

Perception among General Public about Constituents and Usage of Soaps and Sanitizers

Akash N¹, Lakshminarayanan Arivarasu², Jayalakshmi Somasundaram³

Student, Department of Pharmacology¹

Assistant Professor, Department of Pharmacology²

Chief Scientist, White lab - Material Research Centre³

Saveetha Dental College and Hospitals, Saveetha Institute of Medical & Technical Sciences,

Saveetha University, Chennai, Tamilnadu, India

akashn2211@gmail.com, lakshmin.sd@saveetha.com, jayalakshmisomasundaram@gmail.com

Corresponding author: * Lakshminarayanan Arivarasu

Abstract: Soaps and sanitizers are the materials used for hand sanitation. The perception of the general public regarding the difference between the constituents of soaps and sanitizers has been evaluated in this survey. Soaps are sodium or potassium fatty acids whereas sanitizers are chemically based hand sanitation methods. These alcohol based hand sanitizers work against a wide spread variety of microorganisms but not spores. compounds such as glycerol may be added to prevent drying of the skin. Aloe vera gel has a greater impact on reducing skin dryness problems. This research is a cross-sectional study, clearly scientific investigation which was held in 2020 among the people of chennai to create awareness on the constituents between the soaps and sanitizers. 80% of the people know the constituents of the soap and sanitizers. 39% of the people are aware of the working of the soap. By the survey we can conclude the people are aware of the constituents of soap and sanitizers.

Keywords: Gel, hand wash, liquid, soaps, sanitizers, sodium

I. INTRODUCTION

Soaps are sodium and potassium fatty acid salts produced from hydrolysis of fats in a chemical reaction called saponification(NPCS Board of Consultants & Engineers, 2019) . Each soap molecule has a long carbon chain, sometimes called its 'tail', with a carboxylate 'head'(Biswas *et al.*, 2019). Hand sanitizers are a liquid, gel or foam, generally used to decrease infectious agents on the hands. They are available as alcohol based too. These alcohol based hand sanitizers work against a wide spread variety of microorganisms but not spores(Wolfe *et al.*, 2017).compounds such as glycerol may be added to prevent drying of the skin. Aloe vera gel has a greater impact on reducing skin dryness problems.

Features of hand sanitizers can be given as they require less time than hand washing(Luby *et al.*, 2010). They act quickly on killing microorganisms on their hands. They are more accessible than sinks. The reduction of bacterial counts on hands (Liu *et al.*, 2010). They don't promote antimicrobial resistance. They are less irritating to skin than soaps. They can even help with the improvement of skin dryness. The features of the hand sanitizers are the soap is bubbly. This gives the soap the ability to lather (Spitz, 2004b). Cleansing property, the ability of the soap to trap the dirt on the skin and wash it away(Spitz, 2004a). Hardness of the soap gives the firmness of the soap bar. The condensation property of the soap gives the amount of moisture that is left on the skin. The creamy nature of the soap gives the measure of the stability and creaminess of the soap lather(Botwright, 1952; Spitz, 2004).

Hand sanitizers were first introduced in 1966 in medical settings such as hospitals and health care institutions. The product was popularised in the early 1990s. Hernandez realizes alcohol delivered through a gel could clean hands in a situation where there was no access to soap and warm water(Jing *et al.*, 2020). Recognising the commercial potential of her ideas, she duly called an inventions hotline, registering a patent(Meng *et al.*, 2019). This research is to create awareness on the usage of soap and sanitizers and which one they should prefer. The aim of the study is to create

awareness on the correct choice of soap and hand sanitizers. To find which one is better among the soap and sanitizers, and about its specific usage.

II. MATERIALS AND METHODS

This survey was held in 2020 among the people of Chennai to create awareness on the constituents of soaps and sanitizers. In this investigation, 100 people were evaluated in Chennai. The precaution is far better than cure, hence the survey is to analyse the health hygiene of the people. A questionnaire of 15 questions were made and circulated among the people using Google Forms. The people were requested to answer, data was collected and then tabulated. Later data was exported to SPSS software. Frequency was ascertained and correlation with age was done using chi square analysis. Pie charts and bar graphs were used to depict the results.

III. RESULTS & DISCUSSION

The results obtained from the circulated questionnaire are given as follows. 80% of the people are aware of the constituents of the soap. 39% of the people are aware of the working mechanisms of the soap. 65% of the people are aware of the primary constituent of the soap is sodium hydroxide (Gheena and Ezhilarasan, 2019). 79% of the people attempted to make soap. 52% of the people prefer to use gel forms of hand sanitizers because it is easy to use. 80% of the people have the habit of carrying hand sanitizers along with them (Anitha and Ashwini, 2017). 40% of the people use hand sanitizers 4-5 times a day (Ramasethu, 2017). 59% of the people say that their hand sanitizers last for a month after usage of 4-5 times a day (Menon *et al.*, 2018). 69% of the people opted that soap and water is the best way of hand sanitation. 79% of the people are aware that hand sanitizers kill the most forms of microorganisms than any other method of hand sanitation (Monaghan and Hutchison, 2016). 94% of the people are aware that the primary constituent of the hand sanitizers is isopropyl alcohol (Ashwini, Ezhilarasan and Anitha, 2017). 86% of the people are aware that the soap and water method of hand sanitation is the cost-efficient form of hand sanitation. 83% of the people opted to use soap and water for their future.

Hand sanitizers require less time than hand washing, they act quickly to kill microorganisms on hands (de Aceituno *et al.*, 2015). 77% of the people are aware of the constituents of the soap and sanitizers, whereas 23% of the people are unaware of the constituents of the soaps and sanitizers (fig 1) (Rajeshkumar, Kumar, *et al.*, 2018). 53% of the people are aware of the working principle of soap which is the hydrophilic and hydrophobic method or mechanism. 47% of the people are unaware of the working principle (fig 2) (Sharma *et al.*, 2019). 68% of the people are aware that the primary constituent of the soap is sodium hydroxide, whereas 32% of the people are unaware of the primary constituents of the soap (fig 3) (Karthiga, Rajeshkumar and Annadurai, 2018). The sodium hydroxide forms 60-65% of the soap's quantity (Lakshmi *et al.*, 2015). The sodium hydroxide leads to formation of layers of surfactants. This acts as a dirt remover agent. The second primary constituent is the salt NaCl. This leads to the formation of hydrophilic agents. They absorb all the water leading to the hydrophobic and hydrophilic mechanism of the soap (Rajeshkumar, Agarwal, *et al.*, 2018). 65% of the people had tried making soap, maybe for the school activity or due to some other assessment activity. Hence they should be aware of everything about soap. 35% of the people are unaware of the process of making soap (fig 4) (Ezhilarasan, Lakshmi, Vijayaragavan, *et al.*, 2017).

72% of the people prefer using gel. 28% of the people are good with the liquid form of hand sanitizers (fig 5) (Pickering *et al.*, 2013). The gel form of the hand sanitizers are thixotropic. Hence doesn't fall out of hand. They are mostly preferable because they have the gel form mostly made of aloe vera. This prevents the hands from drying. 56% of the people have hand sanitizers with them always. Whereas 44% of the people don't have the habit of having hand sanitizers with them always (fig 6 & 12) (Ezhilarasan, Lakshmi, Vijayaragavan, *et al.*, 2017; Perumalsamy *et al.*, 2018). This prevents the search for soap and water in all the places. They have the better use of instant hygiene. The hand sanitizers are easy to carry with its most important use. 54% of the people use hand sanitizers 45 times a day. Others use hand sanitizers less number of times. Or they never use that. 34% of the people use it less than 3 times a day (Myers *et al.*, 2008). Whereas 12% of the people never use that (fig 7) (Ezhilarasan, Lakshmi, Nagaich, *et al.*, 2017). The people who never used had bad hygiene and they were prone to diseases. They can't get soap and water everywhere. 61% of the people said that a monthly pack hand sanitizer lasts for a month. But for 39%, it doesn't last for a month (fig 8) (Ezhilarasan, Lakshmi, Nagaich, *et al.*, 2017; Mehta *et al.*, 2019). Hence they might have improper hygiene. Or

overuse of hand sanitizers ll lead to skin dryness. 34% of the people prefer hand sanitizers 19% of the people prefer cloth and water, 47% prefer soap and water because it's the best way to remove the microorganisms as well as dirt(fig 9,11)(Nittérus, 2000). On a large scale it is preferable to use the soap and water. They also have another use like they are non-inflammable . On the contrary, these sanitizers are inflammable. The most important reason for the preference of soap is that they don't give any pungent smell, whereas alcohol based hand sanitizers do . The major constituent of the hand sanitizer is isopropyl alcohol. 54% of the people are aware of it whereas the remaining 46% are unaware of it(fig 10)(Ezhilarasan, 2018). These smells can be countered by the flavouring of sanitizers. But they are not effective as normal ones. People hate to use sanitizers before eating. Because it changes the taste of the product.

The reduction in the bacterial count is significant and they kill mostly all kinds of microorganisms irrespective of their usage(Ezhilarasan, Sokal and Najimi, 2018). Since they are in the form of gel, they improve the condition of the skin. Conversely, soap and water are significant methods because it removes the dirt as well as the germs. This method has been employed for years.

AUTHOR CONTRIBUTION

Idea and study was conceptualized by Lakshminarayanan Arivarasu, collection of the literature, statistics and drafting the manuscript was done by Akash, revising the manuscript for publication was done by Jayalakshmi Somasundaram

CONFLICT OF INTEREST

The authors declare No conflict of interest

V. CONCLUSION

From the study it can be concluded that the participants are aware of the constituents of soap and water. It is also observed that the participants prefer soap and water over hand sanitizers.

REFERENCES

- [1]. de Aceituno, A. F. et al. (2015) 'Ability of Hand Hygiene Interventions Using Alcohol-Based Hand Sanitizers and Soap To Reduce Microbial Load on Farmworker Hands Soiled during Harvest', *Journal of food protection*, 78(11), pp. 2024–2032.
- [2]. Anitha, R. and Ashwini, S. (2017) 'Antihyperglycemic activity of *Caralluma fimbriata*: An In vitro approach', *Pharmacognosy Magazine*, p. 499. doi: 10.4103/pm.pm_59_17.
- [3]. Ashwini, S., Ezhilarasan, D. and Anitha, R. (2017) 'Cytotoxic Effect of *Caralluma fimbriata* Against Human Colon Cancer Cells', *Pharmacognosy Journal*, pp. 204–207. doi: 10.5530/pj.2017.2.34.
- [4]. Biswas, D. et al. (2019) 'Effectiveness of a Behavior Change Intervention with Hand Sanitizer Use and Respiratory Hygiene in Reducing Laboratory-Confirmed Influenza among Schoolchildren in Bangladesh: A Cluster Randomized Controlled Trial', *The American journal of tropical medicine and hygiene*, 101(6), pp. 1446–1455.
- [5]. Botwright, W. E. (1952) 'SANITIZATION OF DAIRY FARM UTENSILS. A COMPARISON OF A CLEANER-SANITIZER CONTAINING HYAMINE 1622 WITH AN ALKALINE CLEANER AND HYPOCHLORITE SANITIZER', *Journal of Milk and Food Technology*, pp. 29–33. doi: 10.4315/0022-2747-15.1.29.
- [6]. Ezhilarasan, D., Lakshmi, T., Vijayaragavan, R., et al. (2017) 'Acacia catechu ethanolic bark extract induces apoptosis in human oral squamous carcinoma cells', *Journal of Advanced Pharmaceutical Technology & Research*, p. 143. doi: 10.4103/japtr.japtr_73_17.
- [7]. Ezhilarasan, D., Lakshmi, T., Nagaich, U., et al. (2017) 'Acacia catechu ethanolic seed extract triggers apoptosis of SCC-25 cells', *Pharmacognosy Magazine*, p. 405. doi: 10.4103/pm.pm_458_16.
- [8]. Ezhilarasan, D. (2018) 'Oxidative stress is bane in chronic liver diseases: Clinical and experimental perspective', *Arab journal of gastroenterology: the official publication of the Pan-Arab Association of Gastroenterology*, 19(2), pp. 56–64.

- [9]. Ezhilarasan, D., Sokal, E. and Najimi, M. (2018) ‘Hepatic fibrosis: It is time to go with hepatic stellate cell-specific therapeutic targets’, *Hepatobiliary & pancreatic diseases international: HBPD INT*, 17(3), pp. 192–197.
- [10]. Gheena, S. and Ezhilarasan, D. (2019) ‘Syringic acid triggers reactive oxygen species-mediated cytotoxicity in HepG2 cells’, *Human & Experimental Toxicology*, pp. 694–702. doi: 10.1177/0960327119839173.
- [11]. Jing, J. L. J. et al. (2020) ‘Hand Sanitizers: A Review on Formulation Aspects, Adverse Effects, and Regulations’, *International journal of environmental research and public health*, 17(9). doi: 10.3390/ijerph17093326.
- [12]. Karthiga, P., Rajeshkumar, S. and Annadurai, G. (2018) ‘Mechanism of Larvicidal Activity of Antimicrobial Silver Nanoparticles Synthesized Using *Garcinia mangostana* Bark Extract’, *Journal of Cluster Science*, pp. 1233–1241. doi: 10.1007/s10876-018-1441-z.
- [13]. Lakshmi, T. et al. (2015) ‘*Azadirachta indica* : A herbal panacea in dentistry - An update’, *Pharmacognosy Reviews*, p. 41. doi: 10.4103/0973-7847.156337.
- [14]. Liu, P. et al. (2010) ‘Effectiveness of liquid soap and hand sanitizer against Norwalk virus on contaminated hands’, *Applied and environmental microbiology*, 76(2), pp. 394–399.
- [15]. Luby, S. P. et al. (2010) ‘A community-randomised controlled trial promoting waterless hand sanitizer and handwashing with soap, Dhaka, Bangladesh’, *Tropical medicine & international health: TM & IH*, 15(12), pp. 1508–1516.
- [16]. Mehta, M. et al. (2019) ‘Oligonucleotide therapy: An emerging focus area for drug delivery in chronic inflammatory respiratory diseases’, *Chemico-biological interactions*, 308, pp. 206–215.
- [17]. Meng, M. R. I. et al. (2019) ‘Commonly used adjuvants (liquid soap, foam sanitizer, or ultrasound gel) do not improve strength or curing time of fiberglass cast material’, *Journal of orthopaedic surgery and research*, 14(1), p. 166.
- [18]. Menon, S. et al. (2018) ‘Selenium nanoparticles: A potent chemotherapeutic agent and an elucidation of its mechanism’, *Colloids and Surfaces B: Biointerfaces*, pp. 280–292. doi: 10.1016/j.colsurfb.2018.06.006.
- [19]. Monaghan, J. M. and Hutchison, M. L. (2016) ‘Ineffective hand washing and the contamination of carrots after using a field latrine’, *Letters in applied microbiology*, 62(4), pp. 299–303.
- [20]. Myers, R. et al. (2008) ‘Hand hygiene among general practice dentists: a survey of knowledge, attitudes and practices’, *Journal of the American Dental Association*, 139(7), pp. 948–957.
- [21]. Nittérus, M. (2000) ‘Ethanol as Fungal Sanitizer in Paper Conservation’, *Restaurator*. doi: 10.1515/rest.2000.101.
- [22]. NPCS Board of Consultants & Engineers (2019) *Soaps, Detergents and Disinfectants Technology Handbook-2nd Revised edition (Washing Soap, Laundry Soap, Handmade Soap, Detergent Soap, Liquid Soap, Hand Wash, Liquid Detergent, Detergent Powder, Bar, Phenyl, Floor Cleaner, Toilet Cleaner, Mosquito Coils, Naphthalene Balls, Air Freshener, Hand Sanitizer and Aerosols Insecticide)*. NIIR PROJECT CONSULTANCY SERVICES.
- [23]. Perumalsamy, H. et al. (2018) ‘In silico and in vitro analysis of coumarin derivative induced anticancer effects by undergoing intrinsic pathway mediated apoptosis in human stomach cancer’, *Phytomedicine: international journal of phytotherapy and phytopharmacology*, 46, pp. 119–130.
- [24]. Pickering, A. J. et al. (2013) ‘Access to waterless hand sanitizer improves student hand hygiene behavior in primary schools in Nairobi, Kenya’, *The American journal of tropical medicine and hygiene*, 89(3), pp. 411–418.
- [25]. Rajeshkumar, S., Kumar, S. V., et al. (2018) ‘Biosynthesis of zinc oxide nanoparticles using *Mangifera indica* leaves and evaluation of their antioxidant and cytotoxic properties in lung cancer (A549) cells’, *Enzyme and microbial technology*, 117, pp. 91–95.
- [26]. Rajeshkumar, S., Agarwal, H., et al. (2018) ‘*Brassica oleracea* Mediated Synthesis of Zinc Oxide Nanoparticles and its Antibacterial Activity against Pathogenic Bacteria’, *Asian Journal of Chemistry*, pp. 2711–2715. doi: 10.14233/ajchem.2018.21562.

- [27]. Ramasethu, J. (2017) 'Prevention and treatment of neonatal nosocomial infections', Maternal health, neonatology and perinatology, 3, p. 5.
- [28]. Sharma, P. et al. (2019) 'Emerging trends in the novel drug delivery approaches for the treatment of lung cancer', Chemico-biological interactions, 309, p. 108720.
- [29]. Spitz, L. (2004a) 'Multicolored and Multicomponent Soaps', Sodeopec. doi: 10.1201/9781439822326.ch7.
- [30]. Spitz, L. (2004b) 'The History of Soaps and Detergents', Sodeopec. doi: 10.1201/9781439822326.ch1.
- [31]. Wolfe, M. K. et al. (2017) 'Handwashing and Ebola virus disease outbreaks: A randomized comparison of soap, hand sanitizer, and 0.05% chlorine solutions on the inactivation and removal of model organisms Phi6 and E. coli from hands and persistence in rinse water', PloS one, 12(2), p. e0172734.

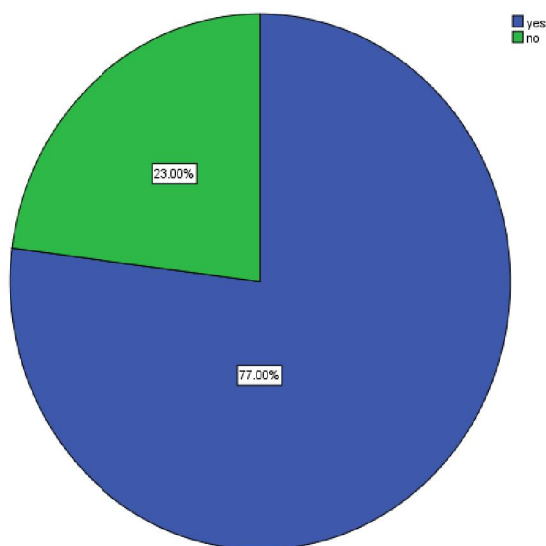


Fig.1:Pie chart showing awareness among participants about the constituents present in soap and sanitizers. Participants responded yes - 77% (blue) and No - 23% (Green)

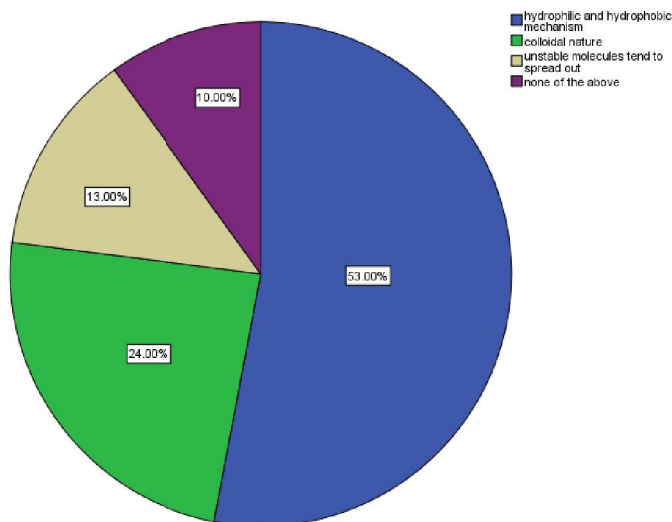


Fig.2: Pie chart showing awareness among participants about the working principle of soap. Participants responded to hydrophilic and hydrophobic mechanisms-53% (blue), colloidal nature-23%(green), unstable molecules tend to spread out-13% (grey) and none of the above-10%(violet).

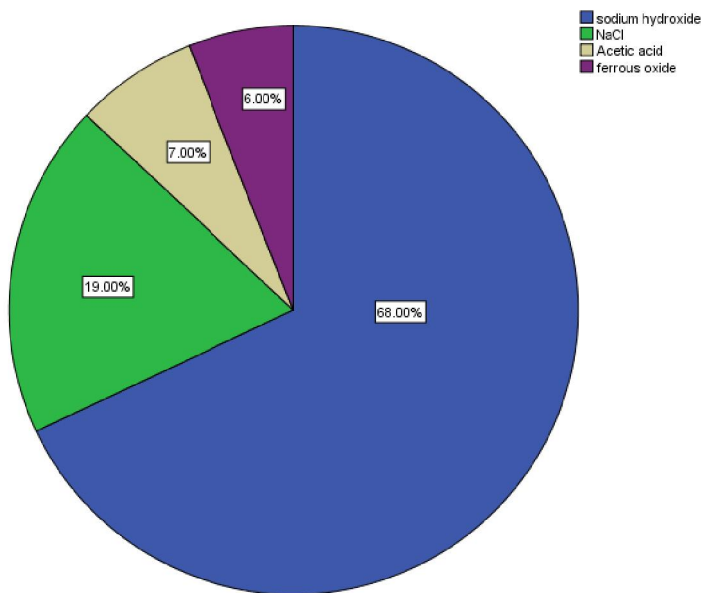


Fig.3: Pie chart showing awareness about the primary constituent of soap, participants responded calcium hydroxide-68%(Blue), NaCl-19%(green), acetic acid-7%(grey) and ferrous oxide-6%(violet).

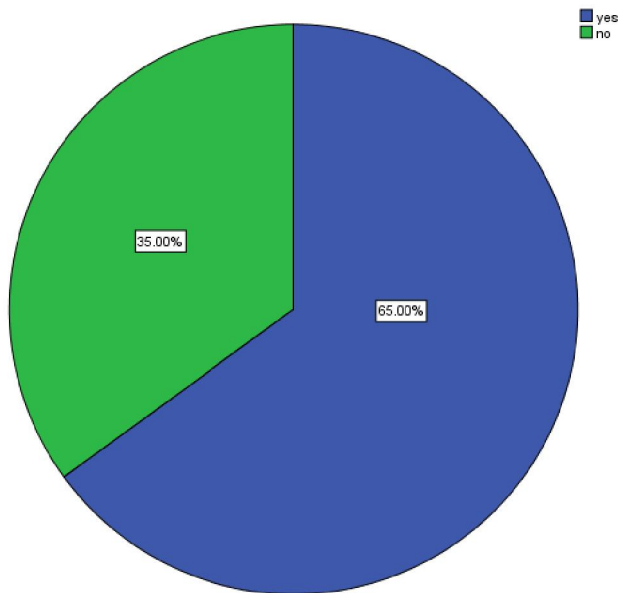


Fig.4: Pie chart showing participants who have tried to make soap. Participants responded yes -65%(blue) and no-35%(green).

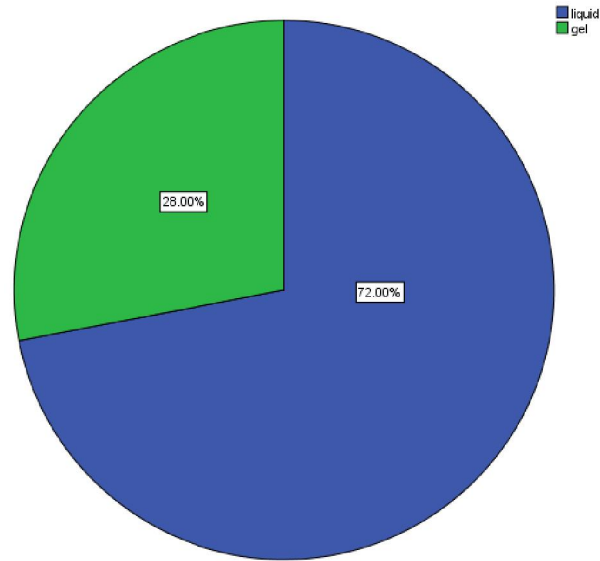


Fig.5: Pie chart showing the preference of the type of hand sanitizers. Participants responded liquid-72%(blue) and gel-28%(green).

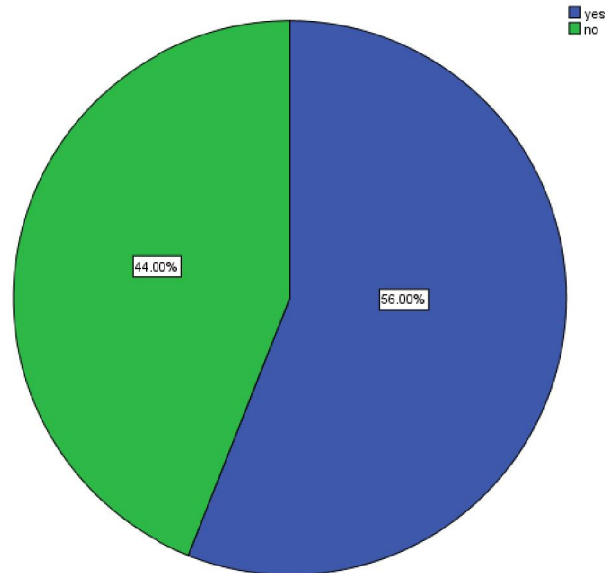


Fig.6: Pie chart showing the participants who have hand sanitizer with them. Participants responded yes-56%(blue) and no-44%(green)

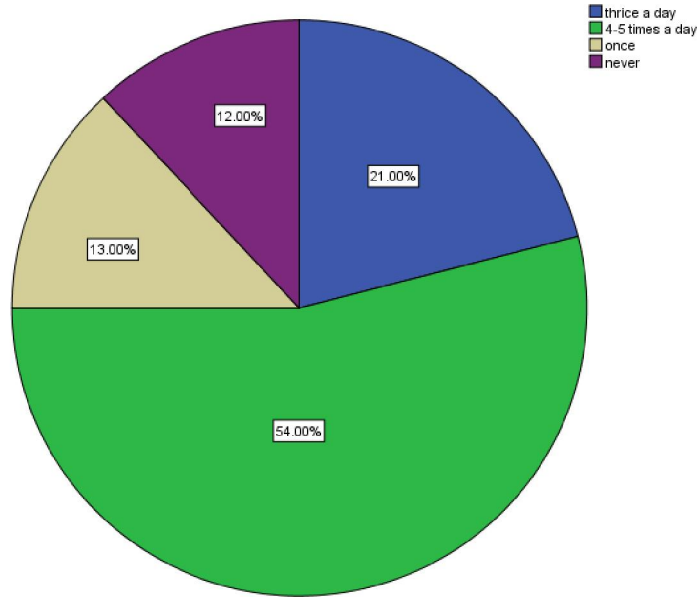


Fig.7: Pie chart showing the usage times of hand sanitizer in a day. Participants responded thrice a day-21%(blue), 4-5 times a day-54%(green), once-13%(grey) and never-12%(violet).

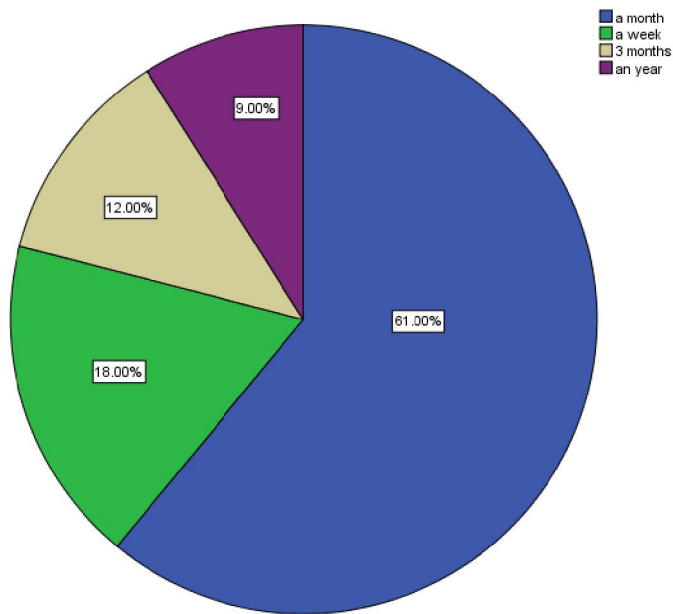


Fig.8: Pie chart showing the span of hand sanitizer. Participants responded a month-61%(blue), a week-18%(green), 3 months-12%(grey) and a year-9%(violet).

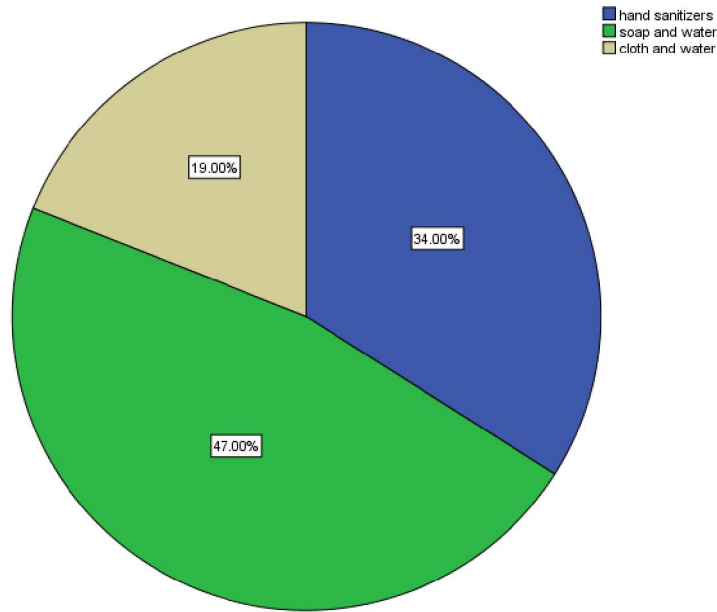


Fig.9: Pie chart showing the participants preference in hand sanitation. Participants responded hand sanitizers-34%(blue), soap and water-47%(green) and cloth and water-19%(grey).

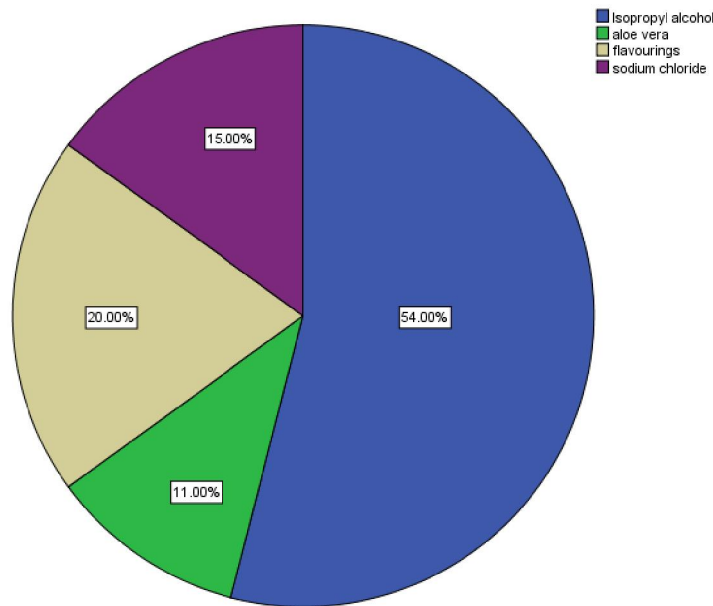


Fig.10: Pie chart showing awareness on the primary constituent of hand sanitizers. Participants responded to Isopropyl alcohol-54%(blue), aloe vera11%(green), flavourings-20%(grey) and sodium chloride-15%(violet).

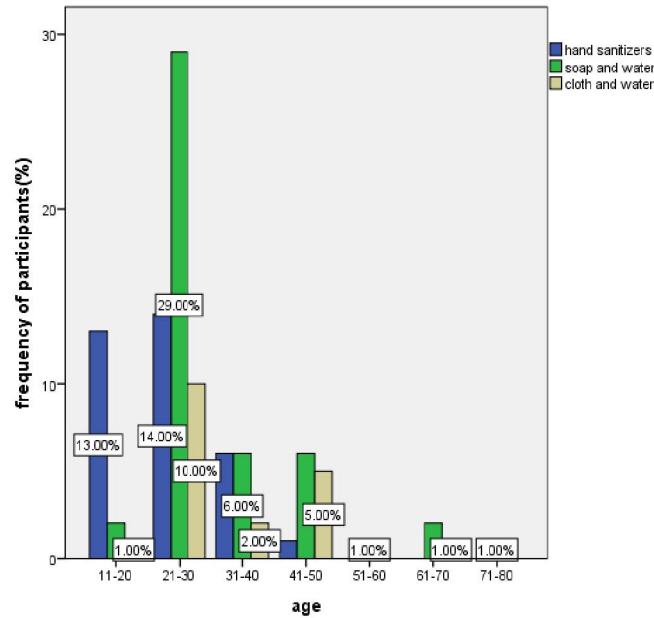


Fig 11: Bar chart represents the association of age and hand sanitation . X-axis represents the age and Y axis represents the frequency of participants in preference on hand sanitation. In the age group 21-30 years , soap and water was most prevalent (29%) when compared to other age groups. Chi-square test was done, Chi square value: 9.478, DF: 1, p value: 0.02($p < 0.05$) hence statistically significant. Soap and water was the more preferred hand sanitation method among the age group of 21-30 years.

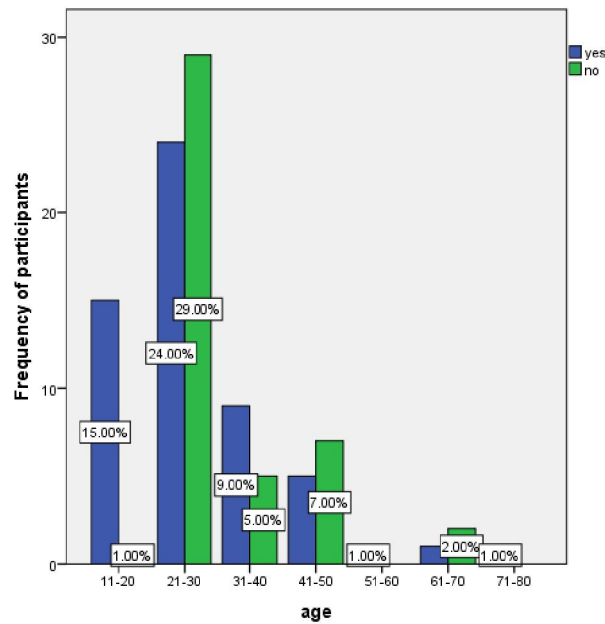


Fig 12: Bar chart represents the association of age and hand sanitizer. X-axis represents the age and Y axis represents the frequency of participants on carrying hand sanitizer with them. Blue represents Yes and green represents No. In all the groups, participants carry a hand sanitizer. Among the age group 21-30 years, Most of them do not carry a hand sanitizer (29%). Chi-square test was done, Chi square value: 1.596, DF: 1, p value-0.206(> 0.05) hence not statistically significant.