Knowledge, Attitude, Perception, And Practice Regarding Clinical Recommendations With Infection Control Measures In The Ongoingcovid-19 Pandemic Among Indian Health Care Workers :

Type of Study- A systematic review

Dr.Killampalli Y V Satyanarayana
Department of Oral & Maxillofacial Surgery
Saveetha Dental College
Saveetha Institute of Medical And Technical Science
Chennai

Prof. Dr.Madhulaxmi M, MDS, Ph.D., FDSRCPS, MOMSRCPS
Professor,
Department of Oral & Maxillofacial Surgery
Saveetha Dental College
Saveetha Institute of Medical And Technical Science
Chennai

Dr.Melvin George, MDS, Dip.OGS
Senior lecturer
Department of Oral & Maxillofacial Surgery
Saveetha Dental College
Saveetha Institute of Medical And Technical Science
Chennai

Dr.Sabari Nathan Rajamoorthy
Department of Oral & Maxillofacial Surgery
Saveetha Dental College
Saveetha Institute of Medical And Technical Science
Chennai

Structured Abstract

AIM: This study aimed to evaluate the knowledge, attitude, Perceptions, and Practice regarding clinical recommendations with infection control measures in ongoing COVID-19 amongIndian health care worker

Methods: In this systematic review, databases (PubMed, Scopus, and google scholar) were searched for the relevant studies published in English from the inception of databases until March 30, 2021. Hoy et al.'s tool was used to evaluate the quality of studies. All search steps, screening, selection of studies, quality assessment, and data extraction were performed separately by two researchers.

Results: Out of 122 articles searched, 4 articles conducted on 5132 Health Care Workers were included in the study. Most of the HCWs had good knowledge (72.2%), a positive attitude (70.9%), and good practice (78.8%) toward COVID-19. The most important clinical recommendation to improve knowledge, attitude, and practice (KAP) was to provide HCWs with a periodic training program regarding COVID-19. The most important source of information for HCWs on COVID-19 was social networks.

  Conclusions: Despite HCWs' good knowledge, attitude, and practice (KAP), it is recommended to periodically review KAP and carry out further studies in different states as well. It is also recommended to use social media to improve KAP.

Keywords: attitude; COVID-19; health care workers; knowledge.

Introduction

A global pandemic declared by World Health Organization (WHO) On March 11, 2020, which became a public health emergency throughout the world, the coronavirus disease (COVID-19 [1]. COVID-19 was first reported on December 1, 2019, in Wuhan, Hubei Province, China [2]. The still unknown dimension of this pandemic is making the situation worsen day by day. According to CDC, the pathogenesis period of coronavirus ranges between 2 and 14 days, and more than 80% of cases have mild symptoms [3]. The latest statistics reveal that coronavirus has infected more than 146,201,934people until 24 April 2021, and led to the deaths of more than 3,098,306 people worldwide,India stands in 2nd place statistically revealing that 16,602,456 infected cases and 189,549 deaths.

  One of the most important risks associated with this disease is the very rapid spread of the disease so more than 750,000 people worldwide were added daily to patients with COVID-19 [4]. The most common routes of transmission are travel, social interactions, and infectious transmission. Health care workers (HWCs) are more susceptible to the development and transmission of the disease than other groups.

The first mass vaccination program started in early December 2020 and as of 15 February 2021, 175.3 million vaccine doses have been administered. At least 7 different vaccines (3 platforms) have been administered. WHO issued an Emergency UseListing (EULs) for the Pfizer COVID-19 vaccine on 31 December 2020. On 15 February 2021, WHO issued EULs for two versions of the AstraZeneca/Oxford COVID-19 vaccine, manufactured by the Serum Institute of India and SKBio. On 12 March 2021, WHO issued a EUL for the COVID-19 vaccine Ad26.COV2.S, developed by Janssen (Johnson & Johnson). WHO is on track to EUL other vaccine products through June.The products and progress in regulatory review by WHO are provided by WHO and updated regularly. (5)Studies have shown that the prevalence of coronavirus among HCWs in the Netherlands [6], the United States [7], and Italy [8,9] was 15, 5.3, and 3.4–20%, respectively.

Given that there is no definitive way to treat the disease, the only way to control the disease is to prevent it through adherence to standard precautions, vaccination, increasing social distance, and washing hands. With due attention to the newly emerging nature of coronavirus, the huge variety of the disease symptoms, different diagnostic tests, and definitive coronavirus treatment, having

sufficient knowledge, a positive

attitude, and good practice to deal with the disease are of great urgency. Having sufficient knowledge regarding COVID-19 in HCWs who are exposed to patients with COVID-19 day and night is highly important. These days all people have adequate knowledge and a negative attitude towards COVID-19 directly leads to late diagnosis, poor practice, poor adherence to infection control principles, and a faster spread of the disease [10]. Even though the arrival of vaccines could not break the spread of the disease so far, there has been no comprehensive studyamong health care workers in India. Determining the current status of HCWs' knowledge, attitude, and practice (KAP) towards coronavirus can greatly help policymakers to come up with a better plan to increase knowledge, create a positive attitude, and improve proper practice. Therefore, this study aimed to evaluate the knowledge, attitude, practice, and clinical recommendations of HCWs regarding COVID-19.

Previously our team has a rich experience in working on various research projects across multiple disciplines (Govindaraju and Gurunathan 2017; A. Christabel et al. 2016; Soh and Narayanan 2013; Mehta et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Campeau et al. 2014; Kumar and S 2016; S. L. Christabel 2015; Kumar and Rahman 2017; Sridharan, Ramani, and Patankar 2017; Ramesh et al. 2016; Thamaraiselvan et al. 2015; Thangaraj et al. 2016; Ponnulakshmi et al. 2019; "Fluoride, Fluoridated Toothpaste Efficacy and Its Safety in Children - Review" 2018) Now the growing trend in this area motivated us to pursue this project.

MATERIALS AND METHODS

Eligibility criteria

This systematic review was conducted using the Cochrane Handbook, and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [11] were used to report the study. In this study, cross-sectional studies on variousIndian health care workers (HCWs) published in English peer-reviewed journals were included in the study without any time limit. Qualitative, review, and non-English studies were excluded. The outcomes measured in the included studies were knowledge, attitude, practice, and clinical recommendations of HCWS towards COVID-19.

Search strategy

International electronic Databases (google scholar, PubMed, and Scopus) were searched for the relevant articles from the inception of databases until April23, 2021. To provide a search strategy, the keywords were first identified with the help of Medical Subject Headings (MESH), and Emtree, and combined with related words in published articles. The search strategy used for PubMed was applied to search other databases as well. The PROSPERO was searched for ongoing reviews. The keywords used were: "knowledge" OR "attitude" OR "practice" OR "COVID-19" OR "coronavirus" OR "health care workers". We conducted the last search on April 23, 2021, in India.

Selection of studies and data extraction

After searching databases, Duplicate articles were removed after screening. In the next step, the titles of the articles were examined and irrelevant titles were removed. Then, the abstracts of the remaining articles were reviewed based on the inclusion criteria and irrelevant items were excluded. In the final step, the full text of the relevant articles was reviewed and the final included items were selected. First, the risk of bias (quality) of the included articles was assessed and the data were

extracted. Selection of studies, screening, quality assessment, and data extraction were performed separately by two researchers. Extracted items were included: author, year, country, study design, number of participants, target population, instrument (type, items, reliability, and validity), study outcome measure, sampling method, method of data collection, age, gender (male/female), main outcomes (knowledge/ awareness, attitude, practice), sources of information, and clinical recommendations to the improvement of HCWs KAP.

Quality assessment

Hoy et al. standard tool was used to assess the quality of the methodology of the studies [12]. This tool consisted of 10 items and evaluated the quality of the methodology of observational studies in two dimensions including external validity (target population, sampling method and procedure, and minimum non-response bias) and internal validity (data collection method, outcome definition, study instrument, and data collection procedure). The quality of the studies was separately assessed by two researchers. Tables were used to display the results.

Results

Study selection

After searching the databases, 122 articles were found, of which 49 articles remained after deleting duplicates. Out of 49 articles, 43 articles were excluded due to not

meeting the inclusion criteria. Of the remaining 6 studies with reviewed full-text, 4 studies were included in the systematic review study, and 2 studies were excluded from the study. (Figure 1).

Prisma flow diagram
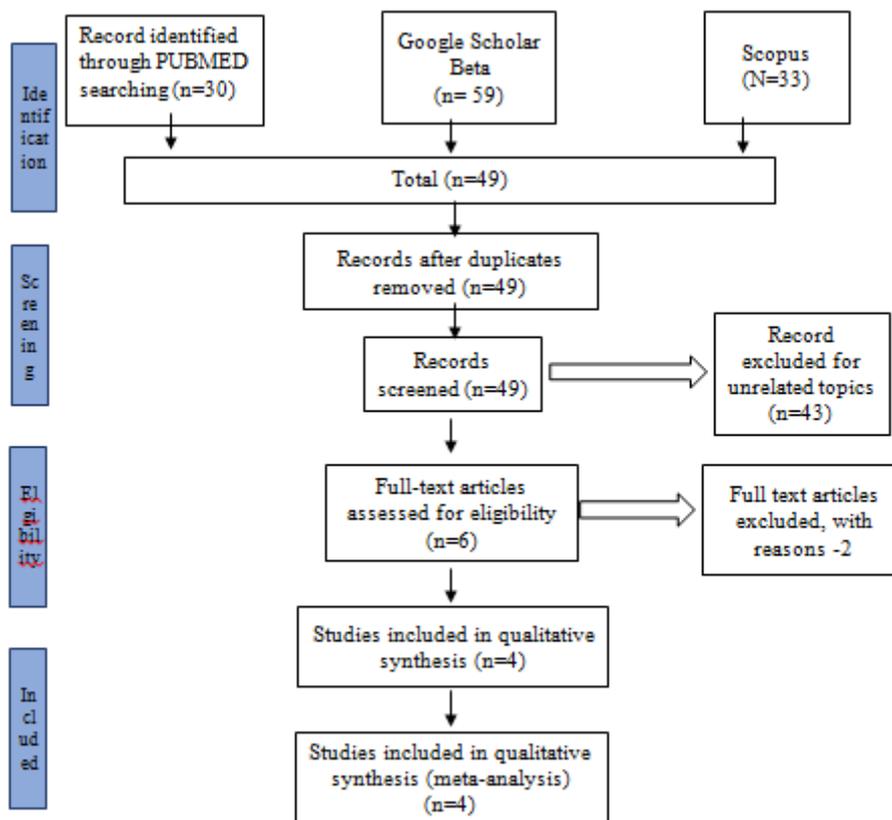
Study characteristics

Four cross-sectional studies conducted on 5132 HCWs were entered into the systematic review. All the studies were carried out in 2020. Most of the studies were conducted in India. ALL studies were performed on a set of HCWs and there were also some studies conducted specifically on dentists or physicians and nurses. In all the studies, the tools used were researcher-made. The most common type of sampling method used in studies was convenience sampling.The mean age of participants was 32.8 years in all 4 studies. In most studies, the gender of participants was specified.

Main results

Tools

Different tools were used in all 4 included studies. In most studies (n=4), the tools used were researcher-made.

In all studies, the content of the tools was developed using national, the World Health Organization (WHO), and the Centers for Disease Control and Prevention (CDC) guidelines. In the included studies, several researchers were provided with tools in a pilot program to determine the validity of the tools. Moreover, Cronbach's alpha was used to determine the reliability of the tools. It ranged from 0.71 to 0.81 in different studies. In studies, the number of items was mentioned. The number of questions in the tools ranged from 5 to 45 questions

Knowledge, attitude, and practice of HCWs towards COVID-19

4 studies evaluated the level of knowledge of HCWs about COVID-19. The level of knowledge/ awareness in each study were expressed as the percentage of participants with sufficient knowledge of COVID-19. 4 studies conducted on 5132 individuals showed the percentage of participants with sufficient knowledge. Knowledge was expressed at sufficient, moderate, and poor levels in the included studies. The level of knowledge of HCWs in different studies ranged from 26.5 to 96.89%. Based on the general classification of the level of knowledge, a score of 1–33, 33–66, and 66– 100% suggested poor, moderate, and good knowledge, respectively. In most studies (68%), participants had good knowledge of COVID-19. In general, 72.2% of participants had sufficient knowledge of COVID-19.   4 studies evaluated the attitude of HCWs towards COVID-19. In studies, the level of attitude was expressed as the percentage of participants with a positive attitude towards COVID-19. In general, in most studies participants had a positive attitude towards COVID-19. Overall, the results revealed that more than 70.9% of HCWs had a positive attitude towards COVID-19. Out of 28 studies, 9 studies evaluated the practice of HCWs towards COVID-19. In the included studies, HCWs' practice was reported as the percentage of participants with good practice towards COVID-19. The participants'

Figure 1: Study selection process.

Author,year, state/country	Studies characteristics (1) Design, (2) Outcome measure, (3) Sampling methods, (4) Method of data collection, (5) Risk of bias	Tools (1) 1Type, (2) Items, (3) Reliability and validity	Participants (1) 1Target populations (2) Number of participants (3) Age (4) Gender (Male/Female)	Knowledge/ Awareness (1) 1Percent or mean, (2) Level, (3) Source of information	Attitude (Percent) or mean Practice (1) 1Percent or mean (2) Level
Shivkumar Gopalakrishnan (across the country)	1) cross-sectional 2) Knowledge, awareness, practice, 3) Convenience 4) Online 5) low	1)researcher made 2) 24 3) approved	1) HCWs 2) 1,429 3) 21-70yrs 4) F-61.5% M-38.5%	74.1% good	Attitude-84.2% Practise-93.0% good
Aayushi Rastogi et al India(25 states)	1) cross-sectional 2) Knowledge, attitude, practice, 3) Convenience 4) Online 5)low	1)researcher made 2) 37 3) approved	1) nurses 2) 1,182 mean age of 30 ± 6.7 years 3) F-61.5% M-38.5%	Mean- 16.82 ± 3.3, good	Attitude-9.77 ± 2.03 Practise- 18.37 ± 3.29 Good
Mishra Supriya et al (India)	1) cross-sectional 2) Knowledge, attitude, practice, 3) convenience 4) Online 5)Low	1)researcher made 2) 22 3) approved	1) Private dental practioner 2) 1925 3) 37.64±7.25 4) F-64.5% M-33.5%	89.5% Good	Attitude-74.08% Practice-
Prakash D. Samantet al, Navi Mumbai	1) cross-sectional , observational, 2) Knowledge, attitude, practice, 3) convenience	1)researcher made 2) 48 3) approved	1) HCWs 2) 596 3) 21-70yrs 4) F-61.5%	12.1±1.8 Good	Attitude-93.8%) felt that mask (85.4%) thought alcohol-based

| | 4) Online | | M-38.5% | | sanitize |
| | 5) Low | | | | Good |

practice score was reported to be between 24.2 and 96%. In most studies participants performed good practice. In general, 78.8% of HCWs had good practice in adherence to COVID-19-related infection control principles.

Out of 4 studies, 3 studies reported clinical recommendations to improve KAP among HCWs. The most important clinical recommendations to improve HCWs' KAP towards COVID-19 were: Continued education program for HCWS about coronavirus, providing sufficient quantities of PPE and training all HCWs, and Participating in online webinars provided by the CDC and WHO to update awareness about COVID-19 Concerning the resources of information for HCWs used to improve KAP, the most important sources of information were social media, television, and newspapers.

Discussion

This study aimed to evaluate the knowledge, attitude, practice, and clinical recommendations of HCWs towards COVID-19. To do so, databases were searched for the relevant studies up to April 23, 2021. 4 cross-sectional studies conducted on 5132 HCWs inIndiaentered into the final stage of the systematic review. In most studies, researcher-made tools were used. Regarding knowledge, the results showed that in most studies, HCWs had good knowledge of COVID-19. In general, 72.2% of participants had sufficient knowledge of COVID-19. However, in a systematic review generally conducted on various aspects the results demonstrated that in most included studies, participants had sufficient knowledge of the infection control principles, which is in line with the findings of the present study. Regarding individual studies, the results of the present study also confirm the findings of individual studies conducted on medical students in Jordan [13], the Philippines [14], and India, which can be due to the similarities in methodology and the level of communication on coronavirus topics among most of the medical students. Unlike the present study in which the level of knowledge about COVID-19 was 72.2%, in studies conducted on the general population in Turkey (36%) [15], India (63%) [16], and Iran (4.8–7.3%) [17], participants had low knowledge regarding COVID-19. The reason for such discrepancy may reside in differences in the study populations and the sample size of the studies reviewed. Concerning attitudes in different studies, between 16.7 and 96.4% of participants had a positive attitude towards COVID-19. In general, in most studies, more than 70% of participants had a positive attitude towards COVID-19, which corroborates with a systematic review study regarding general infection principles among nurses. In Alobuia WM's study conducted on the general population in the United States (27–52%) [18], it was found that participants had a negative attitude towards COVID-19, which is inconsistent with the findings of the present study. Regarding practice, in most studies, participants performed good practice. Overall, 78.8% of HCWs had good practice towards the adherence to COVID-19-related infection control principles, which is inconsistent with the findings of the review study on nurses [12], which indicated that nurses performed a moderate to poor practice regarding infection control. Providing HCWs with COVID-19-related training programs as well as the PPE equipment and the required practical skills and taking part in online webinars to increase the level of knowledge about COVID-19 were among the most important clinical recommendations to improve HCWs' KAP towards COVID-19. The most important source of information for HCWs to improve KAP was

social networks. With due attention to the increasing prevalence of the disease and the lack of definitive treatment and since the only way to control the disease is to create social distance and be quarantined, social networks play a substantial role in increasing the level of knowledge about COVID-19. Since the outbreak of the coronavirus, countries have applied various social networks such as Facebook, Twitter, Instagram, and WhatsApp to raise the level of knowledge among HCWs and the general population

Limitations and strengths

The most important limitations of this study are as follows: (1) All the included studies were descriptive, and a non-random sampling method was used to select the participants. When interpreting the results, the specific limitations of these studies should be taken into account, which may limit the generalizability of the results as well. (2) In some of the studies included, there was incomplete information, so the authors were contacted to receive the information. (3) Another limitation is the language of studies- only studies in English entered the final stage. (4) And the use of researcher-made tools in various studies is another limitation, which did not allow us to conduct a meta-analysis. Despite the limitations stated, there are also some strengths associated with this study. Firstly, according to the best information provided by the researchers, this study was the first systematic review in this field. Secondly, in this study, all possible dimensions of knowledge, attitude, practice, sources of information, and related clinical recommendations were also discussed.

Our institution is passionate about high-quality evidence-based research and has excelled in various fields ((Jayaseelan Vijayashree Priyadharsini 2019; Pc, Marimuthu, and Devadoss 2018; Ramesh et al. 2018; Ramadurai et al. 2019; Sridharan et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Mathew et al. 2020; Samuel 2021; R et al. 2020; Chandrasekar et al. 2020; J. Vijayashree Priyadharsini, Smiline Girija, and Paramasivam 2018)

Conclusion

The results of this study revealed that in most of the included studies, HCWs had good knowledge, a positive attitude, and good practicestoward COVID-19. The most important clinical recommendation was to improve the KAP by providing relevant training programs. Moreover, social networks were the most important source of information applied. With due attention to the limitations of the present study, it is recommended that future studies with a larger sample size be conducted periodically in different states. The results of the current study can be applied to HCWs and health policy-makers to improve KAP.

Conflict of interest: The authors declare that they have no conflicts of interest.

Informed consent: Not applicable.

Ethical approval: Not applicable.

References

1. WHO. Director-General's opening remarks at the media briefing on COVID-19—11 March 2020; 2020. Available from: HTTPS:// www.who.int/dg/speeches/detail/who-director-generals opening-remarks-at-the-media-briefing-on-covid-19— 11-march-2020.

2. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, et al. Coronavirus disease 2019 (COVID-19): a perspective from China. Radiology 2020;296:200490.

3. CDC. Coronavirus disease 2019 (COVID-19); 2020. Available from: https://www.cdc.gov/coronavirus/2019-ncov/about/ transmission.html.

4. Worldometers. Covid-19 coronavirus pandemic; 2020. Available from: https://www.worldometers.info/coronavirus/

5.https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines?adgroupsurvey={adgroupsurvey}&gclid=Cj0KCQjw4ImEBhDFARIsAGOTMj8l_vbbI2a-vU4OmII2ZsksqLhZhHyRCxt5DHzxWPtyyIhBrKJWWZcaAiNfEALw_wcB

6 Sikkema RS, Pas SD, Nieuwenhuijse DF, O'Toole Á, Verweij J,van der Linden A, et al. COVID-19 in health-care workers in threehospitals in the south of the Netherlands: a cross-sectionalstudy. Lancet Infect Dis 2020;20:1273–80.

7. Mani NS, Budak JZ, Lan KF, Bryson-Cahn C, Zelikoff A, Barker GE, et al. Prevalence of COVID-19 Infection and Outcomes Among Symptomatic Healthcare Workers in Seattle. Washington: Clinical Infectious Diseases; 2020.

8. Fusco F, Pisaturo M, Iodice V, Bellopede R, Tambaro O, Parrella G, et al. COVID-19 among healthcare workers in specialist infectious diseases setting in Naples, Southern Italy: results of a cross-sectional surveillance study. J Hosp Infect 2020;105:596–600.

9. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet 2020;395.

10. Liang T. Handbook of COVID-19 prevention and treatment. The First Affiliated Hospital, Zhejiang University School of Medicine Compiled According to Clinical Experience; 2020.

11. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med 2009;6:e1000097.

12 Hoyt,Brooks P,Woolf A,Blyth F,March L, Bain C, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J Clin Epidemiol 2012;65:934–9.

13. Alzoubi H, Alnawaiseh N, Al-Mnayyis A, Lubad M, Aqel A, AlShagahin H. COVID-19-knowledge, attitude and practice among medical and non-medical universitystudents in Jordan. J Pure Appl Microbiol 2020;14:17–24.

14. Baloran ET. Knowledge, attitudes, anxiety, and coping strategies of students during COVID-19 pandemic. J Loss Trauma 2020;25: 635–42

15. Yıldırım M, Güler A. COVID-19 severity, self-efficacy, knowledge, preventive behaviors, and mental health in Turkey. Death Stud 2020:1–8. https://doi.org/10.1080/07481187.2020.1793434 [Epub ahead of print]. 12 Hesaraki et al.: Knowledge, attitude, practice and clinical

16. Gudi SK, Chhabra M, Undela K, Venkataraman R, Mateti UV, Tiwari KK, et al. Knowledge and beliefs towards universal safety precautions during the coronavirus disease (COVID-19) pandemic among the Indian public: a web-based cross-sectional survey. Drugs Ther Perspect 2020:1–8. https://doi.org/10.1007/s40267- 020-00752-8 [Epub ahead of print].

17. Honarvar B, Lankarani KB, Kharmandar A, Shaygani F, Zahedroozgar M, Rahmanian Haghighi

MR, et al. Knowledge, attitudes, risk perceptions, and practices of adults toward COVID-19: a population and field-based study from Iran. Int J Publ Health 2020;65:1–9.

18. Alobuia WM, Dalva-Baird NP, Forrester JD, Bendavid E, Bhattacharya J, Kebebew E. Racial disparities in knowledge, attitudes, and practices related to COVID-19 in the USA. Oxford, England: J Public Health 2020;42:470–8.

19. SHRIYAN, AMRITA, and ASHVIJ SHRIYAN. "A STUDY ON THE EFFICIENCY OF CSSD AT A HEALTH CARE CENTRE." *TJPRC: Journal of Nursing and Patient Safety & Care (TJPRC: JNPSC)* 1.2 (2015): 7-16.

20. AL-ANSARI, WALEED IBRAHEEM ALI, ALI SHAWKI, and THURA HIKMAT. "THE EFFECTIVENESS OF TIGECYCLINE IN MULTIDRUG RESISTANT INFECTIONS IN INTENSIVE CARE UNIT." *International Journal of Medicine and Pharmaceutical Science (IJMPS)* 7 (2017): 13-20.

21. Agarwal, P. A. R. U. L. "Review of patient satisfaction in private hospitals-a study of health care sector with special reference to Noida & Ghaziabad." *International Journal of Sales & Marketing Management Research and Development* 4.2 (2014): 27-34.

22. Al-Khafaji, N. S. "Molecular Study of Some Virulence Factors among Pseudomonsa aeruginosa Recovered from Burn infection, Iraq." *International Journal of Medicine and Pharmaceutical Sciences* 4.3 (2014): 71-80.

23. Naganandini, R. "Effectiveness of structured teaching programme on knowledge regarding selected adolescent behavioral Problems and its prevention among students." *Nursing (TJPRC: IJPN)* 2.1 (2016): 1-8.

24. Agarwal, P. A. R. U. L. "Review of patient satisfaction in private hospitals-a study of health care sector with special reference to Noida & Ghaziabad." *International Journal of Sales & Marketing Management Research and Development* 4.2 (2014): 27-34.