Global Scientific JOURNALS

GSJ: Volume 10, Issue 8, August 2022, Online: ISSN 2320-9186
www.globalscientificjournal.com

BIOSAFETY AWARENESS AMONG LABORATORY WORKERS

R.M.S.S. Rathnayake, Consultant in Medical Administration

ABSTRACT

Background: Biosafety is the application of knowledge, technology and instrument to avoid individual and external environment contacting with potentially infectious toxins or biohazards. Having good knowledge, attitudes and practices in relation to biosafety of those who work in hazardous conditions is very important for the safety of those persons. Objective of this study was to assess the awareness on Bio safety among laboratory workers.

Material and Methods: A cross-sectional study was conducted among 121 Health Care Assistance (HCA) working at Medical Research Institute Colombo (MRI), Sri Lanka. A self-administered questionnaire was used to assess the current level of knowledge, attitudes and practices of HCAs. An observation checklist was used to assess the available facilities in relation to biosafety in eight main laboratories at MRI. Data analysis was done using SPSS version 21.

Result: The response rate was 79.8%. The overall knowledge of the respondents on biosafety was good (74.7%). and 56.6% had overall good attitudes towards biosafety. Only 45.8% of HCAs were regularly using standard PPE in the laboratory. None of the laboratories at MRI had eyewash station. Only 37.5% of the laboratories had spill kits and written procedure for using spill kits was available in 50% of the laboratories.

Conclusion: Majority of HCAs had good knowledge on Bio safety. Their attitude towards practicing it was poor. Proper training programs on biosafety should be conducted to enhance the knowledge and attitudes towards biosafety which facilitate better biosafety practices.

Key words; Bio Safety, Health Care Assistants, Laboratory,

INTRODUCTION

A laboratory is a unique environment that requires special practice and containment facilities to protect persons working with pathogenic microbes, chemicals, physical and radioactive hazards [1].

Biosafety is the application of knowledge, technology and instrument to avoid individual and external environment contacting with potentially infectious toxins or biohazards.
Human error and poor technique can compromise the best of safeguards to protect the laboratory worker. Thus, safety-conscious staff, well informed about the recognition and control of laboratory hazards, is key to the prevention of laboratory acquired infections, incidents and accidents [2].

The Medical Research Institute (MRI) is the premier center in the country for biomedical and applied health research. It is the National laboratory for Rubella, Measles, Influenza and Japanese Encephalitis infections. It also functions as the regional reference laboratory for poliomyelitis.

Health care assistants (HCA) are unskilled casual or ordinary labourers working in the Ministry of Health, Sri Lanka. HCAs working at MRI are dealing with highly infectious materials which need extra precautions in handling when they work in laboratories. To prevent exposing to contagious infections, HCAs need excellent knowledge and skills of biosafety conditions in laboratories.

OBJECTIVES

To assess the awareness on biosafety and to identify the related problems when practicing standard safety measures.

METHODOLOGY

A cross sectional study was conducted among HCAs working at MRI. All the 121 HCAs who were more than 3 months in the service were selected for the study using purposive sampling technique.

This study consisted of two components. In the first component, a self-administered questionnaire was used to collect data on knowledge on biosafety, attitude towards biosafety and practices related to biosafety. The questionnaire was designed in English and translated

to Sinhala and Tamil. Questions to assess knowledge on biosafety included knowledge on infrastructure, cleaning and waste disposal, practices and procedures in the laboratory and knowledge on miscellaneous aspects in biosafety. Each correct answer was given 1 mark. Those who scored 3 or less marks for questions related to particular section was considered as having poor knowledge on that section. Marks 4 or above for each of the section was considered as having good knowledge. The opinions of HCAs were marked on a 5 point Likert scale to assess their attitude towards biosafety. Responses of HCAs regarding practices related to biosafety were mark as always, sometimes, and never.

In the second component an observation checklist was used to assess the available facilities in eight main laboratories at MRI. "Traditional laboratory safety checklist" from American chemical society was used as a reference to develop the checklist.

Ethical clearance was obtained from the Ethic Review Committee, MRI Colombo. Necessary approvals were obtained from the Director, MRI. Data analysis was done using Statistical Package of Social Sciences version 21. Chi-square test was used to assess statistical association between categorical variables and to see the level of significance. The significant level of p value was set as 0.05.

Result

The response rate was 68.6%. Among them majority (75.9%) were females and belonged to 41-60 years of age group (43.4%). Of the study participants 43% were having a service experience of more than 10 years. Interestingly only 6% of them had a training on biosafety practices.

Table 1: Percentage of study participants having good knowledge on biosafety practices (n=83)

Description	% with good knowledge
Overall knowledge	74.7
Knowledge infrastructure	20.5
Knowledge on cleaning and waste disposal	47.0
Knowledge on biosafety practices and procedures	90.4
Knowledge on miscellaneous Factors	89.2

The overall knowledge of the respondents was good (74.7%). Their knowledge was highest for "biosafety practices and procedures" (90.4%) and lowest for "infrastructure of laboratory" (20.5%).

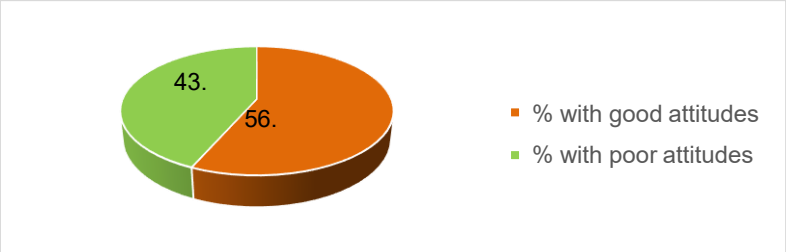
Table 2: Overall knowledge of the study participants according to their socio demographic characteristics (n=83)

Socio- demographic `characteristics		**Percentage**	**% good knowledge**	**Chi value**	**P value**
Sex	Male	24.1	25	0.062	0.803
	Female	75.9	75		
Age category (years)	18-30	31.3	26.9	1.576	0.455
	31 – 40	25.3	28.8		
	41 -60	43.4	44.2		
Duration of the Service	Less than 2 years	32.5	32.7	0.750	0.687
	2-10 years	24.1	26.9		
	More than10 years	43.4	40.4		
Place of current service	Office	9.6	3.8	6.991	0.030*
	Lab	84.3	92.3		
	Other	6.1	3.8		
Designation	Lab Orderly	26.5	34.6	4.700	.030*
	Other HCA	73.5	65.4		

* Significant 0.05 level

According to table 2, females had better overall knowledge on biosafety than males. Overall knowledge increased with increase in age. Those served more than 10 years had highest knowledge. Out of the socio-demographic characteristics assessed overall knowledge was significantly associated with place of current service and designation.

Fig. 1: Distribution of the study participants according to their overall attitude towards biosafety



According to fig. 1, majority (56.6%) of the study participants had good overall attitude towards biosafety.

Table 3: Overall attitude of study participants according to their socio demographic characteristics (n=83)

Socio- demographic `characteristics		**Percentage**	**% of good attitude**	**Chi value**	**P value**
Sex	Male	24.1	21.3	0.471	0.492
	Female	75.9	78.7		
Age category (Years)	18-30	31.3	25.5	2.793	0.248
	31 – 40	25.3	23.4		
	41 -60	43.4	51.1		
Duration of the Service	Less than 2 years	32.5	25.5	4.397	0.111
	2-10 years	24.1	21.3		
	More than 10 years	43.4	53.2		
Place of current service	Office	9.6	2.1	7.779	0.020*
	Lab	84.3	89.4		
	Other	6.1	8.5		
Designation	Lab Orderly	26.5	42.6	14.324	0.000*
	Other HCA	73.5	57.4		

* Significant 0.05 level

As shown in table 3, females had better overall attitude towards biosafety than males. Overall attitude was highest for those in the age category 41-60 years (51.1%) and those who had served

for more than 10 years. Out of the socio-demographic characteristics assessed overall attitude was significantly associated with, only place of current service and designation.

Table 4: Percentage distribution of study participants who "always" performed safe laboratory practices

	Safe laboratory practices	**%**
01	Wearing heavy duty gloves or double gloves when handling blood waste	69.9
02	Washing hands after removing gloves	69.9
03	Washing hands before leaving the laboratory	90.4
04	Wearing plastic apron and gloves when cleaning specimen containers	62.7
05	Using standard personal protective equipment (PPE) in the laboratory	45.8
06	Decontaminating all cultures and waste by autoclaving before disposal	77.1
07	Categorizing the biomedical waste before disposal	85.5

Table 4 shows that only 45.8% of the HCAs always wear standard PPE. Moreover, only 62.7% of HCAs wear plastic apron and gloves when cleaning specimen containers.

Table 5: Percentage of laboratories with their availability of facilities

No.	**Facility available**	**% of labs having the facility**
1	Sink for hand washing near the laboratory	100
2	Eyewash station inside or closer to the laboratory	0.0
3	Spill kit in the lab	37.5
4	Fire extinguisher	87.5
5	First-aid areas or rooms suitably equipped and easily accessible	37.5
6	Provision of adequate personal protective equipment	87.5
7	Autoclavable yellow bags	100
8	Guideline for the preparation of disinfectants	62.5
9	Hazards symbols	62.5
10	A written procedure for using spill kits	50

None of the laboratories had eyewash station (table 5). Only 37.5% of the laboratories had spill kits and written procedure for using spill kits was available in 50% of the laboratories.

DISCUSSION

Proper safety management techniques are important when handling with various toxic and infectious agents. Biosafety creates the containment conditions under which toxins and infectious agents can be safely manipulated [3]. Improving knowledge, attitudes and practices in relation to biosafety of those who work in hazardous conditions, laboratories very important for the safety of those persons.

Present study was designed to assess the knowledge, attitude and practices of the HCAs on Bio safety. Nearly 75% of HCAs were unskilled labourers who had no special training to work in labs. Even though overall knowledge of the HCAs on biosafety was good (74%), their knowledge on infrastructure and cleaning and waste disposal was poor. One cannot take risks when practicing biosafety techniques. Therefore, it is utmost important to improve the knowledge of HCAs in all the aspects of biosafety. Majority of HCAs have shown to increase their knowledge on biosafety with age and duration of service.

It is the responsibility of the health authorities make sure that the health workers are provided with a proper training when they are recruited to the job. The current study revealed that only 6% of the study participants had undergone a training in relation to biosafety. Similar finding was reported by Nasim, et.al [4] in their research on biosafety which revealed that 84.2% of respondents did not have any training in bio safety. Research on bio safety practices in Ethiopia [5] found about half (54.1%) of study participants did not get regular training on laboratory safety.

The overall attitude towards biosafety was not satisfactory. only 56.6% of HCAs had good overall attitude. Poor overall attitude was especially noticed among the younger aged groups as well as those who were new to the service. As shown in table 3, overall attitude was affected by the place of current work, with those who work in the labs were having better attitude.

The knowledge and attitude towards biosafety is depicted by the practices of the HCAs as lower percentage of HCAs were always wearing standard personal protective equipment and plastic apron and gloves when cleaning specimen containers. As all the labs were having sinks to wash hands, it was practiced by majority of the HCAs. Despite having poor knowledge on cleaning and waste disposal, categorizing the biomedical waste before disposal was done by most of the

HCAs. The value of wearing protective devices and biomedical waste disposal has been highlighted by Hansa et al [6] in their study done among paramedical staff on laboratory safety measures.

Availability of spill kits is vital for any laboratory. But only 37.5% of the labs were equipped with spill kits. Moreover, only 50% of the labs were having a written procedure for using spill kits. Alexsander[5] in his research reported that 37.3% of the study participants had said that there was no written procedure for the clean-up of spills.

Another important finding from this study is that only 62.5% of the labs were having hazards symbols. Health authorities need to pay attention on these factors.

Since the study was conducted only in one institution, results of this study cannot be generalized to whole of Sri Lanka.

CONCLUTION

Out of the HCAs working at MRI who participated the study, 74.7% had good overall knowledge on biosafety and 56.6% had overall good attitudes towards biosafety. Out of the practices assessed only 45.8% of HCAs were regularly using standard PPE in the laboratory. None of the laboratories at MRI had eyewash station inside or close proximity to the lab. Only 37.5% of the laboratories had spill kits and written procedure for using spill kits was available in 50% of the laboratories.

Biosafety should be part of the quality improvement programme in hospitals. There should be Standard Operating Procedures (SOP) for biosafety practices. Appointing biological safety officer to oversee the laboratory work would be beneficial. Providing all necessary infrastructure facilities is important to practice proper biosafety techniques. Preparation of a proper training module is strongly recommended.

References

1. Ganegoda G, Pathirage S, Somarathna P, Kottahachchi J, Karunanayake L, Corea,E., Biosafety Manual for Medical Laborataries. 2nd Ed. Colombo, Sri Lanka.2014 . Chapter 1: Introduction to biosafety and biosecurity;pg1

2. World Health Organization, Laboratory Biosafety Manual. 3rd Ed.Geneva.2004; pg 7

3. Medicinenet. com. Medical definition of bio safety.[Internet] Available at:http://www.medicinenet.com/script/main/art.asp?articlekey=33817[Accessed3 October 2016]

4. Nasim S, Shahid A, Mustufa A, Arain GM, Alli G, Taseer IH.,etal , Biosafety perspective of clinical laboratory workers: a profile of Pakistan.Journal of infections in developing countries.2012;6(8): pp 611-619.

5. Alexsander SH. Assessment of Bio safety practice and associated factors in clinical laboratory workers among government hospitals in Addis Ababa, Ethiopia.[online] 2014 [Accessed 2014 Oct3]; Available at: http://localhost:80/xmlui/handle/123456789/3073

5. Hansa MG, Sumeeta TS, Sachin MP, Mitesh KP. A study on knowledge, attitude and practice of laboratory safety measures among paramedical staff of laboratory services. National Journal of Community Medicine, 2011; 2 (3),pg 470

Acknowledgement: I wish to thank Dr Malika Karunarathna consultant Microbiologist and Dr. Prasanna Jayasekara Consultant Community Physician for their continuous support to complete this research .