



IJCRR

Section: Healthcare

Sci. Journal Impact

Factor: 6.1 (2018)

ICV: 90.90 (2018)



Copyright@IJCRR

# Knowledge and Awareness on the Role of Hand Sanitizer in Prevention of COVID 19 - A Questionnaire Survey

M. Kavya Shree<sup>1</sup>, Leslie Rani S<sup>2</sup>, Brundha M. P.<sup>3</sup>

<sup>1</sup>Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India; <sup>2</sup>Lecturer, Department of General Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India; <sup>3</sup>Associate Professor, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

## ABSTRACT

**Introduction:** Hand hygiene is now regarded as one of the most important elements of infection control activities. This is not only because of the magnitude of the problem but in terms of the associated morbidity, mortality, and cost of treatment. Alcohol-based hand sanitizers used in healthcare settings will provide better hand hygiene. Hand sanitizers are used properly with a high concentration of alcohol and can ensure the best results within seconds. But it also causes dryness of the skin.

**Objective:** The study aims to assess the knowledge of the general population on hand sanitization and also to evaluate the importance given for hand hygiene in controlling the spread of disease.

**Materials and Method:** A cross-sectional Questionnaire survey was initiated in the Dindigul district, Tamil Nadu. Nearly 100 people responded. Statistical analysis was done using the SPSS software version 22. Descriptive statistics were expressed using frequency and percentage. Chi-square tests were used to find the association between the variables.

**Result:** The result varies according to the age groups but almost (57%) prefer hand sanitizer rather than soap and water for hand hygiene, using Chi-square tests;  $p$ -value = 0.022, it is statically significant.

**Conclusion:** The conclusion of this article that nearly 80% of people are aware of the importance of hand sanitizer in pandemic conditions is COVID-19,  $p$ -value = 0.773 it is statistically significant. They also agree that the usage of hand sanitizer prevents diseases and keeps our hygiene.

**Key Words:** Hand hygiene, Hand sanitizer, Alcohol-based, COVID-19, Pandemic, Awareness

## INTRODUCTION

Hand hygiene is one of the methods which can reduce the spread of pathogenic microorganisms among people. Hand Hygiene includes the usage of soaps and water, hand sanitizer, etc. Among these two, sanitizer is the most reliable material which can be used by everyone. It can be easily carried along with us and it has a lot of advantages. COVID 19 (Coronavirus Diseases-2019) pandemic is becoming a deadly disease and sparing many lives irrespective of age. As there was no vaccine <sup>1,2</sup> has been found, to prevent the disease masks, hand hygiene practice, self-isolation are encouraged. It is important to practice hand hygiene because we might get in contact with contaminated surfaces and also from direct contact with patients through respiratory drop-

lets from coughs and sneezes or indirect contact via surfaces, which may then facilitate the transmission and spreading of the disease <sup>3,4</sup>. SARS-CoV2 outbreak settings showed that providing efficient hand washing facilities reduced transmission, usage of handwash among participants is the most important <sup>5,6</sup>. Centre for Diseases Control and prevention promotes Hand hygiene through the usage of hand sanitizers<sup>7</sup>. Hand sanitizer that contains at least 60% alcohol or contains a “persistent antiseptic” should be used <sup>8</sup>. WHO highlighted the importance of hand hygiene and they launched guidelines to be followed for hand hygiene. Coronavirus can easily affect immunocompromized patients like Diabetes Mellitus people<sup>9</sup>. Hand Hygiene is widely used among medical participants as well as people working in the hospital to prevent cross infections <sup>10,11</sup>.

### Corresponding Author:

Dr. Leslie Rani S, Lecturer, Department of General Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India; Phone: 9360293308; Email: [leslieranis.sdc@saveetha.com](mailto:leslieranis.sdc@saveetha.com)

ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 25.07.2020

Revised: 24.08.2020

Accepted: 28.09.2020

Published: 20.10.2020

Some articles say that hand sanitizers are available in two forms, one is alcohol and the other is non-alcohol. The World Health Organization (ABHS) in line proved that the hand sanitizer has a fast reaction and antimicrobial activity offering protection against the bacteria and viruses<sup>12,13,14,15</sup>. Alcohol rubs kill all types of microorganisms and it is antibiotic-resistant<sup>16,17,18</sup>. Alcohol-based sanitizer restricts the viral development and enhances the surface proteins that break the chain of transmission of coronavirus. Also, the quality of alcohol is the key factor that decides the biocidal possibility of the sanitizers/rub<sup>19</sup>. There is a statement that usage of alcohols based sanitizer, some time can cause contact allergy diseases but some articles oppose this statement. Alcohol-based hand sanitizers have been used for more than 10 years, without reporting any allergic reactions to the product in Switzerland land<sup>20</sup>. Accordingly, in COVID 19 outbreaks, with the increased demand for hand sanitizer, the WHO formulation can be produced locally in case of the absence or shortage of commercial products<sup>21</sup>.

Due to the rate of increase in positive cases in COVID 19, usage of the sanitizer will help us to protect from disease. The novel coronavirus disease-2019 (COVID-19) continues to affect the world, within a short period. To manage the extent of this pandemic, there is a need to develop, disseminate, and implement infection control and prevention strategies in both healthcare settings and the community. In the early outbreak, there were general recommendations to frequently wash hands to reduce the spread of infection. The adequacy of preventive measures depends on the quality of surface disinfectants, the composition of hand sanitizer, proper material to manufacture of personal protective equipment (PPE).

The study aimed to make aware of the role of hand sanitizer in COVID 19 prevention. This edifies the different preventive measures, for example, an appropriate choice of surface disinfectants, proper hand cleansing, and empowering the PPE that could be a potential intercession to fight against COVID-19.

## MATERIALS AND METHODS

A cross-sectional questionnaire survey was conducted among the general public not below the age group of 20 years, in Dindigul district, Tamil Nadu. A set of 15 questions were framed including the demographic details and also about the Knowledge, awareness, and perception about the role of hand sanitizer in COVID 19 prevention. This approval is from the institutional review board. The questionnaires were enclosed within 1 week when it began to reach 100 responses.

### Sampling

In the present study, the sampling method used is a simple random sampling method.

### Data collection and tabulation

The number of questions distributed was 10. The close-ended yes or no type of question was asked. The software used for the data collection on the online survey website “google forms” <https://docs.google.com/forms/d/18dGAGt-yOejpg-mzR86Fn6ZTrfuVQQak27fzx7URGgXDI/edit#responses>

The data from the google forms are analyzed and then put into the excel sheet and then tabulation of the data finally and the question comparison is done.

The representation of the data is through the bar graph.

### Statistical Analysis

The statistical software used was IBM SPSS V22. The statistical test used is a Chi-square test (p-value). The type of analysis used was descriptive analysis, demographic data.

### Inclusion criteria

People from 18-40 years only participated in the survey, because they were aware of the technical mode of usage.

### Exclusion criteria

People above 40 yrs were not considered and the people, rural areas were not considered due to illiteracy and lack of opportunities to participate in the survey.

## RESULTS AND DISCUSSION

The vaccination or antiviral drugs for COVID-19 are not discovered to date. Hence, hand hygiene is a mainstay of efforts to prevent the spread of diseases. A Questionnaire-based survey has been conducted to create awareness about the usage of sanitizer in COVID 19 among the urban population.

Figure 1 represents the importance of hand hygiene during COVID-19, 78% says that it prevents spread and 14% of people says it is used for hygiene and 4% says it is used for their pseudo promotion and the remaining 3% don't have any idea. Figure 2 represents there is no significant difference between the age groups and knowledge on the importance of hand hygiene ( $p > 0.05$ ). Hand hygiene is one of the most important factors in pandemic conditions and it helps us to prevent diseases. According to existing reports, hand hygiene is the most important requirement of infection prevention and control (IPC) during the pandemic condition<sup>22</sup>. The reduced practice of hand hygiene increases the risk of respiratory infection, skin infection, etc<sup>23</sup>.

Figure 3 represents the source of usage of hand sanitizer nearly 56% of people said that they use hand sanitizer, 40% say that they use soaps and water, and the remaining 3% people said that they use only water to clean their hands. Figure 4 represents there is a significant difference between the age groups and knowledge about the method of handwash peo-

ple prefer ( $p < 0.05$ ). Most people prefer hand sanitizer to keep hygiene. Alcohol-based hand sanitizers are preferable to hand washing over soap and water<sup>24</sup>. Hand sanitizer can be an alternative to soap and water usage. The mechanism of Alcohol-based sanitizers is to dissolve the lipid membranes of microbes, and thereby inactivate them. Thus, the sanitizer is an alternative when the soap and water are not readily available<sup>25</sup>

Figure 5 shows 85% of people agree that hand sanitizer can kill the Coronavirus. But the remaining 15% disagree with the statement. Figure 6 represents there is a significant difference between the age groups knowledge about hand sanitizer-kill Coronavirus ( $p < 0.05$ ). 90% alcohol rubs are more effective against viruses than most other forms of hand washing<sup>26,27</sup>.

Figure 7 shows 82% of people were aware of the forms of hand sanitizer and the remaining 14% was not aware of it. Figure 8 represents a significant difference between the age groups aware of the forms of sanitizer ( $p < 0.05$ ) Hand sanitizer is available in the form of liquid, gel, or foam generally used to decrease infectious agents on the hands<sup>28</sup>. Alcohol-based hand rubs provide better skin tolerance as compared to antiseptic soap<sup>29</sup>. There are some existing studies reported that the gel form of alcohol-based hand sanitizer makes the skin dry and leaves the moisture in the skin<sup>30</sup> than handwashing with sterile/antimicrobial cleanser and water<sup>31</sup>.

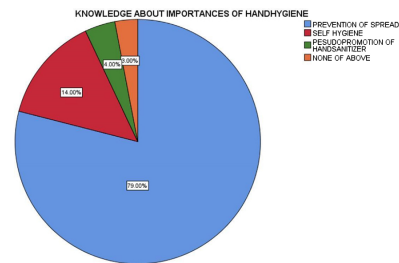
Figure 9 shows that 87% of people were aware of alcohol contained in the sanitizer that prevents infection, alcohol-based sanitizer can only kill viruses and it is recommended to use prevention from diseases and non-alcohol based is not recommended<sup>32</sup>. Figure 10 represents there is a significant difference between the age groups aware of the alcohol-based hand sanitizer ( $p < 0.05$ ). A study conducted with the WHO-recommended they said that alcohol-based formulations demonstrated a strong destroying effect against emerging pathogens, including ZIKV, EBOV, SARS-CoV, and MERS-CoV<sup>33</sup>. The usage of alcohol-based sanitizers is restricted to children. If the hand sanitizer accidentally comes in contact with the eyes, it can cause eye irritation. If it is left untreated it forms abscess like stye<sup>34,35</sup>.

Figure 11 represents that 44% of people were aware of the types of hand sanitizers that are antimicrobial and antibacterial but 56% were not aware of it. Antibacterial is more effective than antimicrobial as it can kill all pathogenic bacteria<sup>36</sup>. Sanitizer containing at least 60% alcohol is more effective in destroying the microorganisms than handwashing with antimicrobial soaps due to their ability to inactivate and destroy the microbe in vegetative state<sup>37</sup>.

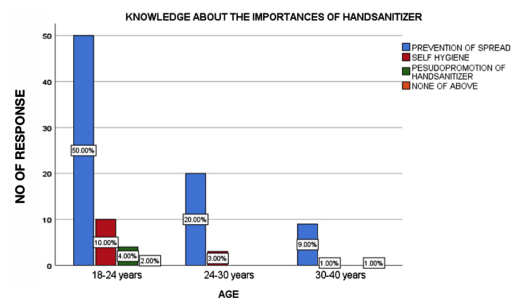
Figure 12 represents 61% of people were about the method of usage of hand sanitizer but the remaining 39% was not aware of it. Figure 13 represents there is a significant difference between the age groups and awareness about the method of

usage of hand sanitizer ( $p < 0.05$ ). The method of applying an alcohol-based hand sanitizer is to apply to hands as well to lower the forearm for at least 30 seconds and then allow it to air dry<sup>38</sup>. Some study says that there is a technique for the usage of hand sanitizer that consists of 6 steps and found that “responsible application” was adequate, as long as people are made aware that they are responsible for covering their entire hands during hygienic hand disinfection. However, some of the children may not know the method of usage of hand sanitizer unless they are educated<sup>39,40,41,42,43</sup>.

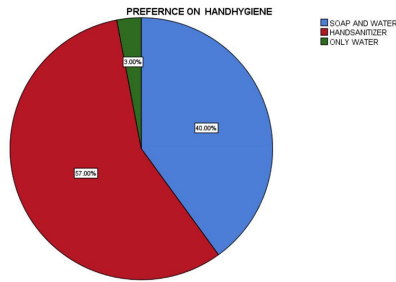
Figure 14 90% of people carry the sanitizer along with them wherever they go out. This statement shows that survey makes them understand the importance of hand sanitizer in their day to day life.



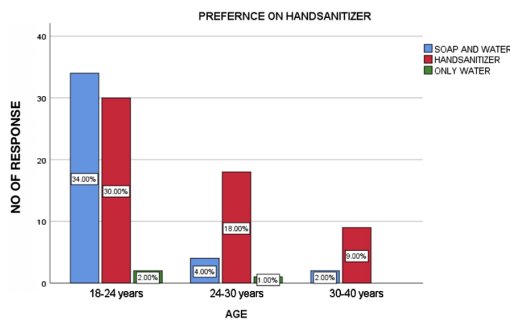
**Figure 1:** Graph shows the result of knowledge about the importance of hand hygiene. 79% of respondents said that it helps prevent spread, 14% said that it is for self-hygiene, 4% respondents said that it is only for advertisement (pseudo promotion) of hand sanitizer and the remaining 3% choose the options none of the above.



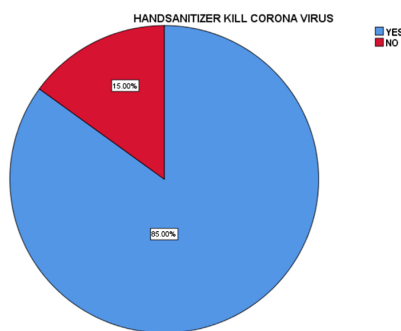
**Figure 2:** Bar graphs represent the association between different age groups and awareness on the importance of hand hygiene. The X-axis represents different age groups and the Y-axis represents the number of responses. The participants answered the prevention of spread in blue color, self-hygiene in red color, pseudo promotion in green color, and none of the above in orange. Out of 79 respondents who answered to prevent the spread, 50% were from the age group between 18-24 years, 20% were from the age group 24-30 years, and 9% were from 30-40 years. A Chi-square test was used to find the association between the variables and was found to be statistically not significant. Pearson chi-square value is 4.118, the p-value is 0.661.



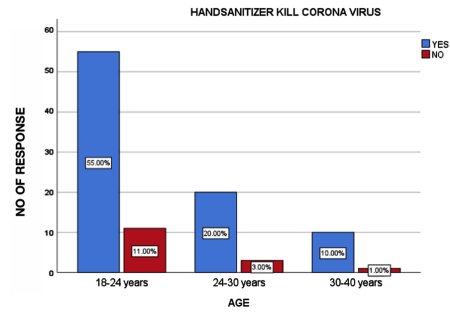
**Figure 3:** Pie chart shows the result of the preference for hand hygiene methods. 57% respondents prefer hand sanitizer, 40% said they prefer soaps and water, and the remaining said that they prefer only water as a method of handwash.



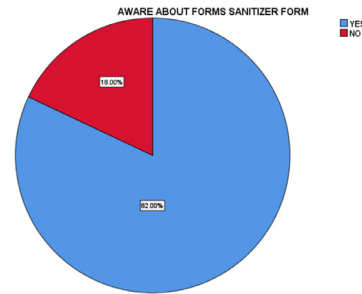
**Figure 4:** Bar graph representing the association between different age groups and preference on hand hygiene methods. The X-axis represents different age groups and Y-axis represents the number of responses. The participants who answered soaps and water in blue color, hand sanitizer in red color, and only water in green color. Out of 57% of respondents who answered hand sanitizer, 30% were from the age group between 18-24 years, 18% were from the age group between 24-30 years and 9 % were from the age group between 30-40 years. Chi-square test was used to find the association between the variable and was found to be statistically significant and Pearson chi-square value is 11.462, p-value=0.022.



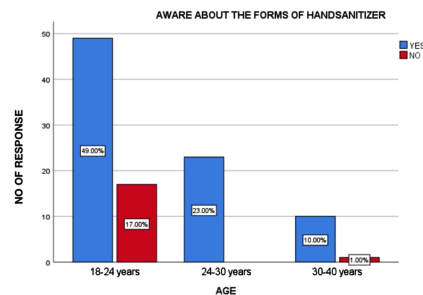
**Figure 5:** Pie chart shows the result of the knowledge about hand sanitizer kills coronavirus. 85% of respondents agree hand sanitizer kills coronavirus 15% disagree with the statement.



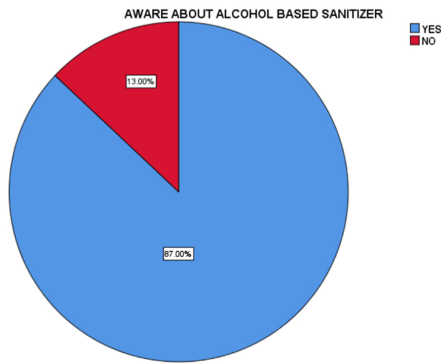
**Figure 6:** Bar graph representing the association between different age groups and knowledge about hand sanitizer-kill coronavirus. The X-axis represents different age groups and Y-axis represents the number of responses. The participants agreed in blue color, whereas disagreed in red color. Out of 100 respondents who agreed the statement was 55% from the age group between 18-24 years, 20% from the age group between 24-30 years, 10% from the age group between 30-40 years. Chi-square test was used to find the association between the variable and was found to be statistically significant and Pearson chi-square value is 0.514, p-value=0.773.



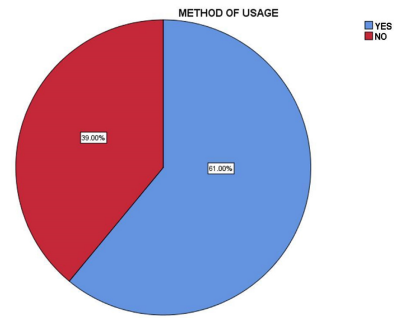
**Figure 7:** Pie chart shows awareness about the forms of hand sanitizer. (82%) respondents are aware and 16% not aware.



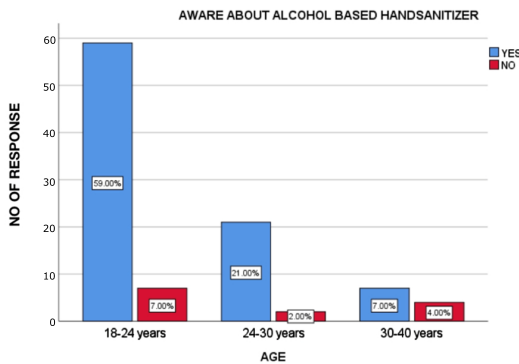
**Figure 8:** Bar graph represents the association between different age groups and awareness about the forms of sanitizer. The X-axis represents different age groups and Y-axis represents the number of responses. The participants who answered Yes in blue color, whereas No in red color. Out of 100 respondents, 49% of the age group between 18-24 years, 23% of the age group between 24-30 years, 10% from the age group between 30-40 years were aware. Chi-square test was used to find the association between the variable and was found to be statistically significant and Pearson chi value 8.331, p-value =0.016.



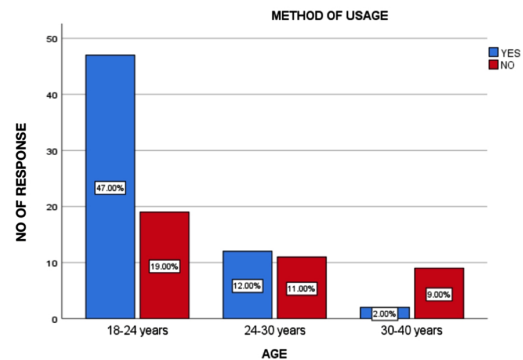
**Figure 9:** Pie chart shows the result of awareness about alcohol-based hand sanitizer. 87% were aware of the alcohol-based sanitizer and 13% were not aware of it.



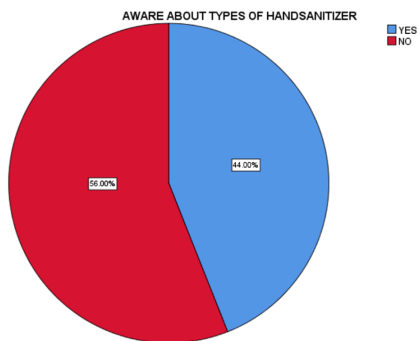
**Figure 12:** Pie chart shows the result of awareness about the method of usage of hand sanitizer. (61%) respondents aware of the method of usage of sanitizer and 39% were not aware of it



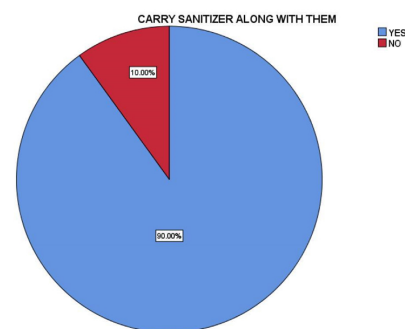
**Figure 10:** Bar graph representing the association between different age groups and the awareness of alcohol-based hand sanitizer. The X-axis represents different age groups and Y-axis represents the number of responses. The participants who answered yes in blue color and no in red color. Out of 87% of respondents, 59% from the age group 18-24 years, 21% were from the age group 24-30 years, and 7% 30-40 years were aware. Chi-square test was used to find the association between the variables and was found to be statistically significant and Pearson chi-square value 6.020, p-value =0.049.



**Figure 13:** Bar graph representing the association between different age groups and awareness about the method of usage of hand sanitizer. The X-axis represents different age groups and the Y-axis represents the number of responses. The participants who answered Yes in blue color and No in red color. Out of 100 respondents, 47 % from the age group 18-24 years, 12 % were from the age group 24-30 years and 2 % from the 30-40 years are aware. Chi-square test was used to find the association between the variables and was found to be statistically significant and Pearson Chi-square value is 12.124, p-value = 0.022.



**Figure 11:** Pie chart shows the result of awareness about types of hand sanitizer. (56%) respondents were not aware of the types of hand sanitizer and 44% aware of it.



**Figure 14:** Bar graph shows the result on awareness about hand sanitizer carry along with them (90%) respondents said wherever they go they will carry hand sanitizer but the remaining 10% disagree with the statement.

## LIMITATION

The survey is conducted with a limited number of people. It concentrated only on urban people not on rural people. This is due to a shortage of time, so more suggestions or opinions from people were not collected. The future scope of this study is that everyone knows that hand sanitizer is used among the entire ages group but it is not recommended for children that are below 4 yrs, hand hygiene is important for everyone so there should be upcoming studies which emphasize the hand sanitizer usages among children.

## CONCLUSION

The present studies show that people have some knowledge and awareness of the role of hand sanitizer in the prevention of COVID-19. Almost everyone is aware of the hand sanitizer and its role in their day-to-day life as Hygiene is very important to everybody whereas hand hygiene prevents diseases. Providing a comprehensive, targeted, yet simple to execute a hand hygiene program significantly reduced the incidence of health care claims and increased employee workplace satisfaction.

### Acknowledgment

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals, and books from which the literature for this article has been reviewed and discussed.

### Conflict of interest

Nil

### Funding Information

None

## REFERENCE

- Sarvesh Kumar J, Brundha MP. Awareness about childhood vaccination among parents with children below 15 years of age. *Drug Invention Today* [Internet]. 2018;10(12). Available from: <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09757619&AN=132447040&h=2WpShrfu%2BS1TcRwVn20QzXQmGi0LTVw8007Sf3e5Ps0hFqxpLBw%2Fk91HZB%2FzP%2Fw%2BmIN5YM6Eu4FTDn8aldinZg%3D%3D&crl=c>
- Swetha G, Rani SL, Brundha MP. Awareness of the side effects of vaccination among the general public. *Drug Invention Today* [Internet]. 2020; Available from <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09757619&AN=142952406&h=cfy4iVQXTmraHT0MJ57kCwWVNs2PNhY2Y7nJTwJVVA3EMfUHVOCFiNRILWIoalMic7UTOupw7U422FIqfdtOVQ%3D%3D&crl=c>
- Kampf G, Kramer A. Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. *Clin Microbiol Rev*. 2004 Oct;17(4):863–93, table of contents.
- Lakshmi S, Rani SL, Brundha MP. Blow the balloon for the ease--A cross-sectional study on wheezing patients. *Drug Invention Today* [Internet]. 2020;14(2). Available from: <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09757619&AN=142963148&h=39ATUPKb6a23SvNugwBM0uKx9O%2FJC6df0UosZHFg5eKqP1UuxcemfNsGIWitOTDzIp%2Fr%2Fq5zCNuOj3OeLZUNa%3D%3D&crl=c>
- Varshini A, Rani SL, Brundha MP. Awareness of annual doctor checkups among the general population. *Drug Invention Today* [Internet]. 2020;14(2). Available from: <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09757619&AN=142963150&h=JMYwEjib4y3wAV%2FptkikPpBts%2FPagLZIQKGkGzMNvKYYXoPF7zSRAFDXmrgudbAvKN6Ssf8%2BJYDye%2FCisEtxzA%3D%3D&crl=c>
- Yu IT, Xie ZH, Tsoi KK, Chiu YL, Lok SW, Tang XP, et al. Why did outbreaks of severe acute respiratory syndrome occur in some hospital wards but not in others? *Clin Infect Dis*. 2007 Apr 15;44(8):1017–25.
- Website [Internet]. [cited 2020 Jun 4]. Available from: Centers for Disease Control and Prevention. Prevention of Coronavirus Disease 2019 (COVID-19). Available online: <https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html>
- Hadaway A. Handwashing: Clean Hands Save Lives [Internet]. Vol. 24, *Journal of Consumer Health on the Internet*. 2020. p. 43–9. Available from: <http://dx.doi.org/10.1080/15398285.2019.1710981>
- Preethikaa S, Brundha MP. Awareness of diabetes mellitus among general population [Internet]. Vol. 11, *Research Journal of Pharmacy and Technology*. 2018. p. 1825. Available from: <http://dx.doi.org/10.5958/0974-360x.2018.00339.6>
- Ravichandran H, Brundha MP. Awareness about personal protective equipments in hospital workers (sweepers and cleaners). *International Journal of Pharmaceutical Sciences Review and Research*. 2016;40(1):28–9.
- Balaji S, Brundha MP, Path DNB. Awareness of About Breast Cancer among Dental Surgeons. *Res J Pharm Biol Chem Sci*. 2016;8(8):797.
- Kilpatrick C, Tartari E, Gayet-Ageron A, Storr J, Tomczyk S, Allegranzi B, et al. Global hand hygiene improvement progress: two surveys using the WHO Hand Hygiene Self-Assessment Framework [Internet]. Vol. 100, *Journal of Hospital Infection*. 2018. p. 202–6. Available from: <http://dx.doi.org/10.1016/j.jhin.2018.07.036>
- Brundha MP, Pathmashri VP, Sundari S. Quantitative Changes of Red Blood cells in Cancer Patients under Palliative Radiotherapy-A Retrospective Study [Internet]. Vol. 12, *Research Journal of Pharmacy and Technology*. 2019. p. 687. Available from: <http://dx.doi.org/10.5958/0974-360x.2019.00122.7>
- Shenoy PB, Brundha MP. Awareness of polycystic ovarian disease among females of age group 18-30 years. *Res J Pharm Biol Chem Sci*. 2016;8(8):813.
- Mp B, Brundha MP, Nallaswamy D. Hide and seek in pathology- A research on game-based histopathology learning [Internet]. Vol. 10, *International Journal of Research in Pharmaceutical Sciences*. 2019. p. 1410–4. Available from: <http://dx.doi.org/10.26452/ijrps.v10i2.606>
- Trampuz A, Widmer AF. Hand hygiene: a frequently missed life-saving opportunity during patient care. *Mayo Clin Proc*. 2004 Jan;79(1):109–16.

17. Shreya S, Brundha MP. Alteration of Haemoglobin Value in Relation to Age, Sex and Dental Diseases-A Retrospective Correlation Study [Internet]. Vol. 10, Research Journal of Pharmacy and Technology. 2017. p. 1363. Available from: <http://dx.doi.org/10.5958/0974-360x.2017.00241.4>
18. Harsha L, Brundha MP. Prevalence of dental developmental anomalies among men and women and its psychological effect in a given population. Res J Pharm Biol Chem Sci. 2017;9(6):869.
19. Website [Internet]. [cited 2020 Jun 4]. Available from: Al-Osail AM, Al-Wazzah MJ. The history and epidemiology of Middle East respiratory syndrome corona virus. Multidiscip Respir Med 2017;12:20. <https://doi.org/10.1186/s40248-017-0101-8>.
20. Widmer AF. Replace Hand Washing with Use of a Waterless Alcohol Hand Rub? [Internet]. Vol. 31, Clinical Infectious Diseases. 2000. p. 136–43. Available from: <http://dx.doi.org/10.1086/313888>
21. Bauer-Savage J, Pittet D, Kim E, Allegranzi B. Local production of WHO-recommended alcohol-based handrubs: feasibility, advantages, barriers and costs [Internet]. Vol. 91, Bulletin of the World Health Organization. 2013. p. 963–9. Available from: <http://dx.doi.org/10.2471/blt.12.117085>
22. Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011 Jan 15;377(9761):228–41.
23. Bloomfield SF, Aiello AE, Cookson B, O'Boyle C, Larson EL. The effectiveness of hand hygiene procedures in reducing the risks of infections in home and community settings including handwashing and alcohol-based hand sanitizers [Internet]. Vol. 35, American Journal of Infection Control. 2007. p. S27–64. Available from: <http://dx.doi.org/10.1016/j.ajic.2007.07.001>
24. Bolon MK. Hand Hygiene [Internet]. Vol. 30, Infectious Disease Clinics of North America. 2016. p. 591–607. Available from: <http://dx.doi.org/10.1016/j.idc.2016.04.007>
25. Guideline for Hand Hygiene in Health-Care Settings [Internet]. PsycEXTRA Dataset. 2002. Available from: <http://dx.doi.org/10.1037/e548382006-001>
26. Pedersen LK, Held E, Johansen JD, Agner T. Less skin irritation from alcohol-based disinfectant than from detergent used for hand disinfection [Internet]. Vol. 153, British Journal of Dermatology. 2005. p. 1142–6. Available from: <http://dx.doi.org/10.1111/j.1365-2133.2005.06875.x>
27. Kumar S, Sneha S. KNOWLEDGE AND AWARENESS REGARDING ANTIBIOTIC PROPHYLAXIS FOR INFECTIVE ENDOCARDITIS AMONG UNDERGRADUATE DENTAL STUDENTS [Internet]. Asian Journal of Pharmaceutical and Clinical Research. 2016. p. 154. Available from: <http://dx.doi.org/10.22159/ajpcr.2016.v9s2.13405>
28. Althawadi S. Hospital Epidemiology and Infection Control, 2nd Edition Hospital Epidemiology and Infection Control, 2nd Edition. Edited by C. Glen Mayhall. Lippincott Williams & Wilkins, P.O. Box 1640, Hagerstown, MD 21741-1640. ISBN: 0-683-30608-1 [Internet]. Vol. 21, Annals of Saudi Medicine. 2001. p. 135–6. Available from: <http://dx.doi.org/10.5144/0256-4947.2001.135a>
29. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force [Internet]. Vol. 23, Infection Control & Hospital Epidemiology. 2002. p. S3–40. Available from: <http://dx.doi.org/10.1086/503164>
30. Brundha MP. A Comparative Study-The Role of Skin and Nerve Biopsy in Hansen's Disease. Res J Pharm Biol Chem Sci. 2015;7(10):837.
31. Boyce JM, Kelliher S, Vallande N. Skin Irritation and Dryness Associated With Two Hand-Hygiene Regimens: Soap-and-Water Hand Washing Versus Hand Antisepsis With an Alcoholic Hand Gel [Internet]. Vol. 21, Infection Control & Hospital Epidemiology. 2000. p. 442–8. Available from: <http://dx.doi.org/10.1086/501785>
32. Hirose R, Nakaya T, Naito Y, Daidoji T, Bandou R, Inoue K, et al. Situations Leading to Reduced Effectiveness of Current Hand Hygiene against Infectious Mucus from Influenza Virus-Infected Patients [Internet]. Vol. 4, mSphere. 2019. Available from: <http://dx.doi.org/10.1128/msphere.00474-19>
33. Siddharta A, Pfaender S, Vielle NJ, Dijkman R, Friesland M, Becker B, et al. Virucidal Activity of World Health Organization-Recommended Formulations Against Enveloped Viruses, Including Zika, Ebola, and Emerging Coronaviruses. J Infect Dis. 2017 Mar 15;215(6):902–6.
34. P Jannathulferdiz BM. Awareness of Sty. Int J Pharm Sci Rev Res., 40(1):30–2.
35. Ravisankar A. Comparative Study of Touch Perception in Normal and Blind People. Res J Pharm Biol Chem Sci. 2016;8(11):1285.
36. Reynolds SA, Levy F, Walker ES. Hand Sanitizer Alert [Internet]. Vol. 12, Emerging Infectious Diseases. 2006. p. 527–9. Available from: <http://dx.doi.org/10.3201/eid1203.050955>
37. Timothy CN, Samyuktha PS, Brundha MP. Dental pulp Stem Cells in Regenerative Medicine – A Literature Review [Internet]. Vol. 12, Research Journal of Pharmacy and Technology. 2019. p. 4052. Available from: <http://dx.doi.org/10.5958/0974-360x.2019.00698.x>
38. Girou E. Efficacy of handrubbing with alcohol based solution versus standard handwashing with antiseptic soap: randomised clinical trial [Internet]. Vol. 325, BMJ. 2002. p. 362–362. Available from: <http://dx.doi.org/10.1136/bmj.325.7360.362>
39. Stebbins S, Cummings DAT, Stark JH, Vukotich C, Mitruka K, Thompson W, et al. Reduction in the incidence of influenza A but not influenza B associated with use of hand sanitizer and cough hygiene in schools: a randomized controlled trial. Pediatr Infect Dis J. 2011 Nov;30(11):921–6.
40. Kumar MDA, Ashok Kumar MD, Brundha MP. Awareness about nocturia-A questionnaire survey [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 1707. Available from: <http://dx.doi.org/10.5958/0974-360x.2016.00344.9>
41. Prashaanthi N, Brundha MP. A Comparative Study between Popplet Notes and Conventional Notes for Learning Pathology [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 175. Available from: <http://dx.doi.org/10.5958/0974-360x.2018.00032.x>
42. Hannah R, Ramani P, Brundha MP, Herald. J. Sherlin, Ranjith G, Ramasubramanian A, et al. Liquid Paraffin as a Rehydrant for Air Dried Buccal Smear [Internet]. Vol. 12, Research Journal of Pharmacy and Technology. 2019. p. 1197. Available from: <http://dx.doi.org/10.5958/0974-360x.2019.00199.9>
43. Kalaiselvi R, Brundha MP. Prevalence of hysterectomy in South Indian population [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 1941. Available from: <http://dx.doi.org/10.5958/0974-360x.2016.00398.x>