NIOSH, in 2003, suggested two complementary types of research to fill knowledge gaps with regard to health effects connected to welding:

- A continuation of **epidemiological studies** to provide a better understanding of the role that welding fumes play in immunosuppression, lung cancer development, neurotoxicity, skin damage, reproductive disorders, and other effects that some studies have associated with components of welding fumes.
- **Toxicology studies** using state- of- the- art techniques to examine key biochemical reactions to welding fumes at the molecular level in laboratory experiments.

With such data, scientists will have better insight into the ways that subtle genetic and cellular changes might lead to tumor formation, nerve damage, or other adverse changes in tissues and organs.

Summary

Welding fumes contain respiratory irritants. The exposure is largely preventable. Epidemiological studies of groups of welders have shown variable results, but they indicate an association between exposure to welding and different types of lung effects.

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Use of Hand Held XRF Equipment – Challenges in Health and Safety

Paari Krishnan[*]

Abstract

The X-ray Fluorescence equipment (XRF) is a non-destructive testing device used to find the presence of elements in solids, liquids and the amount of each element in raw materials and finished products. The test is a reliable, fast, non- destructive and inexpensive process compared to establishing a large chemical laboratory and time consuming methods to analyze elements. However, X-ray of a confirmed carcinogen is a physical hazard which causes tissue damage by ionizing radiation. Though XRF technology existed since 1990s, the Hand Held XRF (HHXRF) is a small gun like device introduced in 2001 and its large scale commercial use started from 2008. Compared to medical radiology, where the primary beam is pointed to the patient, in Industrial radiography, the primary beam is pointed to inanimate object. The X-ray scattering while using XRF analyzer, which creates background radiation is a hazard that needs attention. This article enumerates the challenges to the health and safety of the operator and peers and the measures to be implemented at work place, as HHXRF analyzers are used in many industries.

Keywords: **HHXRF, X-ray radiation, Fluorescence, Scatter, Stochastic effects, ALARA.**

Introduction

HHXRF Analyzer works on the principle that the fluorescence exhibited by elements when flashed by X-ray is specific to each element. It computes this value and the result are displayed in seconds. It is used to identify elements present in alloys (qualitative and quantitative measurement), scrap segregation, precious metals testing etc. These analyzers are used in mining, oil, agriculture, pharmaceutical industries, security, education and research.[1, 2]

Figure 1.Side View of HHXRF Device

Advantages of using HHXRF Analyzer

The advantages of HHXRF are non-destructive technology, inexpensive, rapid, accurate analysis, and correct grading in seconds. Low limits of detection for elements without large scale infrastructure to do the tests, and user-defined pass/ fail messages for fast sorting and screening which makes effortless batch evaluation of the tested samples are the hall mark of this technology.[3]

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Figure 2.Result Display Screen

Hazards during the Operation

The equipment being small in size, innocuous look of a toy gun, and the ease of operation by the press of a button to shoot the X-ray; training of operators on safety and health effects of radiation to self and environment needs emphasis. The HHXRF have been manufactured and sold with a warning that no body part shall be in line of the primary beam during the testing process.[4] However, when the primary beam passes through lighter metal like aluminum, plastic or wood, there is dispersion of X-ray in the environment causing radiation due to scattering. The radiation exposure could occur during testing in the following ways:

1. Accidental exposure to primary radiation, without interacting with the sample.
2. Scattered X-ray in the environment at the time of testing a sample.
3. Dispersion of X-ray from low density metals and other materials.

Health Effects due to Radiation

Stochastic effects (Deterministic) are the adverse effects due to radiation without existence of threshold value. This is explained as the probability of developing radiation induced illness (cancer, inheritable effects) among the exposed. All living organisms are exposed to natural radiation from the cosmos and environment. The radiation protection measures taken at work place are to prevent the exposed from developing stochastic effects.

Non-Stochastic or Deterministic effects are the adverse effects due to radiation in which the severity of the effect varies with the dose received. These effects may develop within hours to days and depend on the dose of exposure (skin burn, systemic syndromes affecting bone marrow, blood or nervous system etc). These effects are seen only due to accidental exposure to radiation and must be avoided completely.

Personnel at Risk to X-ray Radiation

The individual operating the HHXRF and any other employee present in line of primary radiation path or in the scattered X-ray zone is at risk. The exposure to radiation and occurrence of adverse health effects depends upon the intensity, duration of exposure and also on the susceptibility of the individual.

Law related to Ionizing Radiation in India

The Atomic Energy Regulatory Board (AERB), constituted under the Atomic Energy Act, 1962 by the Government of India, is entrusted with the responsibility of developing and implementing appropriate regulatory measures aimed at ensuring radiation safety in all applications involving ionizing radiation.

Category	Dose mSv/year	Cumulative effective dose mSv for 5 years
Worker	20 (Max 30)	100
Lens of eye	150	
Skin, Hand, Feet	500	
Trainee	6	
Public	1	Average to be 1/year

Table 1.Guideline on Radiation Dose limit[5]

Challenges in Health and Safety

- Unlike other physical hazards, radiation could not be sensed and exposure to X-ray radiation goes unnoticed.
- In addition to radiation by the primary beam, energy from scattered X-ray would also be as high as incident energy.
- While assessing the hazard and risk analysis, the equipments based on X-ray technology should be identified and relevant radiation prevention measure should be implemented.
- The operator is to hold the equipment by hand at the time of use.
- The X-ray exit window must be kept in close approximation with the tested sample without any gap, to prevent scattering at the time test.

Figure 3.X-Ray Emission Window

- The sample must not be held in hand while testing.
- If sample size is smaller than the X-ray window, scatter and background radiation is more.
- In case inexplicable redness of skin or burn injury is reported, history of handling HHXRF equipment by the individual should be ruled out.

Safety Measures against Radiation

The safety measures against radiation in occupational setting have multifarious facets.

Corporate Policy

- There shall be a Radiation Safety Officer who would co-ordinate and supervise the radiation safety measures in the organization.
- The procurement process should include that AERB certified HHXRF Analyzer should only be purchased.
- The equipment should be handled by trained and qualified persons only.
- It has to be kept in safe custody when not in use.
- The equipment shall be operated in confined area with "RADIATION HAZARD" sign board.
- Log book should be maintained regarding details of use by the individuals and number of samples tested every day, maintenance and repairs, services carried out if any on the equipment.
- Unauthorized person should never be allowed to open or repair the equipment.
- Radiation surveillance of workers who are operating the radiation equipment needs to be carried out as advised by the AERB, India.

Operation of the HHXRF Analyzer

- The equipment should have "RADIATION HAZARD" warning sign.
- The equipment should never be pointed at a person.
- While testing, the sample should never be held in hand.
- Gun holding bench top stand should be used to prevent radiation.
- When operating the equipment, the hands should never be exposed to the primary beam of the equipment.
- Radiation shield should be used to protect the operator from the scattered radiation effect.

Health Measures for Workers Exposed to Radiation

HHXRF operators should be monitored for radiation using personal dosimeter.

Medical examination tests and medical surveillance should be carried out at appropriate interval for workers exposed to radiation, as recommended by AERB.

Related to Human Behavior

The safe method of testing the sample is to keep the face of the gun and the sample closely approximated without any gap. Improper positioning leads to reflected X-ray escaping to environment and increasing the scattered radiation level. This aspect of testing process needs to be emphasized during training and supervised during the actual operation for 100% compliance.

Conclusion

The X-ray equipment used in health care institutions and industrial NDT Testing Centre are handled by trained and certified radiographers. The scenario has changed since the number of HHXRF analyzers being operated by employees, who are not radiographers in various industries, is likely to increase in future. Radiation being an invisible hazard, a known carcinogen with unknown threshold limit, stringent safety and health measures alone could offer protection to individuals at workplace. The basic principle behind radiation safety is As Low As Reasonably Achievable (ALARA) radiation which is based on time, distance and shielding; that is as low time as possible exposed, as more distance as possible from the radiation source and as thick shield as could be placed between the person and radiation.

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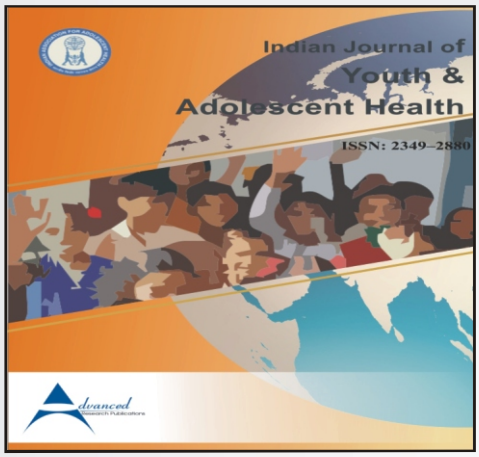

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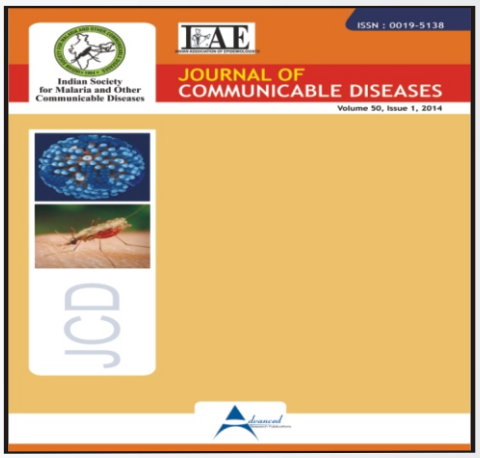

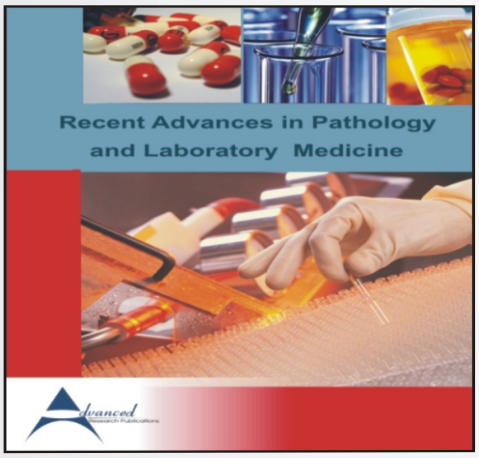

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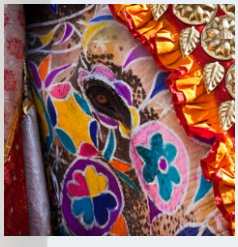

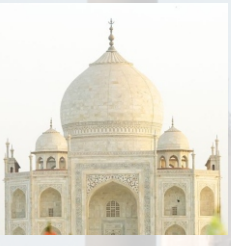

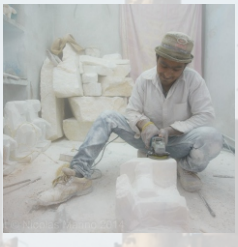

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