Research Article

A longitudinal study - Morbidity profile among clinical laboratory personnel in a private tertiary care hospital in Bengaluru, South India

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ABSTRACT

Background: Laboratory workers are exposed to various risks and hazards such as physical, chemical, biological, and ergonomic. Workplace safety in the laboratory setting is an important issue. Studies that address the overall morbidity patterns in these personnel are limited; hence, the current study was undertaken. **Objectives:** The objectives of the study were to estimate the incidence rate, morbidity profile and the associated factors of acute morbidities among clinical laboratory personnel. **Materials and Methods:** A descriptive longitudinal study was undertaken in a private tertiary care hospital over a period of 1 year. Personnel from clinical pathology, biochemistry, microbiology, and blood bank services were included. Data were collected through periodic mobile phone short messaging services and personal interactions, along with sick leave record review. **Results:** Of the 132 workers majority were females, ever-married, involved in sample processing and working in clinical pathology, permanent, and experienced workers (>6 years). The incidence rate of acute morbidity was 3.09 episodes per 100 person weeks. By univariate logistic regression analysis, frequency of morbidity was significantly high in older age group, ever-married workers, housekeeping staff, permanent, and experienced workers. However, multivariate logistic regression analysis revealed the frequency to be significantly high in ever married workers (adjusted odds ratio [OR]: 4.3, 95% confidence interval [CI]: 1.3–14.9) and permanent workers (adjusted OR: 5.3, 95% CI: 1.2–23.2). The most common acute morbidities were upper respiratory tract infection (27.1%) and musculoskeletal pain (20.2 %). Infectious diseases were commonly reported by young and microbiology workers. Musculoskeletal disorders were common among female workers. **Conclusions:** Implementation of standard operating procedures, application of the science of ergonomics in laboratory workstations along with behavioral change communication approach may address many of the identified problems among laboratory personnel.

KEY WORDS: Clinical Laboratory Personnel; Laboratory Worker; Morbidity Profile; Longitudinal Study; Tertiary Care Hospital

INTRODUCTION

Laboratories are microenvironments with diverse occupational health hazards and a at-risk population.[1] Laboratory workers are exposed to various infectious materials such as blood and other body fluids or equipment contaminated with infection-causing agents.[2-4] In addition, laboratory procedures may generate aerosols further exposing the personnel to the risk of infections.[2,3] Laboratory personnel are also at risk of needlestick injuries which come with a dual threat of an injury and an infection.[5] As a result, these workers are at risk of acquiring infections such as HIV, hepatitis B and hepatitis C, and tuberculosis.[6,7] They are further exposed to corrosive chemicals and reagents which put them at risk of burns and scalds.[8] Therefore, workplace safety in the laboratory setting is an issue that needs to be addressed. Further, in developing

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countries, there is a deficiency in standard operating procedures (SOPs).[9] Most such SOPs may potentially mitigate the above-mentioned hazards if put into practice.

There are many studies which have focused on individual risk factors and diseases in laboratory personnel.[2-9] However, studies that address the overall morbidity patterns in these personnel are limited; hence, the current study was undertaken. The study results will, therefore, be useful in formulating and implementing effective and comprehensive health and safety measures not only in the laboratories of tertiary care hospitals but also across the spectrum of Health Care Institutions.

Objectives

The objectives of the study were to estimate the incidence rate, morbidity profile of acute morbidities and their associated factors among clinical laboratory personnel in a private tertiary care hospital over a period of 1 year.

MATERIALS AND METHODS

This was a descriptive longitudinal study which was undertaken in a private tertiary care teaching hospital in Bengaluru for a period of 1 year in 2012. The personnel from the Departments of Clinical Pathology, Biochemistry, Microbiology, and Blood Bank services who worked for at least 6 h/day and at least 6 days/week were included in the sampling frame. A total of 132 workers were recruited for this study. However, the attrition rate amounted to a loss to follow-up of 17 workers (12.8%), and therefore 115 subjects remained in the study. The Institutional Ethics Committee approved the study; a written informed consent was obtained from the study subjects. The workers were followed up periodically for acute morbidities by the following strategies:

1. Once in 2 weeks - through mobile phone short messaging service, inquiring about the health of workers. If any health ailment/accident/incident related to health were reported, then those workers were personally contacted by the investigator for further inquiries.
2. Once in 2 weeks - personally contacting each worker and discussing about any health ailments/accidents/incidents related to health during the preceding 2 weeks. If any morbidity was reported, a medical examination was conducted if required.
3. A "sickness complaint box" was designed and installed at a place suggested by the laboratory staff in each of the departments. Predesigned illness forms were placed close by, and employees were requested to fill in the form and deposit the same into the box whenever they were ill.
4. In addition, sick leave records of the enrolled subjects maintained by the Personnel Department of the hospital were reviewed.

The information collected using the above-mentioned strategies were further cross-checked and verified for duplication and completeness. The data were entered into a Microsoft Excel spreadsheet and analyzed.

RESULTS

Of the 132 laboratory personnel in our study, the majority were in the age group of 21–30 years; mean age was 33.7 years with a standard deviation of 11.45 years. Nearly, one-third of the study population were females and about half, belonged to the ever married group. About 46% were graduates.

Large majority of the study population worked in the Department of Clinical Pathology followed by Microbiology, Biochemistry, and Blood Bank, respectively. It was found that junior laboratory technicians and trainee laboratory technicians share similar work responsibilities of processing the sample across the departments. Senior laboratory technicians and junior scientific assistants were also involved in sample processing along with accomplishing certain administrative and supervisory responsibilities. Laboratory assistants assist junior and senior laboratory technicians. Front desk work was shared by registration assistants, upper and lower division clerks. Based on this observation, the laboratory personnel were divided into three groups based on the nature of the work. The three groups are - workers involved in sample processing, workers involved in data entry and front desk work and the third group being housekeeping staff [Table 1].

A total of 203 episodes of acute morbidities were reported by the laboratory personnel during the 1 year period of follow-up, which accounted to an incidence rate of 3.09 episodes per 100 person weeks. It was observed that the rates were higher among males, in the age group of 41–50 years, workers with lower educational status and in ever-married workers. Similarly, incidence rates were found to be higher in workers of the Microbiology Department, in housekeeping workers, permanent employees and those with longer duration of work experience. Although this was not statistically significant, attention needs to be given from safety and prevention perspective [Table 2].

It was noticed that many of the study subjects had these episodes of acute morbidities multiple numbers of times during the 1-year period of follow-up, which went up to even 8 times in some individuals. Median frequency was found to be 1 episode with an interquartile range (IQR) of 0–3. By univariate logistic regression analysis, we found that workers with higher age group reported illnesses more frequently than the younger age group workers. The odds of occurrence of illness were almost 15 times more often forever married workers than those who were single. Similarly, it was 18 times and nearly 4 times more often for housekeeping workers and clerical staff, respectively, with sample processing workers as the

Table 1: Work profile of the study population (*n*=132)

Characteristics	*n* (%)
Department wise distribution:	
Clinical pathology	55 (41.7)
Microbiology	36 (27.3)
Biochemistry	31 (23.5)
Blood bank	10 (7.6)
Designation:	
Junior laboratory technician	42 (31.8)
Trainee laboratory technician	24 (18.1)
Registration assistant	18 (13.6)
Lower division clerk	16 (12.1)
Senior laboratory technician	13 (9.8)
Helper	8 (6)
Laboratory assistant	4 (3)
Junior scientific assistant	3 (2.3)
Upper division clerk	2 (1.5)
Senior secretarial assistant	2 (1.5)
Nature of work:	
Sample processing	86 (65.2)
Clerical	38 (28.8)
Housekeeping	8 (6)
Work tenure:	
≤6 years	70 (53)
>6 years	62 (47)
Employment status:	
Permanent	89 (67.4)
Temporary	43 (32.6)

reference group. Permanent workers reported illnesses nearly 18 times more often than temporary workers. Workers with more work experience (>6 years) had fallen ill nearly 7 times more often than those with lesser work experience. However, by multivariate logistic regression analysis, ever married status (adjusted odds ratio [OR]: 4.3, 95% confidence interval [CI]: 1.3–14.9) and permanent employment (adjusted OR: 5.3, 95% CI: 1.2–23.2) were the only two variables which were found to be significant predictors for the frequency of occurrence of acute illnesses, after adjusting for other variables [Table 3].

Upper respiratory tract infection (URTI) (27.1%), musculoskeletal pain (20.2 %) and viral fever (15.3%) were the most common acute morbidities reported by the laboratory personnel during the study period. Needlestick injury and injuries outside workplace accounted for 0.9% and 2.5% of all the morbidities, respectively [Table 4].

Age and Gender

The incidence of infectious diseases such as URTI, viral fever, acute gastroenteritis, and urinary tract infection (UTI) was found to be proportionately higher in the age group of 31–40 years, whereas musculoskeletal disorders were common in 41–50 years. Asthma exacerbation was seen commonly among workers in the age group of 51 years and above. Allergic cough was seen exclusively in the younger age group. In the current study, infectious diseases were reported equally by both the genders. However, UTI and enteric fever were limited only to female workers. Musculoskeletal disorders, allergic manifestations and complaints of fatigue and headache also seemed to be very common among females.

Marital Status

Large majority of the infectious diseases and musculoskeletal disorders were common among ever-married workers as compared to workers who were single. Among allergic manifestations, asthma exacerbation was exclusive to ever-married workers, and allergic cough was limited only to unmarried workers.

Department

Acute infections were found to have a varied distribution among the laboratory workers across the departments; specifically - URTI and enteric fever were common in clinical pathology workers, whereas viral fever and UTI were common in microbiology workers. Musculoskeletal pain was common among clinical pathology workers. Among allergic manifestations, allergic cough was common among biochemistry workers, and asthma exacerbation was common in clinical pathology workers.

Nature of Work

Infections such as URTI, viral fever, and complaints of fatigue were common among sample processing workers, whereas infections such as UTI and enteric fever; complaints of headache and needle stick injuries were reported equally by clerical staff and sample processing workers. Asthma exacerbation was seen exclusively in clerical staff whereas allergic cough was common among sample processing workers. URTI and viral fever were the common morbidities reported by housekeeping workers.

Employment Status

It was found that most of the infectious diseases and musculoskeletal pain disorders were common among permanent workers. Morbidities such as viral fever, UTI, and enteric fever; complaints of headache and exacerbations of asthma were found exclusively among permanent workers. Allergic cough was found exclusively among temporary workers. Needlestick injuries were reported equally by both the groups of workers.

Table 2: Incidence rate of acute morbidities over a period of 1 year

Characteristic	Population	Number of episodes	Incidence rate (episodes/100 person weeks)	Yate's corrected Chi-square value of goodness of fit
Gender:				
Female	83	120	2.91	0.34
Male	49	83	3.39	
Age group (years):				
≤30	69	49	1.47	3.89
31–40	28	72	5.05	
41–50	19	51	5.22	
≥51	16	31	3.73	
Education:				
≤PUC	40	95	4.61	1.4
>PUC	92	108	2.39	
Marital status:				
Ever married	71	167	4.41	3.13
Single	61	36	1.21	
Department:				
Clinical pathology	55	76	2.78	1.6
Blood Bank	10	10	2.07	
Biochemistry	31	46	3.02	
Microbiology	36	71	3.88	
Nature of work:				
Sample processing	86	103	2.45	1.69
Housekeeping	8	20	4.83	
Clerical	38	80	4.1	
Employment status:				
Permanent	89	185	4.19	3.78
Temporary	43	18	0.83	
Work tenure:				
≤6 years	70	54	1.56	2.79
>6 years	62	149	4.77	
Total	132	203	3.09	

PUC:

Work Tenure

Majority of the illnesses were common among workers with more work experience, with the exception of a few morbidities such as allergies and needle stick injuries in the study. Allergic cough was exclusively reported by less experienced workers, whereas asthma exacerbation by more experienced workers. Needlestick injuries were reported equally by both the groups of workers.

DISCUSSION

From this longitudinal study, the incidence rate of acute morbidity among clinical laboratory personnel over a period of 1 year was 3.09 episodes per 100 person weeks, and frequency of occurrence of acute morbidity ranged from none to eight with a median of 1 episode (IQR: 0–3). By logistic regression analysis, frequency of occurrence of morbidities was found to be more among housekeeping staff, workers in the older age group and workers with more work experience than other groups. Similarly, married workers and permanent workers reported illnesses more often than other groups in our study. While describing the morbidity profile of acute illnesses, half were infectious diseases (URTI being the commonest), and nearly one-fourth was musculoskeletal disorders (back pain and shoulder pain being the most common). Needlestick injury accounted for nearly 1% of the illnesses. Musculoskeletal disorders were common in female

Table 3: Frequency of occurrence of acute morbidities among the study subjects (*n*=132)

Characteristic	Frequency of occurrence of illnesses		Unadjusted OR (95% CI)	*P* value	Adjusted OR (95% CI)	*P* value
	≤once	≥twice				
Age group (years):						
≤30	56 (81.2)	13 (18.8)	1		_	
31–40	11 (39.3)	17 (60.7)	6.6 (2.5–17.5)	<0.001		
41–50	6 (31.6)	13 (68.4)	9.3 (2.9–29.1)	<0.001		
≥51	5 (31.2)	11 (68.8)	9.4 (2.8–32)	<0.001		
Marital status:						
Ever married	24 (33.8)	47 (66.2)	15.1 (5.9–38.2)	<0.00	4.3 (1.3–14.9)	0.02
Single	54 (88.5)	7 (11.5)	1	1		
Nature of work:						
Sample processing	62 (72.1)	24 (27.9)	1		_	
Housekeeping	1 (12.5)	7 (87.5)	18 (2.1–154.8)	0.008		
Clerical	15 (39.5)	23 (60.5)	3.9 (1.7–8.8)	0.001		
Employment status:						
Permanent	38 (42.7)	51 (57.3)	17.8 (5.1–62.2)	<0.001	5.3 (1.2–23.2)	0.02
Temporary	40 (93)	3 (7)	1			
Work tenure (year):						
≤6	56 (80)	14 (20)	1		_	
>6	22 (35.5)	40 (64.5)	7.2 (3.3–15.9)	<0.001		

OR: Odds ratio, CI: Confidence interval

workers than their male counterparts. Infections, allergic manifestations, and injuries were relatively common among younger age group workers in our study. Large proportion of the workers in the Microbiology Department had suffered from infectious diseases in our study. Workers involved in sample processing suffered from infectious diseases such as URTI, viral fever, and musculoskeletal disorders more often than others in our study.

Morbidities were found to be more frequent among housekeeping staff in our study and majority of them had poor educational background. One can expect that among those workers with poor education, awareness about health and safety issues at workplace would also be poor. There is a possibility of community-acquired illnesses and other factors to play in this group of employees as well, given their poor educational background.[10] These findings can be compared with an Indian study, in which the vaccination coverage was less among hospital attendants, Grade 4 and laundry staff due to their poor educational background.[11] In this study, morbidities were reported more often by workers with more work experience and workers in the older age group. A worker with more work experience indicates longer duration of exposure to the risks and hazards of the laboratory, which in the long run will have an impact on the health of the worker. This might have led to more frequent illnesses in more experienced and older workers in our study. A study conducted in India to determine the prevalence of hepatitis B infection in healthcare workers found that the rates were significantly higher among laboratory technicians and more experienced (>30 years) workers with no significant difference with age.[12] In workers who were married and living with spouse and children; there was an additional risk of contracting infection from other family members as well, as compared to workers who were single. This may be the probable reason for more frequent illnesses among the married workers in our study. A study in Germany which aimed to compare the risk of influenza infection in healthcare workers with that in non-healthcare workers can be compared with our study. It showed that household contacts, and in particular children at home, were the significant risk factor identified for acquiring influenza infection among healthcare workers.[13]

Morbidity profile among laboratory personnel in our study can be compared with a 4-year cohort study conducted in Brazil which looked into common morbidities among workers in a public hospital. This study also reported that most common illnesses were an acute upper respiratory infection (14%) followed by dorsopathies, other soft tissue disorders, and intestinal infectious diseases. Injuries accounted for 2% of the morbidities.[14] Another recent study was done in Riyadh, Saudi Arabia, identified acute upper respiratory infection, diseases of musculoskeletal system and the digestive system to be the most common causes of sickness absence among healthcare workers.[15] Common musculoskeletal disorders reported in our study were back pain and shoulder pain, probably because uncomfortable seating arrangements (seats

Table 4: Profile of acute morbidities and its distribution with different subgroups of the study population (*n*=132)

Morbidities	URTI	Musculoskeletal pain	Viral fever	Fatigue	Acute gastroenteritis (Age)	UTI	Allergic cough	Exacerbation of asthma	Enteric fever	Headache	Needle stick injury (at work place)	Other injuries (not at work place)	Others	Total
Age group (*n*, %)														
≤30	17 (30.9)	6 (14.6)	2 (6.4)	2 (25)	1 (16.6)	-	5 (100)	-	1 (25)	1 (25)	1 (50)	1 (20)	11 (34.4)	49 (24.1)
31–40	20 (36.4)	11 (26.8)	15 (48.4)	-	4 (66.7)	4 (66.7)	-	1 (25)	1 (25)	1 (25)	1 (50)	2 (40)	13 (40.6)	72 (35.5)
41–50	10 (18.2)	20 (48.8)	7 (22.6)	3 (37.5)	1 (16.7)	1 (16.6)	-	-	1 (25)	1 (25)	-	-	7 (21.9)	51 (25.1)
≥51	8 (14.5)	4 (9.8)	7 (22.6)	3 (37.5)	-	1 (16.6)	-	3 (75)	1 (25)	1 (25)	-	2 (40)	1 (3.1)	31 (15.3)
Gender (*n*, %)														
Females	28 (50.9)	29 (70.7)	15 (48.4)	5 (62.5)	3 (50)	6 (100)	2 (40)	4 (100)	4 (100)	4 (100)	1 (50)	2 (40)	17 (53.1)	120 (59.1)
Males	27 (49.1)	12 (29.3)	16 (51.6)	3 (37.5)	3 (50)	-	3 (60)	-	-	-	1 (50)	3 (60)	15 (46.9)	83 (40.9)
Marital status (*n*, %)														
Ever married	42 (76.4)	33 (80.5)	29 (93.5)	6 (75)	5 (83.3)	5 (83.3)	-	4 (100)	3 (75)	3 (75)	1 (50)	3 (60)	26 (81.2)	160 (78.8)
Single	13 (23.6)	8 (19.5)	2 (6.5)	2 (25)	1 (16.7)	1 (16.7)	5 (100)	-	1 (25)	1 (25)	1 (50)	2 (40)	6 (18.8)	43 (21.2)
Department (*n*, %)														
Clinical pathology	22 (40)	19 (46.3)	6 (19.4)	1 (!2.5)	3 (50)	1 (16.7)	2 (40)	3 (75)	3 (75)	2 (50)	1 (50)	1 (50)	12 (37.5)	76 (37.4)
Blood Bank	3 (5.5)	2 (4.9)	-	1 (12.5)	-	1 (16.7)	-	-	-	-	-	-	3 (9.4)	10 (4.9)
Biochemistry	11 (20)	7 (17.1)	5 (16.1)	3 (37.5)	-	2 (33.3)	3 (60)	-	-	1 (25)	-	3 (60)	11 (34.4)	46 (22.6)
Microbiology	19 (34.5)	13 (31.7)	20 (64.5)	3 (37.5)	3 (50)	2 (33.3)	-	1 (25)	1 (25)	1 (25)	1 (50)	1 (20)	6 (18.7)	71 (34.9)
Nature of work (*n*, %)														
Sample processing	26 (47.2)	22 (53.6)	16 (51.6)	3 (37.5)	3 (37.5)	3 (50)	3 (60)	-	2 (50)	2 (50)	1 (50)	4 (80)	19 (59.3)	103 (50.8)
Clerical staff	20 (36.4)	17 (41.5)	10 (32.3)	4 (50)	3 (50)	3 (50)	2 (40)	4 (100)	2 (50)	2 (50)	1 (50)	1 (20)	11 (34.4)	80 (39.4)
Housekeeping	9 (16.4)	2 (4.9)	5 (16.1)	1 (12.5)	1 (12.5)	-	-	-	-	-	-	-	2 (6.3)	20 (9.8)
Employment status (*n*, %)														
Permanent	50 (90.9)	39 (95.1)	31 (100)	7 (87.5)	5 (83.3)	6 (100)	-	4 (100)	4 (100)	4 (100)	1 (50)	4 (80)	30 (93.8)	185 (91.1)
Temporary	5 (9.1)	2 (4.9)	-	1 (12.5)	1 (16.7)	-	5 (100)	-	-	-	1 (50)	1 (20)	2 (6.2)	18 (8.9)
Work tenure (years) (*n*, %)														
≤6	18 (32.8)	5 (12.2)	6 (19.4)	2 (25)	2 (33.3)	1 (16.7)	5 (100)	-	-	-	1 (50)	3 (60)	11 (34.4)	54 (26.6)
>6	37 (67.2)	36 (87.8)	25 (80.6)	6 (75)	4 (66.7)	5 (83.3)	-	4 (100)	4 (100)	4 (100)	1 (50)	2 (40)	21 (65.6)	149 (73.4)
Total	55 (27.1)	41 (20.2)	31 (15.3)	8 (3.9)	6 (2.9)	6 (2.9)	5 (2.5)	4 (2)	4 (2)	4 (2)	2 (0.9)	5 (2.5)	32 (15.8)	203 (100)

UTI: Urinary tract infection, URTI: Upper respiratory tract infection

without backrest) and long hours at work in static position were frequent among laboratory workers. A study was done in Ethiopia among laboratory personnel listed ankle pain and knee pain as the common morbidities, due to poor ergonomic workstations.[16] Musculoskeletal disorders were relatively common in female workers than their male counterparts. Often women play dual roles tackling both family and job responsibilities, which make them more vulnerable to musculoskeletal disorders than men. Supporting findings were found in a study conducted in Brazil showing that work-related musculoskeletal disorders are more in female workers and associated with higher domestic workloads.[17] Infections, allergic manifestations, and injuries were relatively more common among younger age group workers in our study as most of them were involved in actual sample processing and front desk work, and were more exposed to infectious agents, allergens, and hazards. Comparable findings were found in a study done for assessing occupational infectious diseases among Korean healthcare workers, found that the tuberculosis and hepatitis were the most common infections and that it was more among female workers and more so in the younger age group.[18] Large proportion of the workers in the Microbiology Department had suffered from infectious diseases in our study. This may be because of the contact with infectious materials and contaminated equipment. The risk of occupational TB infection was estimated among microbiology and pathology technicians and compared with non-clinical personnel in a Canada study, showed a higher risk for Pathology workers, which is in contrast to our study finding.[19] A cross-sectional study done to evaluate the main health disorders of laboratory workers in six hospitals of Kaunas city, Lithuania, showed laboratory assistants were the most vulnerable group of the lot in the laboratory setting. Weakness, headache, and sleep disturbances were the most common morbidities with no significant relationship with work experience.[20] Similar findings were found in our longitudinal study as well, that workers involved in sample processing were the most vulnerable group in the laboratory.

Limitations and Strengths

Laboratory personnel were not subjected to any laboratory tests or investigations. However, the study being a longitudinal study and adapting multiple and diverse strategies in data collection have served as an important strength for authenticating the study results.

CONCLUSION

Incidence rate of acute morbidity among clinical laboratory personnel was 3.09 episodes per 100 person weeks over a period of 1 year. The frequency of morbidity was significantly high in ever married and permanent workers. The most common acute morbidity was found to be URTI followed by musculoskeletal pain. Infectious diseases were commonly reported by younger age group workers and Microbiology workers. Musculoskeletal disorders were more widespread among female workers. Both infectious diseases and musculoskeletal disorders were reported similarly by married workers, workers involved in sample processing, permanent and more experienced workers.

Majority of the identified problems of laboratory personnel can be addressed by implementation of standard precautions, supervision with respect to following of SOPs for infection control, use of personnel protective equipment followed by behavioral change communication that covers all the above-stated measures. Application of the science of ergonomics in procuring and use of laboratory workstations and equipment has a potential to address the musculoskeletal problems identified in this study.

Further, periodic training and sensitization sessions on occupational safety along with ergonomic aspects among the laboratory personnel may sustain the healthful occupational environment. It would further the cause if these sensitization sessions could be participatory in nature and not instructional or didactic lectures.

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