

## A Study of Needle Stick Injuries among Nursing College Students in a Tertiary Care Hospital in Chengalpattu District, Tamil Nadu

Ramya M R<sup>1</sup>, Geetha M<sup>2</sup>, Lakshmi N<sup>1</sup>, Jawahar S S<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor, Department of Community Medicine, <sup>3</sup> MBBS student, Karpaga Vinayaga Institute of Medical Sciences & Research Centre, Tamil Nadu, India

**Correspondence :** Dr. Ramya M R. Email: ramyamr21@gmail.com

### Abstract:


**Introduction:** Needle stick injuries (NSIs) are the most potential occupational hazards among nursing personnel with possible transmission of blood borne pathogens. As nursing students are in the learning stage, they might be at higher risk of acquiring the injuries. **Objectives:** To determine the prevalence of needle stick injuries and to assess the awareness, attitude and practices followed with regard to NSIs. **Method:** An online cross-sectional study was conducted from October to December 2020 among 175 students in a nursing college in Chengalpattu district Tamil Nadu, using a pretested semi- structured questionnaire, adopting universal sampling technique. Data was analyzed using SPSS version 23. Categorical variables were summarized as Percentages and chi square test was used for statistical analysis. **Results:** The overall prevalence of needle stick injury among nursing college students was 16%. Final year students were more exposed to the injuries (35.7%). Majority (96.57%) of the students were aware about universal precaution guidelines, 57% of students were aware about the diseases transmitted by NSI, 97.71% were aware about safety devices and 67.43% of students were aware about the post-exposure prophylaxis in management of NSIs. Among the students, 71.43% had used gloves regularly, 72% were immunized against Hepatitis B, only 25.71% of students attended Integrated Counselling Testing Centre (ICTC) and more than half of the students always practiced recapping needle after giving injections. **Conclusion:** Majority of the students in this study were aware about NSIs, their attitude towards NSIs was agreeable. The practices reported though assessed through online survey was found to be deficient. Periodic education and training need to be done to avoid injuries in future.

**Keywords:** Needle stick injuries, Nursing students, Post exposure prophylaxis, Recapping, , Universal precaution guidelines

### Introduction:

Needle Stick Injuries (NSIs) are the most common occupational hazards occurring among health care workers.<sup>[1]</sup> Needlestick injuries as defined by the United States National Institute of Occupational Safety and Health are injuries caused by needles such as hypodermic needles, blood

collection needles, intravenous (IV) stylets, and needles used to connect parts of IV delivery systems. <sup>[1]</sup>World Health report 2002 had reported that among 35 million health care workers, 2 million health workers were exposed to needle stick injuries every year. <sup>[2]</sup> The developing countries have reported higher exposure to NSI and about 75% of injuries were not being reported. <sup>[3]</sup> More than 20 different

Quick Response Code	<b>Access this article online</b>	<b>How to cite this article :</b>
	<b>Website :</b> www.healthlinejournal.org	Ramya M R, Geetha M, Lakshmi N, Jawahar S S. A study of Needle Stick Injuries among Nursing college students in a Tertiary care hospital in Chengalpattu district, Tamil Nadu. Healthline. 2021;12(3):60-67.
	<b>DOI :</b> 10.51957/Healthline_235_2021	

pathogens have been reported to be associated with NSIs of which Hepatitis B and C and Human Immunodeficiency Virus (HIV) infection are most serious infections occurring among health workers.<sup>[4]</sup> The transmission rate of Hepatitis B due to NSIs vary from 6 to 30%, and those of Hepatitis C and HIV are 3% and 0.3% respectively.<sup>[5]</sup> The Ministry of Health and Family Welfare of Government of India had recommended that the healthcare providers must be aware of the safety precautions that must be followed for the prevention of NSIs. Adequate training of health workers and effective reporting system is made available in all health facility.<sup>[3]</sup> Safe practices while handling sharps and needles play a major role in safety of health workers. There are limited data about prevalence of NSI in India.<sup>[3]</sup> When compared with other health professionals, the nursing students are more prone to get needle stick injuries since they start learning to give injections, starting IV line, taking blood samples and also have higher exposure to sharp needles or instruments. Hence this study was planned among nursing students of a nursing college in Chengalpattu district, TamilNadu.

#### Objectives:

1. To determine the prevalence of needle stick injuries among the nursing students in a tertiary care hospital in Chengalpattu district, Tamil Nadu
2. To assess their awareness, attitude and practice related to needle stick injuries among the study population.

#### Method:

An online cross-sectional study was conducted from October to December 2020 among BSc.Nursing students of Karpaga Vinayaka College of Nursing, Chengalpattu district, TamilNadu. All nursing students from first to final years were included in the study. Those students who were included in the pilot study were excluded from the study. The sample size was calculated using the formula  $n = Z^2 pq / d^2$  (where  $Z = 1.96$  at 95%

confidence); a similar study done by Devaki T et al,<sup>[8]</sup> reported prevalence of needle stick injury of 62.42%, with an allowable error of 12% of p. The sample size thus yielded was 168 which was approximated to 175. Totally there were 190 nursing students (1<sup>st</sup> year 49, 2<sup>nd</sup> year 43, 3<sup>rd</sup> year 50 and 4<sup>th</sup> year 48 students) in our college, of which pilot study was done among 10 randomly selected students. About 175 completed forms were received from 180 students and Universal Sampling Technique was used. A pilot study was done among 10 students to check the feasibility of the questionnaire and thus a pretested semi-structured questionnaire consisted of the following such sociodemographic data, about occurrence of any needle stick injuries, questions related to the awareness of needle stick injuries, attitude towards needle stick injury and the practices they followed while handling the needles or sharp instruments were included. The study was conducted after obtaining the necessary clearance from the Institutional Human Ethics committee and after getting the permission from the head of the nursing institutions. The Google survey form with questionnaire was shared with the students through social media. The first part of the Google form consisted of statement of purpose for collection of data and then the informed consent form. The participation was voluntary and the participants were given a choice to exit the study at any point of the survey. Confidentiality was maintained. Data was entered in Microsoft Excel 2016. Analysis was carried out by using Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics such as mean, standard deviation (Mean  $\pm$  Standard Deviation) and percentage were used. Chi square test was used for statistical analysis to find out any association between variables. P value < 0.05 was considered as statistically significant.

#### Results:

A total of 175 completed responses were received. About 57.6% of students were aged 20 years and below, 42.4% were above 20 years. The

mean age of the students was 20.21 ( $\pm 1.408$ ). Majority of the students were female with (92%) and 8% were males.

The overall prevalence of needle stick injuries among nursing college students were 16%. The prevalence was 16.33%, 7.89%, 15.56%

and 23.26% among first, second, third- and fourth-year students respectively. There was no statistically significant association between year of study and sustaining needle stick injury (Table 1). Among 28 students who had sustained needle stick injury, 85.7% students had informed about their injury to their higher authority and 78.6% students had injury

**Table 1: Distribution of needle sticks injuries among nursing college students based on the year of study (n=175)**

Year of study	Sustained any needle stick injury		Chi square (p value)
	Yes (n=28)	No (n=147)	
1st year (n=49)	8 (16.33%)	41 (83.67 %)	3.552 (0.314)
2nd year (n=38)	3 (7.89 %) *	35 (92.11%)	
3rd year (n=45)	7 (15.56 %)	38 (84.44%)	
4th year (n=43)	10 (23.26 %)	33 (76.74%)	

\*Yates correction applied

**Table 2 : Distribution of needle sticks injuries reported by nursing students (n=175)**

Prevalence		1 <sup>st</sup> year (n=49)%	2 <sup>nd</sup> year (n=38)%	3 <sup>rd</sup> year (n=45)%	4 <sup>th</sup> year (n=43)%	Total (n=175)%	Chi-square (P value)
Ever administered injections	Yes	19 (14.3)	35 (26.3)	38 (28.6)	41 (30.8)	133 (76)	53.213 (0.000)
	No	30 (71.4)	3* (7.14)	7 (16.6)	2* (4.6)	42 (24)	
Informed about needle stick injury (28)	Yes	6 (25)	3* (12.5)	6 (25)	9 (37.5)	24 (85.7)	4.782 (0.572)
	No	2*(50)	0	1* (25)	1 *(25)	4 *(2.3)	
How many times sustained NSI (28)	Once	8 (36.4)	2*(9.2)	6 (27.2)	6 (27.2)	22 (78.6)	13.261 (0.350)
	Twice	0	1* (20)	1*(20)	3*(60)	5 (17.9)	
	More than twice	1* (100)	0	0	0	1 (3.5)	

\*Yates correction applied

**Table 3: Awareness regarding needle stick injuries among nursing students(n=175)**

Awareness regarding Needle Stick Injuries (NSI)		1 <sup>st</sup> year (n=49)	2 <sup>nd</sup> year (n=38)	3 <sup>rd</sup> year (n=45)	4 <sup>th</sup> year (n=43)	Total (n= 175)	Chi-square (p value)
Know about universal precaution guidelines	Yes	46 (27.2)	37 (21.9)	44 (26)	42 (24.9)	169 (96.57)	1.503 (0.682)
	No	3* (50)	1* (16.7)	1* (16.7)	1* (16.7)	6 (3.43)	
Diseases transmitted by NSI	HIV/AIDS	17 (30.9)	14 (25.5)	12 (21.8)	12 (21.8)	55 (31.43)	7.902 (0.793)
	Hepatitis B	6 (28.6)	5 (23.8)	5 (23.8)	5 (23.8)	21 (12)	
	Hepatitis C	1* (100)	0	0	0	1 (0.57)	
	All of the above	25 (25.5)	19 (33.3)	28 (28.5)	26 (26.5)	98 (57)	
Aware about safety devices	Yes	47 (27.5)	37 (21.6)	44 (25.7)	43 (25.1)	171 (97.71)	1.735 (0.629)
	No	2* (50)	1* (25)	1* (25)	0	4 (2.29)	
Aware about post exposure prophylaxis in management of NSIs	Yes	24 (20.3)	29 (24.6)	36 (30.5)	29(24.6)	118 (67.43)	12.199 (0.007)
	No	25 (43.9)	9 (15.8)	9 (15.8)	14 (24.6)	57 (32.57)	

\*Yates correction applied

only one time. (Table 2) About 109 students responded that needle stick injury was due to careless attitude followed by 60 students replied that lack of experience, 34 students marked being overburdened and 11 students responded that stress as the reasons for needle stick injury in which multiple responses were received. The common reasons for occurrence of needle stick injury are shown in figure1.

Among 175 nursing students, 169 (96.57%) students knew about the Universal precaution guidelines, 98 (57%) students had answered that HIV, Hepatitis B and Hepatitis C are transmitted by

Needle stick injury, 171 (97.71%) students were aware about the safety devices, 118 (67.43%) students were aware about post-exposure prophylaxis in the management of needle stick injury. There is a statistically significant difference found between year of study and awareness about post exposure prophylaxis in management of NSIs. The distribution of awareness about needle stick injury has been shown in Table 3.

Among 175 nursing students, 147 (84%) had agreed that needle stick injury transmits infection, 101 (57.71%) students had agreed that needle stick injury is preventable, 171 (97.72%) students had agreed that reporting about needle stick injury to

**Table 4: Attitude regarding needle stick injuries among nursing students (n=175)**

Attitude regarding needle stick injuries		1 <sup>st</sup> year (n= 49)	2 <sup>nd</sup> year (n= 38)	3 <sup>rd</sup> year (n= 45)	4 <sup>th</sup> year (n= 43)	Total (n= 175)	Chi-square (p value)
Needle stick injury transmit infection	Agree	41 (27.9)	33 (22.4)	37 (25.2)	36 (24.5)	147 (84)	3.406 (0.756)
	Disagree	1*(11.1)	3*(33.3)	3*(33.3)	2*(22.2)	9 (5.14)	
	Not sure	7 (36.8)	2 (10.5)	5 (26.3)	5 (26.3)	19 (10.86)	
Needle stick injury is preventable	Agree	25 (24.8)	20 (19.8)	31 (30.7)	25 (24.8)	101 (57.71)	7.897 (0.246)
	Disagree	1(14.3)*	3 (42.9)	0	3(42.9)*	7 (4)	
	Not sure	23(34.3)	15(22.4)	14(20.9)	15(22.4)	67 (38.29)	
Reporting of needle stick injury is important	Agree	47 (27.5)	38 (22.2)	43 (25.1)	43 (25.1)	171 (97.72)	11.002 (0.088)
	Disagree	0	0	2 (100)	0	2 (1.14)	
	Not sure	2 (100)*	0	0	0	2 (1.14)	
NSI is fatal	Agree	23(23.7)	28(28.9)	25(25.8)	21(21.6)	97 (55.43)	9.371 (0.154)
	Disagree	3 (30)*	2 (20)	1 (10)*	4 (40)*	10 (5.71)	
	Not sure	23 (33.8)	8 (11.8)	19 (27.9)	18 (26.5)	68 (38.86)	

\*Yates correction applied

higher authority was important, 97 (55.43%) students had reported that needle stick injury was fatal. The distribution of attitude about needle stick injury has been shown in Table 4.

Among 175 nursing students, 125 (71.43%) students regularly wore gloves. Most of the students (62%) didn't wear gloves due to the non-availability, 24% students reported that the patients were so serious and wearing gloves might delay the service and 14% replied it was time consuming as the reasons for not wearing gloves. About 126 (72%) students were immunized against Hepatitis B before needle stick injury. Only 26 (14.86%) of students had done blood investigation after having needle stick injury, 19 (10.86%) students had taken treatment for needle stick injury. Among the various measures taken for immediate management of needle stick

injury, 77.1% of the students responded that they used to wash the injured area with soap and running water and 24.5% responded that they used to clean the area with spirit swab has been shown in figure 2. About 34 (19.43%) students had received TT injection after acquiring the injury. 45 (25.71%) had attended ICTC counselling. 90 (51.43%) students always practiced recapping needle after giving injections. The distribution of practices done to prevent the needle stick injury has been shown in Table 5.

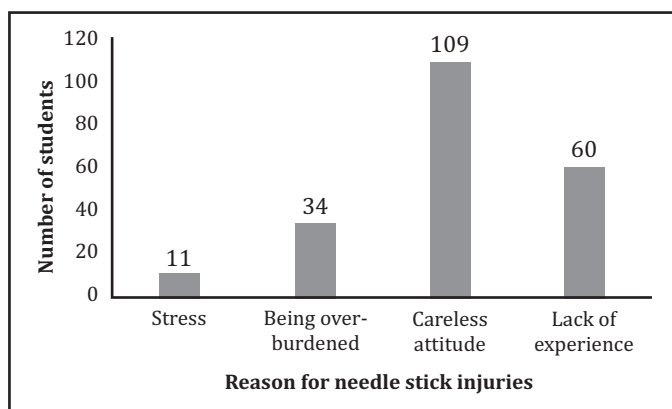
**Discussion:**

This study was done to determine the prevalence of needle stick injuries and to assess the awareness, attitude and practice of needle stick injuries among the nursing students. About 76% of the nursing

**Table 5: Practice regarding prevention of needle stick injuries among nursing students (n=175)**

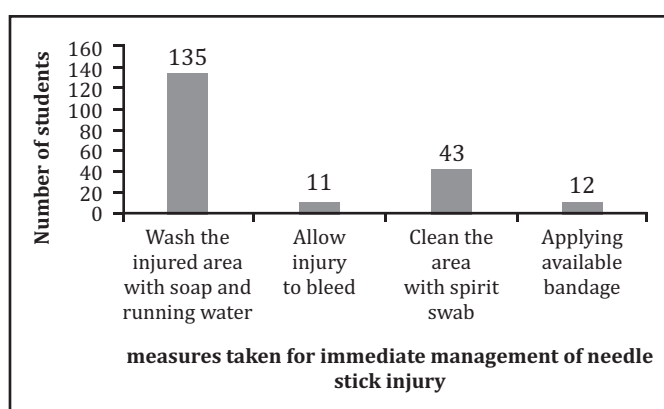
Practice regarding prevention of needle stick injuries		1 <sup>st</sup> year (n=49)	2 <sup>nd</sup> year (n=38)	3 <sup>rd</sup> year (n=45)	4 <sup>th</sup> year (n=43)	Total (n=175)	Chi-square (p value)
Wear gloves regularly	Yes	37(29.6)	23(18.4)	34(27.2)	31(24.8)	125(71.43)	2.998 (0.392)
	No	12 (24)	15 (30)	11 (22)	12 (24)	50 (28.57)	
Immunized against Hepatitis B before needle stick injury	Yes	36 (28.6)	26 (20.6)	34 (27)	30 (23.8)	126 (72)	0.682 (0.877)
	No	13 (26.5)	12 (24.5)	11 (22.5)	13 (26.5)	49 (28)	
Blood investigation done after needle stick injury	Yes	7 (26.9)	4 (15.4)	5 (19.2)	10(38.5)	26(14.86)	3.473 (0.324)
	No	42 (28.1)	34 (22.8)	40 (26.8)	33 (22.1)	149(85.14)	
Taken treatment for NSI	Yes	3 (15.8)	3 (15.8)	6 (31.6)	7 (36.8)	19 (10.86)	3.071 (0.381)
	No	46 (29.5)	35 (22.4)	39 (25)	36 (23.1)	156 (0.89)	
Received vaccination after NSI	Yes	9 (26.5)	6 (17.6)	10 (29.4)	9 (26.5)	34(19.43)	0.643 (0.887)
	No	40 (28.3)	32 (22.6)	35 (22.8)	34 (24.1)	141(80.57)	
Attended ICTC counselling	Yes	13 (28.9)	6 (13.3)	15(33.3)	11 (24.4)	45 (25.71)	3.345 (0.341)
	No	36(27.7)	32(24.7)	30(23)	32(24.6)	130 (74.29)	
Recap needle after injection	Yes	28 (31.1)	24 (26.7)	18 (20)	20 (22.2)	90 (51.43)	5.503 (0.138)
	No	21(24.7)	14(16.47)	27(31.76)	23(27.05)	85(48.57)	

**Figure 1: Common reason for needle stick injury**



students had administered injections to someone and the prevalence of needle stick injury among nursing college students were 16% in this study with majority of them being final year students. Similar studies done by Devaki T et al and Rajesh J et al reported that 56% and 29.7% of nursing students had sustained needle stick injury.<sup>[8,11]</sup> Various studies among different groups of health care worker had

**Figure 2: Measures taken for immediate management of needle stick injury**



reported higher prevalence of NSIs compared to our study.<sup>[4-7,10]</sup> The occurrence of needle stick injury was comparatively less in our study as majority of the students had followed the preventive measures for needle stick injury.

About 96.57% of students knew about universal precaution guidelines. But in a similar study done by Gupta D et al, only 21.6% of students knew about the

guidelines<sup>[5]</sup> which was found to be better in our study. Around 57% of the students knew that HIV/AIDS, Hepatitis B and Hepatitis C were the common diseases transmitted by needle stick injury. Whereas in a study by Gogoi J et al among health care workers, 100%, 98.9% & 67.8% knew HIV/AIDS, Hepatitis B virus and Hepatitis C virus as common diseases associated with needle stick injury.<sup>[4]</sup> Similar studies among health workers had reported less knowledge when compared with the present study.<sup>[5, 9, 10]</sup> About 97.71% of students were aware about safety devices, which was higher when compared with a study done by Gupta D et al, only 27.6% of students were aware about safety devices,<sup>[5]</sup> A higher awareness among our study participants could be attributed to the periodic training regarding safety measures. Regarding post exposure prophylaxis (PEP) 67.43% of students were aware about it. Similar findings were also reported by Gupta D et al.<sup>[5]</sup>

Wearing gloves is said to be the basic preventive measure against needle stick injury. And so, in this study, 71.43% of students had responded that they wore gloves and remaining students said due to non-availability of gloves they did not wear it regularly.<sup>[10]</sup> Thus, when compared with other studies,<sup>[3, 5, 10]</sup> this study participants were found to be more aware about the preventive measures which might be due to the online survey responses. In the present study more than half of the students (72%) were immunized against Hepatitis B which was found to be high when compared with previous studies.<sup>[5,6,10]</sup> Only 10.86% of students had taken treatment for needle stick injury, among them 36.8% were final year students. In a study done by Sriram, 82% of health care workers had taken treatment after needle stick injury.<sup>[3]</sup> This difference might be because of the differences in the study population as students are least concerned about the treatment. In this study only 19.43% of students had taken tetanus toxoid injection. In Prasuna J et al study, 62.5% of students had received vaccination after injury, this difference would be because in our study, majority of the students used gloves while handling sharp

instruments and needles.<sup>[6]</sup> In this study, 51.43% students used to recap needle after injection, among them 31.1% of first year students used to recap the needle. When compared with other similar studies the finding were found to be comparable.<sup>[2,5,7,9,10]</sup> In the current study, 77.1% of the students informed that they used to wash the injured area with soap and running water if they had any injury. When comparing the findings with other studies, study participants had taken proper care if they had any injury.<sup>[9,10]</sup>

Blood borne infections can be prevented by following the infection control guidelines such as proper hand washing, wearing personal protective equipment's, training the health workers, biomedical waste management and proper surveillance system on hospital acquired infections.

**Conclusion:**

The present study reveals that the prevalence of needle stick injuries among nursing students was less which may be due to under reported cases or unnoticed injuries. Majority of the students in our study were aware about the diseases transmitted by needle stick injury, the safety devices, about the post exposure prophylaxis, the attitude towards the injuries were agreeable, but the practices followed was not much satisfactory.

**Recommendation:**

Since the present study was an online survey, the responses found might not be truthful and satisfactory, so a hospital based cross-sectional study is recommended to assess the actual knowledge and practices they follow in the hospital. Periodical refresher training and updating the universal precaution guidelines are recommended for the students to reduce the needle stick injuries in future and improve safer needle use practices.

**Limitation of the study:**

A pretested semi-structured was used for assessing the knowledge of the needle stick injuries. The knowledge questionnaire needed to be modified for assessing the complete knowledge about the

NSI. The practices found in the study results was done by online survey which was self-reported by the study participants which led to memory-based answers and was not directly observed by the investigator and might not exactly reflect actual practices. Since it was an online survey, an element of subjective bias or recall bias could be possible.

#### Declaration:

Funding: Nil

Conflict of Interest: Nil

#### References:

1. Priyanka, Acharya AS, Khandekar J, Sharma A. Awareness and practices regarding needle stick injuries among nurses in a tertiary care hospital of Delhi. *Ind J Comm Health.* 2014;26(4):390-395.
2. Lal D, Sidhu TK, Coonar PPS, Singh G. Needle Stick Injuries among health care workers in a tertiary care hospital in District Bathinda, Punjab. *Indian J Comm Health.* 2017; 29, 4: 429-433
3. Gogoi J, Ahmed SJ, Saikia H, Sarma R. A study on knowledge, attitude, practice and prevalence of needle stick injuries among health care workers in a tertiary care hospital of Assam. *Int J Community Med Public Health* 2017; 4:2031-5
4. Dr. T. Devaki, Dr. B. Vikram simha, Dr. M. Ramya, Dr. R. Srinivas, Dr. Y. Sandhya and Dr. Y. Suresh Chand. Kap study regarding needle stick injuries among nursing college students – –A cross sectional study”, *International Journal of Current Research.* 2016; 8(10), 40076-80.
5. Prasunna J, Sharma R, Bhatt A, Arazoo, Painuly D, Butola H, Yadav A. Occurrence and knowledge about needle stick injury in nursing students. *J Ayub Med Coll Abbottabad* 2015;27(2):430-3
6. Gupta D, Saxena S, Agrawal VK, Singh M, Mishra S. Study of knowledge, attitude and practice of needle stick injury among nurses in a tertiary care hospital. *Int J Community Med Public Health* 2019; 6:865-9.
7. Sharma R, Rasania SK, Verma A, Singh S. Study of prevalence and response to needle stick injuries among Health Care workers in a tertiary care hospital in Delhi, India. *Indian Journal of Community Medicine* 2010;35 (1): 74-77
8. Sriram S. Study of needle stick injuries among healthcare providers: Evidence from a teaching hospital in India. *J Family Med Prim Care* 2019; 8:599-603
9. Vijaya Vishnu Gunturu, M. A. Mushtaq Pasha, Afsar Fatima, Isaac Ebenizer. A KAP study of needle prick injury among healthcare professionals in santhiram medical college-nandyal. *International Journal of Contemporary Medical Research* 2016;3(3):848-851
10. Madhavan A, Asokan A, Vasudevan A, Maniyappan J, Veena K. Comparison of knowledge, attitude, and practices regarding needle-stick injury among health care providers. *J Family Med Prim Care* 2019; 8:840-5
11. Rajesh J, Thamizhmaran SP. A cross sectional study on needle stick injuries, its associated factors and prophylactic measures among nursing staffs and students of a tertiary care hospital in Chennai. *Public Health Rev Int J Public Health Res.* 2019;6(2):41-52.