



Knowledge and Awareness Regarding Protocol After Needle Stick Injury among Medical Students

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ABSTRACT

Needle stick injuries are more prominent among health care professionals, and it can be defined as a wound of percutaneous piercing by a needle point or other sharp instruments and objects. Needle stick injury (NSI) is a significant risk towards the transmission of pathogens and diseases. This present study was aimed to assess the knowledge, awareness and prevalence of NSI among medical students. This is a cross-sectional study conducted among the medical students (104 student). The questionnaire was distributed through an online survey google forms among medical students to assess their knowledge and awareness towards the NSI. SPSS software was used to analyze the collected data. The Pearson Chi-square test was done in association with the year of study of the respondents. The survey results showed that 60.7% of the students were aware of the disease caused by the NSI, 35.5% students were aware of the measures to be taken when NSI occurs, 63.6% of the students said single handed technique is safe for needle recapping. The chi-square analysis showed that there is no association between the year of study and awareness on the protocol to be followed after NSI. The study revealed that knowledge about NSI and the preventive measures among medical students was inadequate. Hence, it is utmost important to make the medical students aware of the protocol for NSI and to train them on that.



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INTRODUCTION

Needle stick injury (NSI) can be described as a wound of percutaneous piercing caused by a nee-

dle point, and also by other sharp instruments and objects. The health care professionals are exposed to various type of infections which are affected by microorganisms and viruses like hepatitis B and hepatitis C viruses (Gupta *et al.*, 2019; Kumar, 2016). Not only the infectious diseases, the prevalence of non-communicable diseases like metabolic disorders (Ponnulakshmi *et al.*, 2019; Shukri *et al.*, 2016), various types of cancers like breast cancer (Gan *et al.*, 2019), hepatic carcinoma (Jainu *et al.*, 2018), laryngeal cancer (Wang *et al.*, 2019), oral cancer (Rengasamy *et al.*, 2018; Ramya *et al.*, 2018), and thyroid cancer (Ma *et al.*, 2019) etc., are also increasing globally nowadays. Various procedures like recapping of the needle, injuries occurring at the operating room, suturing etc are the reasons for NSI. There are many ways that disease can be trans-

mitted, depending on the needle and the pathogens loaded in it. Previous articles revealed that every year around 3 million individuals got injured by NSI (Gambhir *et al.*, 2013). Maximum care and precautions should be required to handle the needle or sharp objects. Improper handling of needles can cause various health disorders. Most of the NSIs happen either during the usage or disposal of sharps. Hence the proper disposal of the sharps is very important, otherwise they might get into the garbage and can injure the health workers which can transmit various diseases (Bindra *et al.*, 2014). At one single prick more than 20 different pathogens can be transmitted by needlestick injuries. Laboratory personnel and housekeeping are at the highest risk of incidence of NSI, but about 60% of the injuries occurred in nursing personnel (Saini, 2011).

There are some standard protocols to be followed once the NSI occur. These are the measures to be followed: the initial step to be followed is immediate washing of the injury site with soap and water. The next step is to report the incident and an exposure report sheet completed. It is important to assess the exposure (type of fluid, type of needle, amount of blood on the needle, etc), the exposure source should be evaluated: 1. HIV, HBV, and HCV status of the patient, 2. If the status is unknown, consent and testing of the patient for these diseases, 3. If the patient is not available to be tested, the likelihood of infection based on the community served by the hospital. Proper management of any positive exposure is of utmost important (Penalver, 2005)

The medical and dental students are more exposed to NSI due to their consequences and relative inexperience, ignorance and lack of awareness of NSI. According to WHO the annual estimate exposed to the pathogens globally is 2.6%, 5.9%, 0.5% for HCV, HBV, HIV respectively. Sixty-six thousand infections were affected by sharp injury exposures worldwide. To reduce NSI, further precautions should be taken by the medical students (Firoz *et al.*, 2018; Megnath *et al.*, 2017).

Previously numerous studies have been conducted by our team in various fields. Studies have been conducted in herbal medicines (Menon *et al.*, 2016; Chen *et al.*, 2019), active constituents (Li *et al.*, 2020; Mohan and Jainu, 2014), nanoparticles (Wu *et al.*, 2019; Ke *et al.*, 2019) and protein characterization (Rengasamy *et al.*, 2016). The aim of the present study is to assess knowledge and awareness of NSI among medical students.

MATERIALS AND METHODS

This is a cross-sectional questionnaire survey conducted among medical students. A random sampling method was used for the study. A total of 104 students have responded to the survey. Participants have been randomly enrolled in the online survey through google forms. A validated questionnaire consisted of 20 closed ended and yes/ no questions distributed to assess their knowledge, attitude and awareness on NSI. The responses have been taken from google forms and were analysed by SPSS software. The Pearson Chi-square test was done in association with the year of study of the respondents. The results were expressed as pie charts and bar diagrams.

RESULTS AND DISCUSSION

The results of the present survey are as follows: In our study (Figure 1) about 66.4% of the participants were male, and 33.6% were females. 66% of the respondents were male (Red), and 34% were female (Blue). Figure 2 shows that 59.8% of the medical students were affected by the NSI, and 40.2% of the medical students were not affected by NSI. Figure 3 shows the year of study of the respondent where 26% are the first year, 23% second year and 26% third year, 30% the fourth year, 69.2% of the students were aware of the protocol to be followed after NSI and 30.8% of the students were not aware of it (Figure 4). Figure 5 shows that 32.7% students said that NSI is caused due to passing of a sharp object, 23.4% said due to recapping the needle, 14% said due to the suturing, 29.9% said all these which are mentioned above. Figure 6 60.7% of the students were aware of the disease caused by NSI 39.3% of the medical students were not aware of it. When students were asked about the disease caused by NSI 43.9% students said HIV can be transmitted through NSI, 28% students said Hepatitis B, 15% of the students said Hepatitis C, 12.1% of the students said Tuberculosis can be affected (Figure 7). Figure 8 shows that 63.6% of the students use single handed technique for needle recapping, 36.4% use double-handed technique for needle recapping. Figure 9 shows that 70% of the participants wear gloves while they are treating the patients and 30% of the participants do not. When the students were asked about the measures to be taken after NSI, (Figure 10) shows that 35% of the students wash the site with the water, 15% of the students squeeze the blood, 14% of the students wash the site with soap and water. Figure 11 shows that 64.5% of the medical students are vaccinated against Hepatitis B, 35.5% of the medical students have not been vacci-

nated.

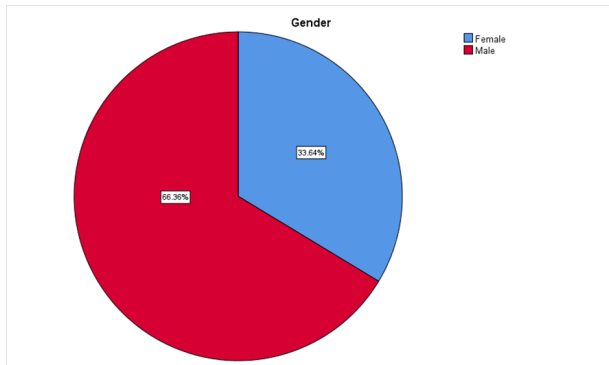


Figure 1: Pie chart showing the percentage distribution of gender of the respondents

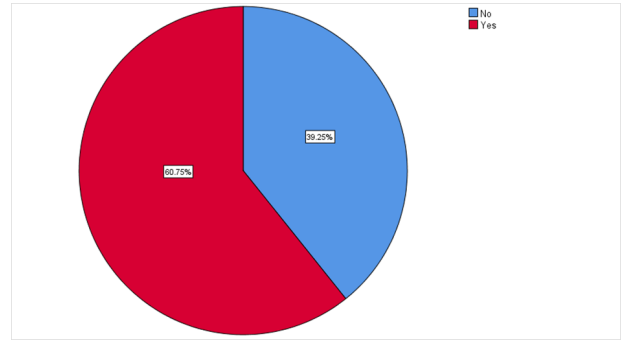


Figure 4: Pie chart showing the percentage distribution of the participants' knowledge about the universal precaution guidelines regarding NSI

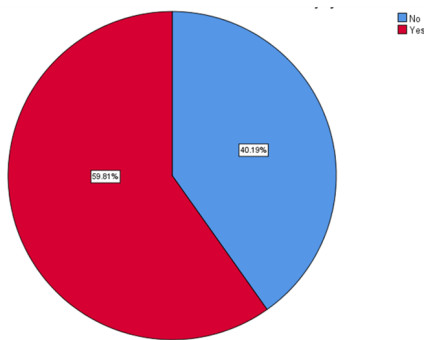


Figure 2: Pie chart showing the percentage distribution of the respondents

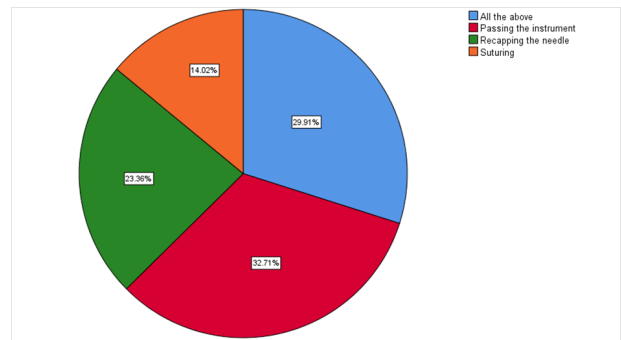


Figure 5: Pie chart showing the percentage distribution of the participants, knowledge about the common clinical activity caused NSI

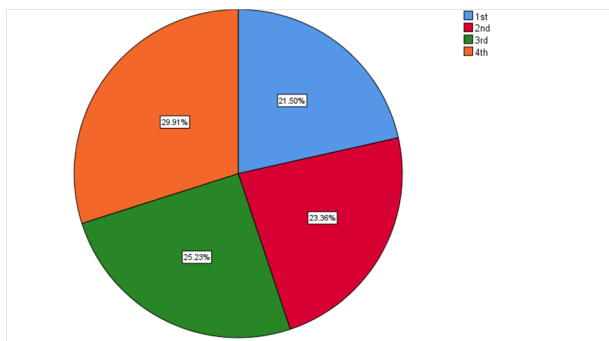


Figure 3: Pie chart showing the percentage distribution of participants' year of study

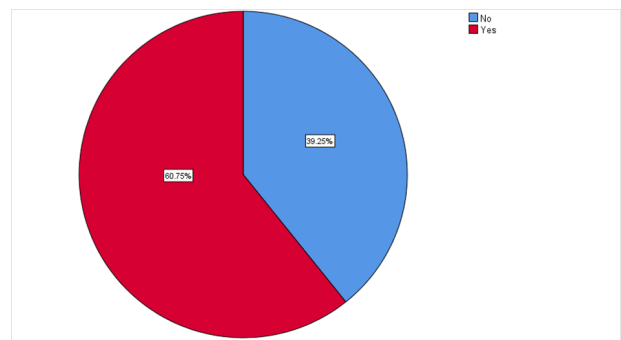


Figure 6: Pie chart showing the percentage distribution of the participants' awareness of the disease caused by NSI

Association of the study year of participants and regarding the awareness of protocol of NSI and analysis using chi-square tests are depicted as bar graphs (Figures 12, 13, 14, 15 and 16). The statistical analysis showed that there is no association between the awareness and study year of the respondents.

Figure 12 shows the majority of the 4th year students (19 participants) were aware of the universal precaution guidelines, which is statistically not significant (Pearson chi-square value = 0.744, p-value = 0.856 >0.05). Figure 13 shows there is no association between the year of the study and responses

regarding the common clinical activity which causes NSI (Pearson chi-square value = 11.753 p-value = 0.228 >0.05). Figure 14 shows there is no association between the year of the study and responses regarding the awareness of the diseases caused by NSI (Pearson chi-square value = 6.421, p-value = 0.093 >0.05). Figure 15 shows there is no association between the year of the study and responses regarding the safest technique for NSI (Pearson chi-square value = 5.291, p-value = 0.152 > 0.05). Figure 16 shows there is no association between the

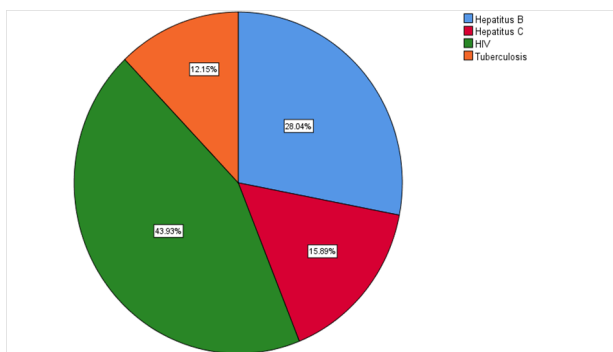


Figure 7: Pie charts represent the percentage distribution of the participants' knowledge about the disease transmitted by NSI

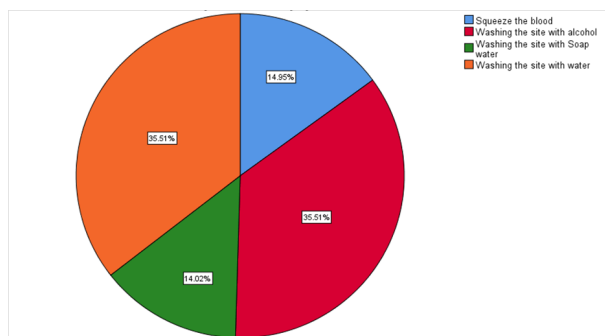


Figure 10: Pie chart showing the percentage distribution of the participants' awareness on measures to be taken when NSI occurs

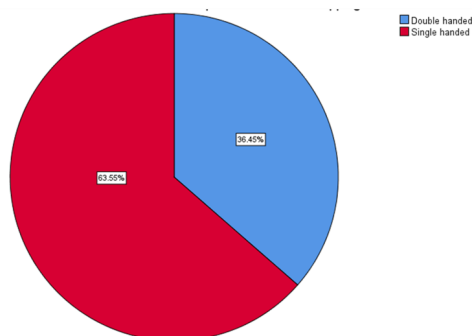


Figure 8: Pie chart showing the percentage distribution of the respondent' awareness of the safest technique of needle recapping to avoid NSI

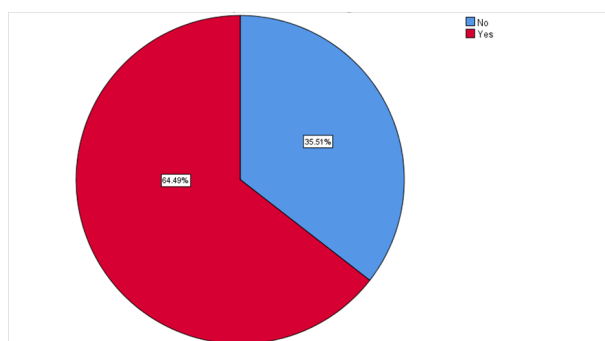


Figure 11: Pie chart shows the percentage distribution of responses about the vaccination of the participants

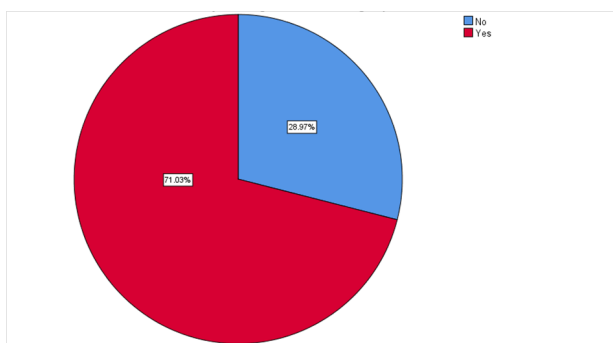


Figure 9: The pie chart showing the percentage distribution of participants' response regarding whether they wear gloves while treating the patients

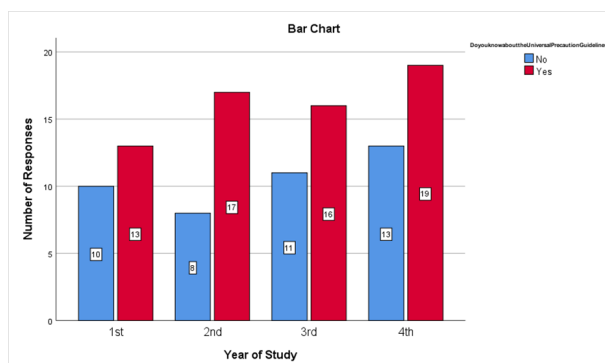


Figure 12: The bar graph represents the association between the year of study and knowledge about universal precaution guidelines regarding NSI

year of the study and responses regarding the measures of NSI (Pearson chi-square value = 8.573, P-value = 0.478 > 0.05).

In the previous study, the results showed that 80% of the HIV disease can be reduced by using Antiretroviral Medications (Wilburn and Eijkemans, 2004). The study showed that the majority of the respondents have been vaccinated against the disease caused by NSI (Hakeem et al., 2019), which

is similar to our study. Majority of the NSIs are occurred by Dental professionals where they are at high risk Callan et al. (2006). In another study, the author reported 19 indications about the NSI, the majority of the participants were aware of it (Rabbitts, 2003). To avoid NSI preventive strategies, have to be taken. All the medical students must be vaccinated against Hepatitis virus, and awareness on the protocols after NSI should be created. Another study explains that 53.4% of injuries occurred before and after the disposal of sharp objects, 63% injury due

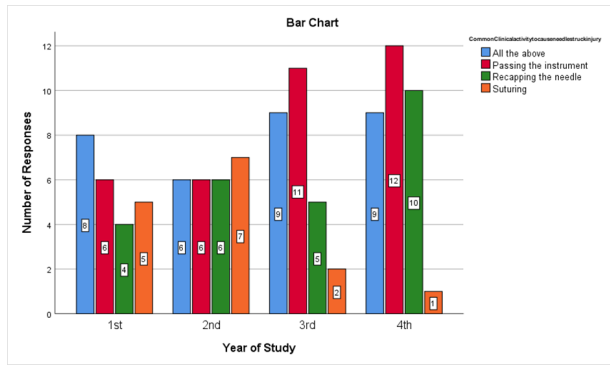


Figure 13: The bar graph represents the association between the year of the study and knowledge about common clinical activity which causes NSI

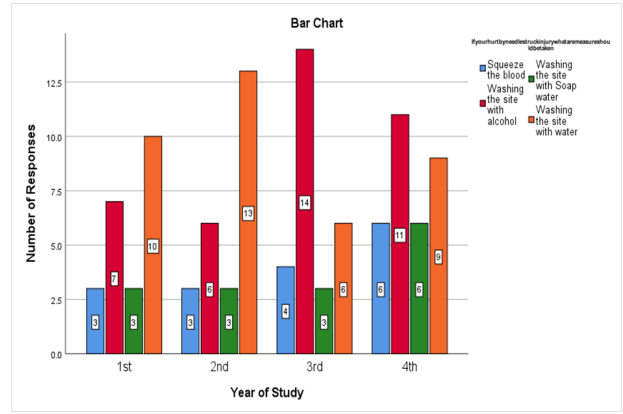


Figure 16: The bar graph represents the association between the year of the study and knowledge about the measures to be taken once NSI occurs

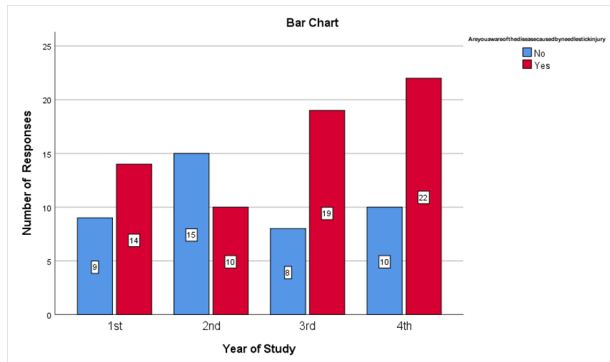


Figure 14: The bar graph represents the association between the year of the study and the awareness about the diseases caused by NSI

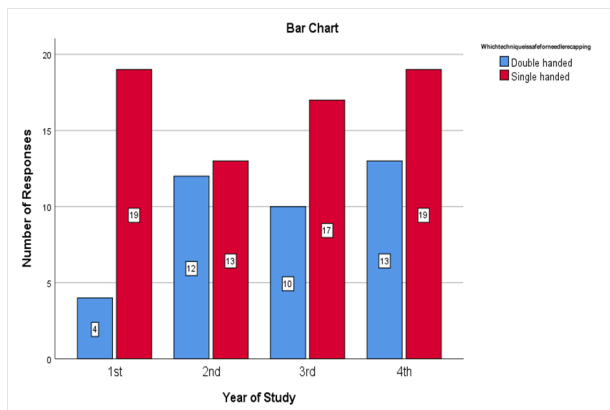


Figure 15: The bar graph represents the association between the year of the study and the responses regarding the safest technique for needle recapping

to recapping of the needle (Jahan, 2005), which is similar to our study. The study by Guruprasad and Chauhan showed that 11% of the participants has been affected by diseases, through infected needles. 67.5% of the respondents were not aware of the technique for needle disposal (Guruprasad and Chauhan, 2011). Another study showed that most common clinical activity to cause NSI are due to blood collection (55%) and then due to suturing (20.3%), (11.7%) due to vaccination, by needles recapping (66.3%) and needle bending before discarding (11.4%) (Muralidhar et al., 2010). Most of the cited articles are similar to our findings.

CONCLUSION

This study revealed the knowledge and awareness of the protocols to be followed after a NSI and the preventative measures was inadequate among the medical students. Only very few students (14%) were aware of the measures to be taken immediately after NSI, although the majority of the students (64%) were aware that single handed needle recapping is the safest method. The survey also shows that there is no association between the year of study and knowledge and awareness of the protocol of NSI. Hence measures to be taken to make the students aware of NSI and to train them on the protocol to be followed.

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Conflict of interest

The authors declare that they have no conflict of

interest for this study.

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REFERENCES

- Bindra, S., Reddy, K. V. R., Chakrabarty, A., Chaudhary, K. 2014. Awareness About Needle Stick Injuries and Sharps Disposal: A Study Conducted at Army College of Dental Sciences. *Journal of Maxillofacial and Oral Surgery*, 13(4):419-424.
- Callan, R. S., Caughman, F., Budd, M. L. 2006. Injury Reports in a Dental School: A Two-Year Overview. *Journal of Dental Education*, 70(10):1089-1097.
- Chen, F., Tang, Y., Sun, Y. 2019. 6-shogaol, an active constituents of ginger prevents UVB radiation mediated inflammation and oxidative stress through modulating NrF2 signalling in human epidermal keratinocytes (HaCaT cells). *Journal of photochemistry and photobiology. B, Biology*, 197:111518-111518.
- Firoz, H., Zarina, I. Z., Zulkefli, Z. N. 2018. Knowledge and awareness of needle stick injury among medical, nursing and paramedic students of medical faculty of hospital chancellor tuanku muhriz. *Malaysian Journal of Emergency Medicine*, 3(1).
- Gambhir, R. S., Gill, S., Kapoor, V., Singh, S., Singh, A. 2013. Knowledge, awareness and practice regarding needle stick injuries in dental profession in India: A systematic review. *Nigerian Medical Journal*, 54(6):365-365.
- Gan, H., Zhang, Y., Zhou, Q. 2019. Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats. *Journal of Biochemical and Molecular Toxicology*, 33(10).
- Gupta, M., Kumar, S., Kumath, M., Jain, G. V. 2019. Forensic Medicine and Autopsy: Knowledge and Awareness among 2nd Year Medical Students. *Indian Journal of Forensic Medicine and Pathology*, 12(4):285-291.
- Guruprasad, Y., Chauhan, D. 2011. Knowledge, attitude, and practice regarding the risk of HIV infection through accidental needle stick injuries among dental students of Raichur, India. *Natl J Maxillofac Surg*, 2(2):152-157.
- Hakeem, A., Alsaigh, S., Alasmari, A. 2019. Awareness, Concerns, and Protection Strategies Against Bloodborne Viruses Among Surgeons. *Cureus*, 11(3).
- Jahan, S. 2005. Epidemiology of needlestick injuries among health care workers in a secondary care hospital in Saudi Arabia. *Annals of Saudi Medicine*, 25(3):233-238.
- Jainu, M., Priya, V., Mohan, S. 2018. Biochemical evidence for the antitumor potential of *Garcinia mangostana* Linn. On diethylnitrosamine-induced hepatic carcinoma. *Pharmacognosy Magazine*, 14(54):186-186.
- Ke, Y., Aboody, M. S. A., Alturaiki, W., Alsagaby, S. A., Alfaiz, F. A., Veeraraghavan, V. P., Micky-maray, S. 2019. Photosynthesized gold nanoparticles from *Catharanthus roseus* induces caspase-mediated apoptosis in cervical cancer cells (HeLa). *Artificial Cells, Nanomedicine, and Biotechnology*, 47(1):1938-1946.
- Kumar, M. S. 2016. Knowledge, Attitude and Practices regarding needlestick injuries among dental students. *Asian J Pharm Clin Res*, 9(4):312-317.
- Li, Z., Veeraraghavan, V. P., Mohan, S. K. 2020. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signalling pathway. *Journal of photochemistry and photobiology. B, Biology*, 203:111773-111773.
- Ma, Y., Karunakaran, T., Veeraraghavan, V. P., Mohan, S. K., Li, S. 2019. Sesame Inhibits Cell Proliferation and Induces Apoptosis through Inhibition of STAT-3 Translocation in Thyroid Cancer Cell Lines (FTC-133). *Biotechnology and Bioprocess Engineering*, 24(4):646-652.
- Megnath, A., Nusrath, A., Rani, N. A. 2017. Prevalence of Needle Stick Injury among Interns of Rural Medical Teaching Hospital. *Journal of Medical Sciences and Health*, 03(02):14-19.
- Menon, A., V. V. P., R. G. 2016. Preliminary phytochemical analysis and cytotoxicity potential of pineapple extract on oral cancer cell lines. *Asian Journal of Pharmaceutical and Clinical Research*, 9:140-140.
- Mohan, S. K., Jainu, M. 2014. Effect of Pioglitazone, Quercetin, and Hydroxy Citric Acid on the Lipid Profile and Lipoproteins in Experimentally Induced Non-alcoholic Steatohepatitis (NASH). *Indian Journal of Pharmaceutical Education and Research*, 18(8):832-836.
- Muralidhar, S., Singh, P. K., Jain, R. K. 2010. Needle stick injuries among health care workers in a tertiary care hospital of India. *The Indian journal of medical research*, 131:405-410.
- Penalver, J. 2005. Management of needlestick injuries in the health care setting. *The virtual mentor*, 7(10):1-4.
- Ponnulakshmi, R., Shyamaladevi, B., Vijayalakshmi,

- P., Selvaraj, J. 2019. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. *Toxicology Mechanisms and Methods*, 29(4):276–290.
- Rabbitts, J. A. 2003. Occupational exposure to blood in medical students. *South African medical journal = Suid-Afrikaansetydskrifvir geneeskunde*, 93(8):621–624.
- Ramya, G., Priya, V., Gayathri, R. 2018. Cytotoxicity of the strawberry extract on the oral cancer cell line. *Asian J Pharm Clin Res*, 11:353–355.
- Rengasamy, G., Jebaraj, D. M., Veeraraghavan, V. P. 2016. Characterization, Partial Purification of Alkaline Protease from Intestinal Waste of *Scomberomorus Guttatus* and Production of Laundry Detergent with Alkaline Protease Additive. *Indian Journal of Pharmaceutical Education*, 50(2):59–67.
- Rengasamy, G., Venkataraman, A., Veeraraghavan, V. P., Jainu, M. 2018. Cytotoxic and apoptotic potential of *Myristica fragrans* Houtt. (mace) extract on human oral epidermal carcinoma KB cell lines. *Brazilian Journal of Pharmaceutical Sciences*, 54(3).
- Saini, R. 2011. Knowledge and awareness of needle-stick injury among students of Rural Dental College. *Annals of Nigerian Medicine*, 5(1):1–12.
- Shukri, N. M. M., Vishnupriya, V., Gayathri, R., Mohan, S. K. 2016. Awareness in childhood obesity. *Research Journal of Pharmacy and Technology*, 9(10):1658–1658.
- Wang, Y., Zhang, Y., Guo, Y. 2019. Synthesis of Zinc oxide nanoparticles from *Marsdenia tenacissima* inhibits the cell proliferation and induces apoptosis in laryngeal cancer cells (Hep-2). *Journal of photochemistry and photobiology. B, Biology*, 201:111624–111624.
- Wilburn, S. Q., Eijkemans, G. 2004. Preventing Needlestick Injuries among Healthcare Workers: A WHO-ICN Collaboration. *International Journal of Occupational and Environmental Health*, 10(4):451–456.
- Wu, F., Zhu, J., Li, G. 2019. Biologically synthesized green gold nanoparticles from Siberian ginseng induce growth-inhibitory effect on melanoma cells (B16). *Artificial cells nanomedicine, and biotechnology*, 47(1):3297–3305.