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Knowledge and Attitude on The Use of Nano Particle Based Herbal Mouthwash Among Dental Students – A Survey

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Abstract: Many investigations have pointed out widespread use of the herbal based nano system in various domains of dentistry such as prevention, prognosis, care, tissue regeneration and restoration. Nano material in mouthwashes to improve oral health performance. The main aim of the research to assess the knowledge and attitude on the use of nanoparticle based herbal mouthwash among dental students. A questionnaire based survey was conducted online among dental students regarding their knowledge and awareness about the mouth washing habits and awareness about nano based herbal mouthwashes. Total students participated :100. Total questions asked :13. Spss analysis with chi-square test is done for analysis. From the results it's evident that among the total (100) students participating in the survey 51.52% were female, 48.48% male. 83.84% of students were using mouthwash daily. 86.87% students prefer herbal mouthwash, 56.57% students were aware about nanoparticles, 79.80% students are aware about the purpose of using mouthwash, 18.18% students used nano particle mouthwash. 54.55% of students didn't have dental problems. 56.57% of students, dentists motivate them to use mouthwash. 84.85% of students know that mouthwash has greater ability to reduce bacteria in the mouth, 78.79% of students know the usage of mouthwash in reducing dental caries. Among all students, 57.58% are aware about nano based herbal mouthwashes.This study concluded that more of them are aware about nanoparticle based herbal mouthwashes.

Keywords : Awareness ,Mouthwash, Herbal,Nanoparticle, knowledge, dental students.

INTRODUCTION

Dental health is one of the aspects of human health that are often missed [(A and Gupta, 2018)]. Dental health problems in general are cracked cavities tooth the onset hygiene, an inevitable part personnel hygiene practices is a very important factor in maintaining the personal hygiene such as brushing techniques flossing and mouth rinsing habits[(Monsen, no date)] (Miller, Vandome and John, 2010)].Out of all mouth washing habit plays a vital role in maintaining oral hygiene[(Institute and National Cancer Institute, 2020a)] [(Institute and National Cancer Institute, 2020c)].If not, it leads to various dental problems [(Ashwini, Ezhilarasan and Anitha, 2017)] [(Rajeshkumar, Agarwal, et al., 2018)].Due to bacterial accumulation on the surface of the tooth which creates caries. There are many mouthwashes available in the market which can be from a natural source and also from nanoparticles[(Institute and National Cancer Institute, 2020d)] [(Afkhami et al., 2015; Institute and National Cancer Institute, 2020b)]. Nano based herbal mouthwashes which have been proved to be efficient in many areas of dentistry were used as mouthwash and proven to decrease the pathogenic oral bacteria . Nano based herbal mouthwash is expected to show profitable growth in recent years because of growing professional recognition on nano based mouthwashes [(Ezhilarasan, Lakshmi, Nagaich, et al., 2017)] [(Rajeshkumar, Venkat Kumar, et al., 2018)]. Nanoparticles size ranging from 1 to 100 nm successfully used in many products of day today life[(Anitha and Ashwini, 2017)] [(Mehta et al., 2019)]. Nanoparticle is a promising novel alternate for dentistry[(Karthiga, Rajeshkumar and Annadurai, 2018)] [(Koch, 1967)]. Dental problems can arise because of the lack of minerals in the teeth and dental porous structure [(Inc. and Kernel Networks Inc., 2019)]. With regards to the small pore size ,nanotechnology is an effective solution to deal with this . Use of mouthwash is very effective because of its ability to clean areas which are difficult with tooth brush and can damage the formation of plague[(Lakshmi et al., 2015)] [(Perumalsamy et al., 2018)]. The main purpose of the filling of innovation based mouthwash by using phytomedicine in nanotechnology is to produce dental health care products that are natural and effective for management of dental health[(Sharma et al., 2019)] (Ezhilarasan, Lakshmi, Vijayaragavan, et al., 2017; Sharma et al., 2019)]. The main aim of the research to assess the

knowledge and attitude on the use of nanoparticle based herbal mouthwash among dental students.Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018a; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar, Kumar, et al., 2018; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019a; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Rajeshkumar et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

MATERIALS AND METHODS

A questionnaire based survey was conducted online among dental students regarding their knowledge and awareness about the mouth washing habits and awareness about nano based herbal mouthwashes. The questionnaire was conducted via online. No human and animal ethical approval needed because it's a purely online based survey. It is a general health survey enquiring about nanoparticle mouthwash and health awareness among dental students and preferences for oral hygiene.

Questionnaire:

* Name
* Gender
* Are you using mouthwash daily
* what kind of mouthwash do you prefer
* Did you use nanoparticles mouthwash before
* Do you know about Nanoparticles
* Are you aware about the purpose of mouthwash
* Do you have any dental problems
* Did your dentist motivate you to use mouthwashes
* Do you know that mouthwashes have greater ability to reduce bacteria in mouth
* Did you know the usage of mouthwashes in reducing risk of dental caries
* Are your aware about nano herbal mouthwashes
* Personal preference of oral hygiene

RESULT

From the results it's evident that among the total (100) students participating in the survey 51.52% were female, 48.48% male (Figure 1). 16.16% of students are not using mouthwash daily , 83.84% of students were using mouthwash daily (Figure 2). 86.87% students prefer herbal mouthwash, 13.13% prefer chemical mouthwashes (Figure 3). 56.57% students were aware about nanoparticles, 43.43% students were not aware about nanoparticles (Figure 4). 79.80% students are aware about the purpose of using mouthwashes, 20.20% are not aware about it(Figure 5). 18.18% students used nano particle mouthwash and 81.82% students didn't use nano particle mouthwash before (Figure 6). 54.55% of students didn't have dental problems,45.45% didn't have dental problems (Figure 7). 56.57% students, dentists motivate them to use mouthwash 43.43% students dentists didn't motivate them (Figure 8). 84.85% know that mouthwash has greater ability to reduce bacteria in the mouth, 15.15% don't know about it (Figure 9). 78.79% students who know the usage of mouthwash in reducing dental caries, 21.21% are not aware about it (Figure 10). Among all students 57.58% aware about nano based herbal mouthwashes, 42.42% is not aware (Figure 11). Among all personal preferences, brushing 28.28%, mouthwash 18.18%, both 53.54% (Figure 12). Bar graph represents the association between gender and awareness about using mouthwash daily.X-axis represents the gender and Y-axis represents the percentage of awareness about using mouthwash daily. Chi-square test was done and association was found to be statistically not significant.Pearson's chi square value=1.501,DF=2, (P value > 0.05).Hence there is no significance(Figure 13). Bar graph represents the association between gender and preference of herbal and chemical mouthwashes. X-axis represents the gender and Y-axis represents the percentage of preferences about herbal and chemical mouthwash. Chi-square test was done and preferences were found to be statistically not significant . Pearson's chi square value=0.172, DF=2,(P value >0.05). Hence there is no significance(Figure 14). Bar graph represents the association between gender and awareness about nano based herbal mouthwashes. X-axis represents the gender and Y-axis represents the percentage of awareness about nano based herbal mouthwashes. Chi square test was done and association was found to be statistically not significant. Pearson's chi square value=0.925, DF=1 (P value >0.05). Hence there is no significance (Figure 15). Bar graph represents the association between gender and personal preference of Brushing, Mouth Washing or both . X-axis represents the gender and Y-axis represents the percentage of personal preferences about brushing, mouth washing and both. Chi square test was done and association was found to be statistically not significant . Pearson's chi square =1.541, DF=2 ,(P value > 0.05)(Figure 16).

DISCUSSION

The use of mouthwash is an imperative aspect of oral care prevention, treatment of oral diseases. Dental and oral hygiene has been done by brushing teeth, but all that was not enough because the mouth has a complex environment and microflora, so the use of mouthwash is indispensable[(Ezhilarasan, Sokal and Najimi, 2018b)]. Gargle with mouthwash can eliminate bacteria between teeth that are not reached by the toothbrush. Mouth Washing the oral cavity with nano based herbal mouthwashes helps to maintain the moisture in the mouth, removes remaining debris and reduces accumulation of plaque and infection[(Ezhilarasan, 2018)] [(Lakshmi et al., 2018)]. However, Nano Based herbal mouthwashes are found to be comparably effective with the advantage of being safer. In our study most of them prefer herbal mouthwashes when compared to chemical mouthwash. Most of the participants preferred mouthwash and brushing to use both for good Oral hygiene. Studies have said that the use of Nano Based herbal mouthwashes has become a routine part of daily infection control procedures[(Gheena and Ezhilarasan, 2019b)]. Most of the participants are aware about mouthwashes protecting oral cavity from many oral diseases. Lot of variation exists in the type of mouthwashes prescribed there way of use, duration and efficiency perceived by various practitioners, specialists and patients should be properly told about the proper oral care and importance of outcome. There is a need for extensive research for the standardization and popularity of nano based herbal mouthwash among the population. The main aim of the research to assess the knowledge and attitude on the use of nanoparticle based herbal mouthwash among dental students.Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

CONCLUSION

This study concluded that more of them are aware about nanoparticle based herbal mouthwashes. Mouthwashes are safely used by the majority of the population. Most people avoiding chemical mouthwashes prefer herbals for safety. Majority of them are willing to use nano based herbal mouthwashes, if it is recommended by professionals. Through this survey we would like to stress upon the need for extensive and active dialogue between the various treating specialists to reach a consensus on the use of nano based herbal mouthwashes.

REFERENCE

1. Afkhami, F. et al. (2015) 'Antibiofilm efficacy of silver nanoparticles as a vehicle for calcium hydroxide medicament against Enterococcus faecalis', Journal of dentistry, 43(12), pp. 1573–1579.
2. A, G. and Gupta, A. (2018) 'Effectiveness of Curry-Leaf Mouthwash in Maintaining Salivary and Tongue pH as Compared to Chlorhexidine Mouthwash: A Randomised Controlled Trial', Journal of Natural & Ayurvedic Medicine. doi: 10.23880/jonam-16000114.
3. 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.
4. 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.
5. Deogade, S., Gupta, P. and Ariga, P. (2018) 'Effect of monopoly-coating agent on the surface roughness of a tissue conditioner subjected to cleansing and disinfection: A Contact Profilometric In vitro study', Contemporary Clinical Dentistry, p. 122. doi: 10.4103/ccd.ccd_112_18.
6. Dua, K. et al. (2019) 'The potential of siRNA based drug delivery in respiratory disorders: Recent advances and progress', Drug development research, 80(6), pp. 714–730.
7. Duraisamy, R. et al. (2019) 'Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments', Implant dentistry, 28(3), pp. 289–295.
8. 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.
9. 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.
10. 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.
11. Ezhilarasan, D., Apoorva, V. S. and Ashok Vardhan, N. (2019) 'Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells', Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology, 48(2), pp. 115–121.

12. Ezhilarasan, D., Sokal, E. and Najimi, M. (2018a) '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.
13. Ezhilarasan, D., Sokal, E. and Najimi, M. (2018b) 'Hepatic fibrosis: It is time to go with hepatic stellate cell-specific therapeutic targets', Hepatobiliary & Pancreatic Diseases International, pp. 192–197. doi: 10.1016/j.hbpd.2018.04.003.
14. Gheena, S. and Ezhilarasan, D. (2019a) 'Syringic acid triggers reactive oxygen species-mediated cytotoxicity in HepG2 cells', Human & experimental toxicology, 38(6), pp. 694–702.
15. Gheena, S. and Ezhilarasan, D. (2019b) 'Syringic acid triggers reactive oxygen species–mediated cytotoxicity in HepG2 cells', Human & Experimental Toxicology, pp. 694–702. doi: 10.1177/0960327119839173.
16. Gomathi, A. C. et al. (2020) 'Anticancer activity of silver nanoparticles synthesized using aqueous fruit shell extract of Tamarindus indica on MCF-7 human breast cancer cell line', Journal of Drug Delivery Science and Technology, p. 101376. doi: 10.1016/j.jddst.2019.101376.
17. Inc., K. N. and Kernel Networks Inc. (2019) 'The Effect of Propolis Mouthwash Compared to Chlorhexidine Mouthwash on Oral and Cardiovascular Health', Case Medical Research. doi: 10.31525/ct1-nct04117451.
18. Institute, N. C. and National Cancer Institute (2020a) 'Dexpanthenol Mouthwash', Definitions. doi: 10.32388/iglcf5.
19. Institute, N. C. and National Cancer Institute (2020b) 'Ethyl Alcohol Mouthwash', Definitions. doi: 10.32388/dmugi5.
20. Institute, N. C. and National Cancer Institute (2020c) 'Gargle/Mouthwash Dosage Form', Definitions. doi: 10.32388/79zwor.
21. Institute, N. C. and National Cancer Institute (2020d) 'Magic Mouthwash', Definitions. doi: 10.32388/hakd3f.
22. Jeevanandan, G. and Govindaraju, L. (2018) 'Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial', European Archives of Paediatric Dentistry, pp. 273–278. doi: 10.1007/s40368-018-0356-6.
23. J, P. C. et al. (2018) 'Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study', Clinical implant dentistry and related research, 20(4), pp. 531–534.
24. 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.
25. Koch, G. (1967) Effect of Sodium Fluoride in Dentifrice and Mouthwash on Incidence of Dental Caries in Schoolchildren.
26. Lakshmi, T. et al. (2015) 'Azadirachta indica: A herbal panacea in dentistry - An update', Pharmacognosy reviews, 9(17), pp. 41–44.
27. Lakshmi, T. et al. (2018) 'Seed and bark extracts of Acacia catechu protects liver from acetaminophen induced hepatotoxicity by modulating oxidative stress, antioxidant enzymes and liver function enzymes in Wistar rat model', Biomedicine & pharmacotherapy = Biomedecine & pharmacotherapie, 108, pp. 838–844.
28. Malli Sureshbabu, N. et al. (2019) 'Concentrated Growth Factors as an Ingenious Biomaterial in Regeneration of Bony Defects after Periapical Surgery: A Report of Two Cases', Case reports in dentistry, 2019, p. 7046203.
29. Mathew, M. G. et al. (2020) 'Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary …', Clinical oral investigations. Available at: https://link.springer.com/article/10.1007/s00784-020-03204-9.
30. 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.
31. 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.
32. Miller, F. P., Vandome, A. F. and John, M. (2010) Mouthwash.
33. Monsen, R. (no date) 'A Comparison of Normal Saline Mouthwash and Mouthwash Based on Tea Solution from Salvia Officinalis in Palliative Care: A Randomized Controlled Trial'. doi: 10.26226/morressier.5c76c8bbe2ea5a723761258a.
34. Panchal, V., Jeevanandan, G. and Subramanian, E. M. G. (2019) 'Comparison of post-operative pain after root canal instrumentation with hand K-files, H-files and rotary Kedo-S files in primary teeth: a randomised clinical trial', European archives of paediatric dentistry: official journal of the European Academy of Paediatric Dentistry, 20(5), pp. 467–472.
35. Pc, J., Marimuthu, T. and Devadoss, P. (2018) 'Prevalence and measurement of anterior loop of the

mandibular canal using CBCT: A cross sectional study', Clinical implant dentistry and related research. Available at: https://europepmc.org/article/med/29624863.
36. 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.
37. Prabakar, J. et al. (2018) 'Comparative Evaluation of Retention, Cariostatic Effect and Discoloration of Conventional and Hydrophilic Sealants - A Single Blinded Randomized Split Mouth Clinical Trial', Contemporary clinical dentistry, 9(Suppl 2), pp. S233–S239.
38. Rajendran, R. et al. (2019) 'Comparative Evaluation of Remineralizing Potential of a Paste Containing Bioactive Glass and a Topical Cream Containing Casein Phosphopeptide-Amorphous Calcium Phosphate: An in Vitro Study', Pesquisa Brasileira em Odontopediatria e Clínica Integrada, pp. 1–10. doi: 10.4034/pboci.2019.191.61.
39. Rajeshkumar, S., Venkat Kumar, S., et al. (2018) 'Biosynthesis of zinc oxide nanoparticles usingMangifera indica leaves and evaluation of their antioxidant and cytotoxic properties in lung cancer (A549) cells', Enzyme and Microbial Technology, pp. 91–95. doi: 10.1016/j.enzmictec.2018.06.009.
40. Rajeshkumar, S., Kumar, S. V., et al. (2018) 'Biosynthesis of zinc oxide nanoparticles usingMangifera indica leaves and evaluation of their antioxidant and cytotoxic properties in lung cancer (A549) cells', Enzyme and microbial technology, 117, pp. 91–95.
41. 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.
42. Rajeshkumar, S. et al. (2019) 'Antibacterial and antioxidant potential of biosynthesized copper nanoparticles mediated through Cissus arnotiana plant extract', Journal of photochemistry and photobiology. B, Biology, 197, p. 111531.
43. Ramadurai, N. et al. (2019) 'Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial', Clinical oral investigations, 23(9), pp. 3543–3550.
44. Ramakrishnan, M., Dhanalakshmi, R. and Subramanian, E. M. G. (2019) 'Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry - A systematic review', The Saudi dental journal, 31(2), pp. 165–172.
45. Ramesh, A. et al. (2018) 'Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study', Journal of periodontology, 89(10), pp. 1241–1248.
46. Samuel, S. R., Acharya, S. and Rao, J. C. (2020) 'School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial', Journal of public health dentistry, 80(1), pp. 51–60.
47. 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.
48. Sridharan, G. et al. (2019) 'Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma', Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology, 48(4), pp. 299–306.
49. Varghese, S. S., Ramesh, A. and Veeraiyan, D. N. (2019) 'Blended Module-Based Teaching in Biostatistics and Research Methodology: A Retrospective Study with Postgraduate Dental Students', Journal of dental education, 83(4), pp. 445–450.
50. Vijayashree Priyadharsini, J. (2019) 'In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens', Journal of periodontology, 90(12), pp. 1441–1448.
51. Vishnu Prasad, S. et al. (2018) 'Report on oral health status and treatment needs of 5-15 years old children with sensory deficits in Chennai, India', Special care in dentistry: official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry, 38(1), pp. 58–59.
52. Wahab, P. U. A. et al. (2018) 'Scalpel Versus Diathermy in Wound Healing After Mucosal Incisions: A Split-Mouth Study', Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons, 76(6), pp. 1160–1164.

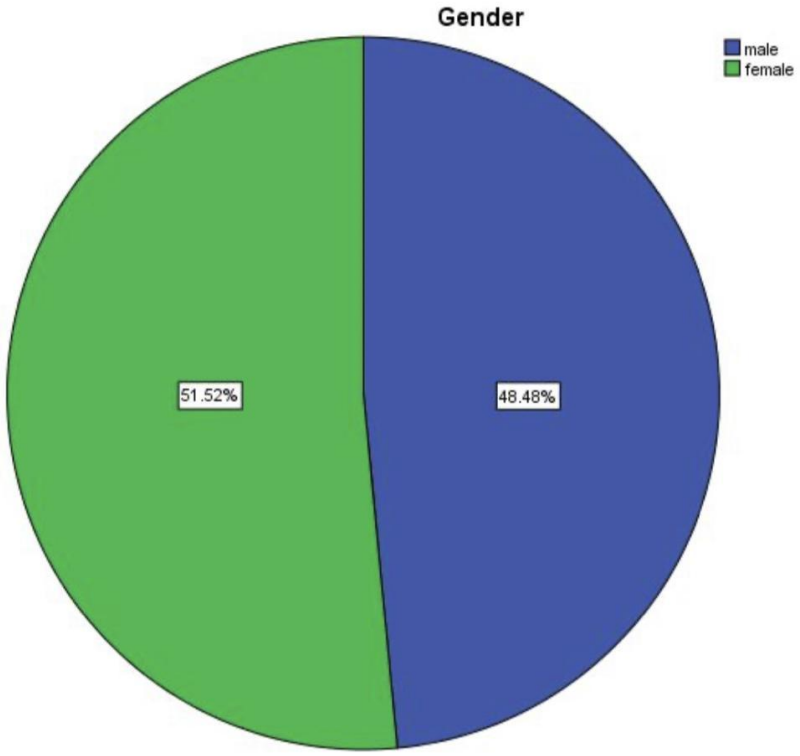

Fig.1: The pie chart shows the distribution of Gender among the total students(100), 51.52% females (Green), 48.48% males (Blue).

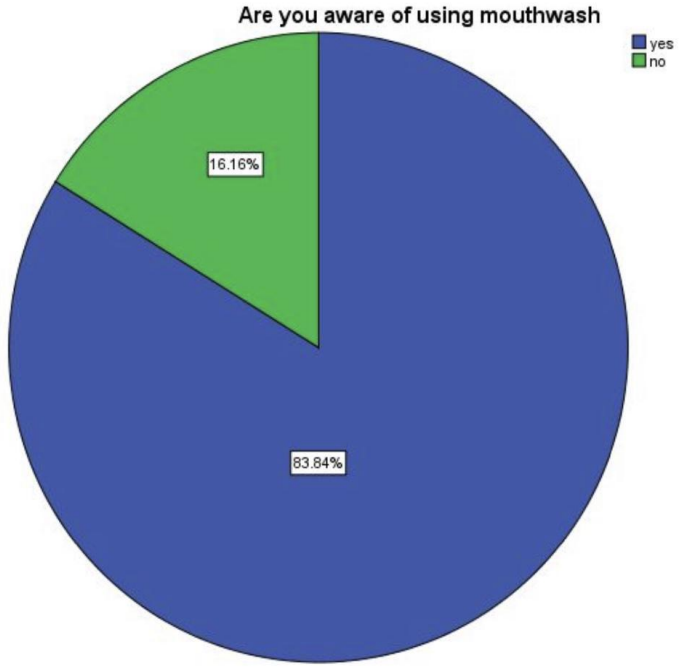

Fig.2 : The pie chart shows the awareness of using mouthwash among the students (100). Based on the survey 16.16% are aware (Blue) and 83.84% are not aware (Green) of using mouthwash.

Fig.3 : The chart shows the preference of mouthwash among the students (100). Based on the survey 86.87% prefer herbal mouthwash (Blue), 13.13% prefer chemical mouthwashes (Green).

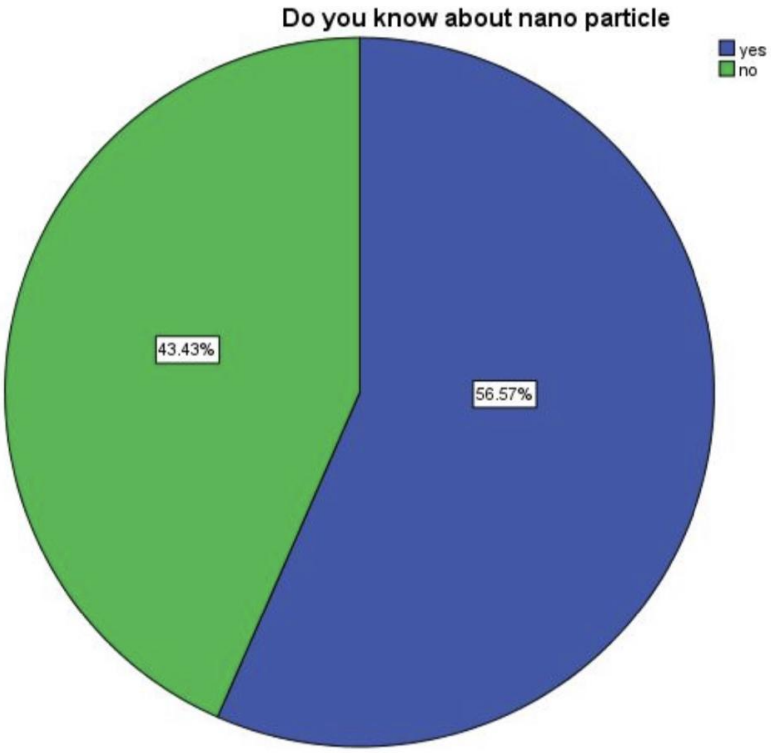

Fig.4 : The Pie chart shows the distribution of awareness about nano particles among the students (100). Based on the survey 56.57% are aware about nanoparticles (Blue) , 43.43% are not aware about nanoparticles (Green).

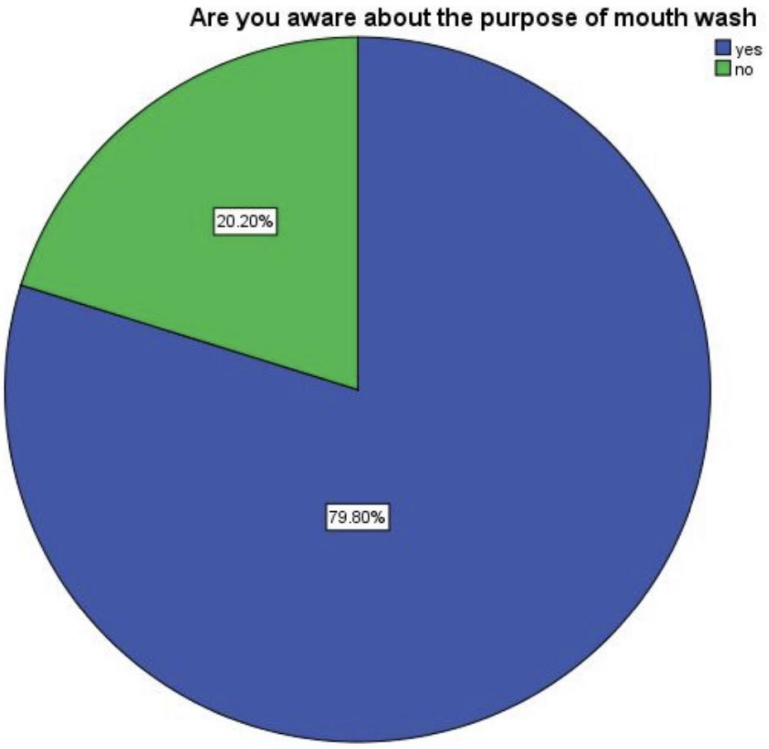

Fig.5 : The Pie chart shows the distribution of awareness about the purpose of mouthwash among the students (100). Based on the survey 79.80% are aware (Blue) and 20.20% are not aware about the purpose and uses of mouthwash (green).

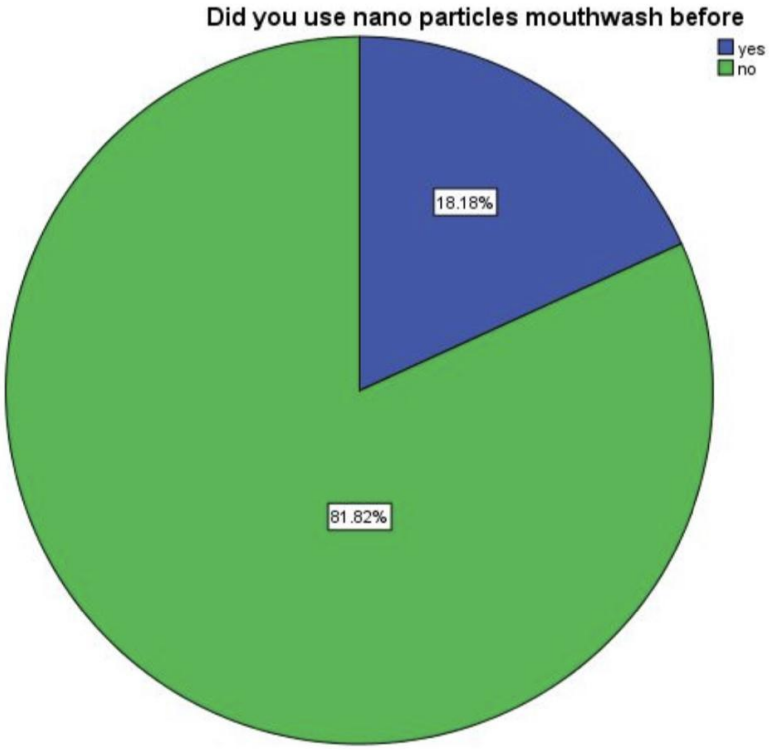

Fig.6 : The Pie chart shows the use of nanoparticle mouthwash among the students (100). Based on the survey 18.18% used nano particle mouthwashes (Blue)and 81.82% didn't use nano particle mouthwashes (Green).

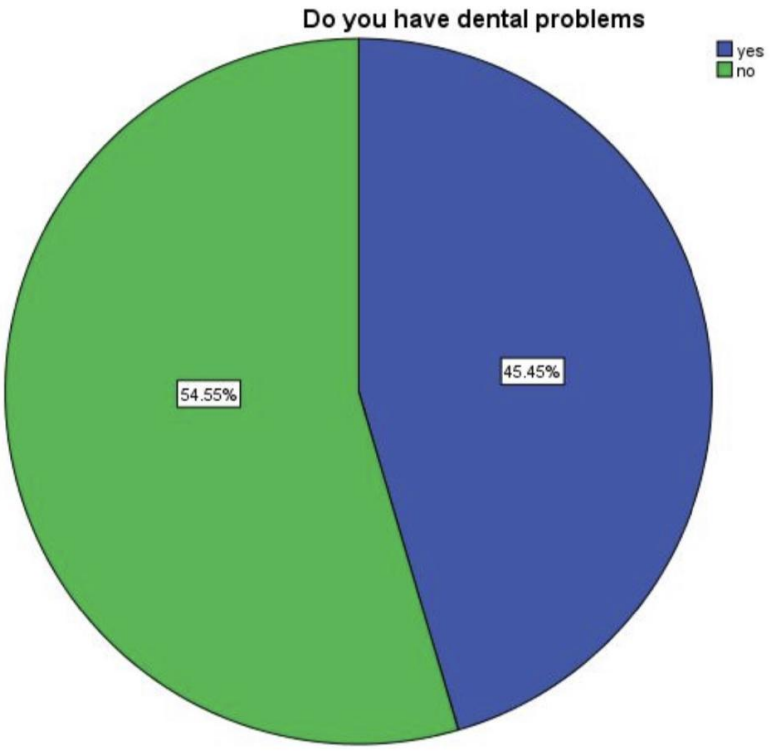

Fig.7 : The Pie chart shows the total number of students suffering from dental problems among all (100) . Based on the survey 45.45% of them have dental problems (Blue), 54.55% don't have dental problems (Green).

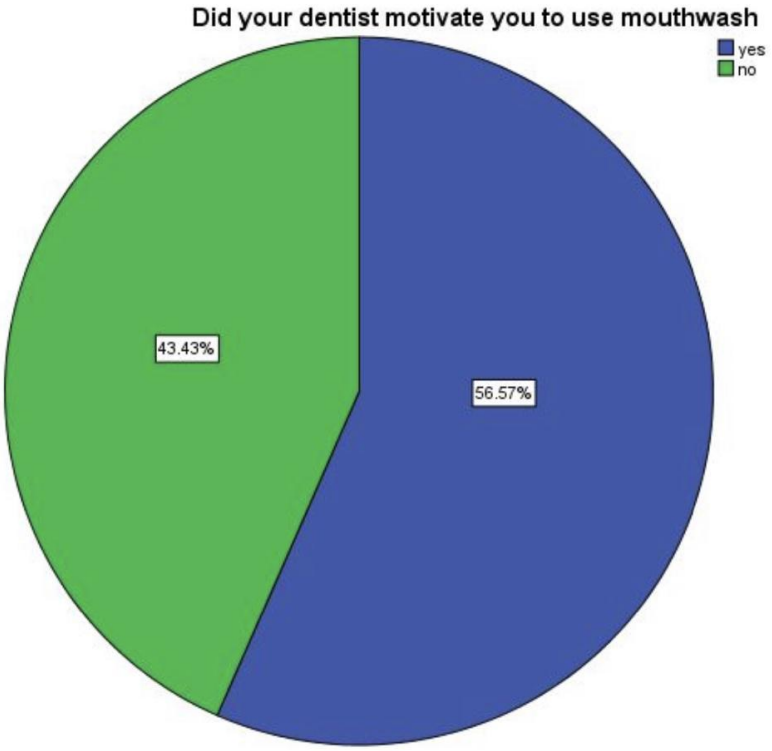

Fig.8 : The Pie chart shows that if the dentist had motivated the participant to use mouthwashes. Based on the survey 56.57% of their dentists motivated them to use mouthwash (Blue), 43.43% of their dentists didn't motivate them (Green).

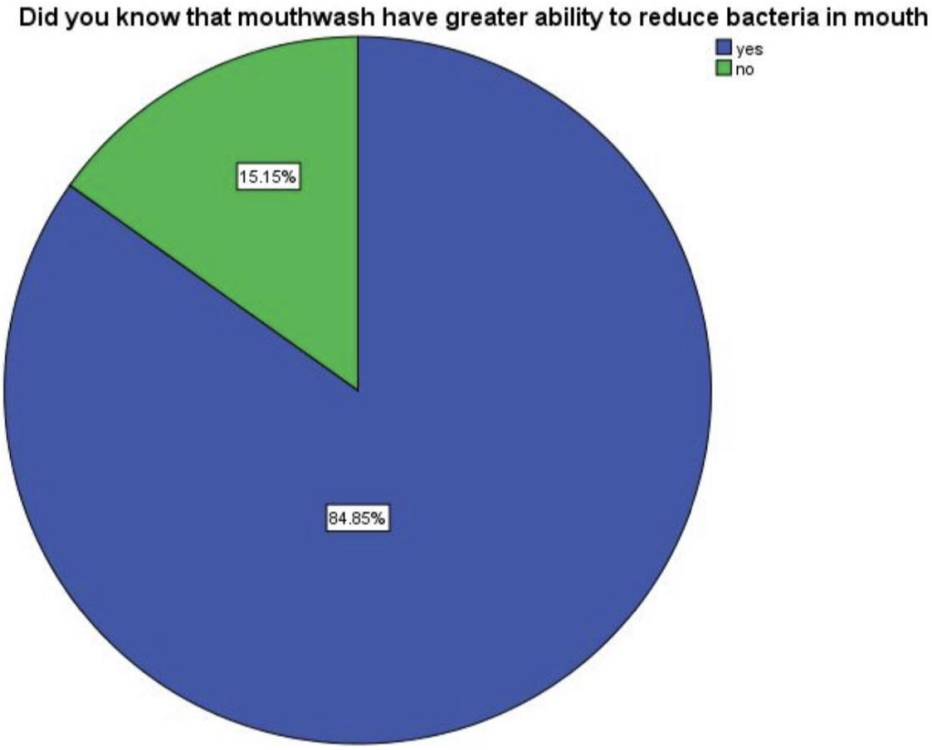

Fig.9 : The Pie chart shows the distribution of awareness of mouthwash having a greater ability to reduce bacteria, among the students (100). Based on the survey 84.85% know that mouthwash has a greater ability to reduce bacteria in the mouth (Blue), 15.15% are not aware that mouthwash has a greater ability to reduce bacteria (Green).

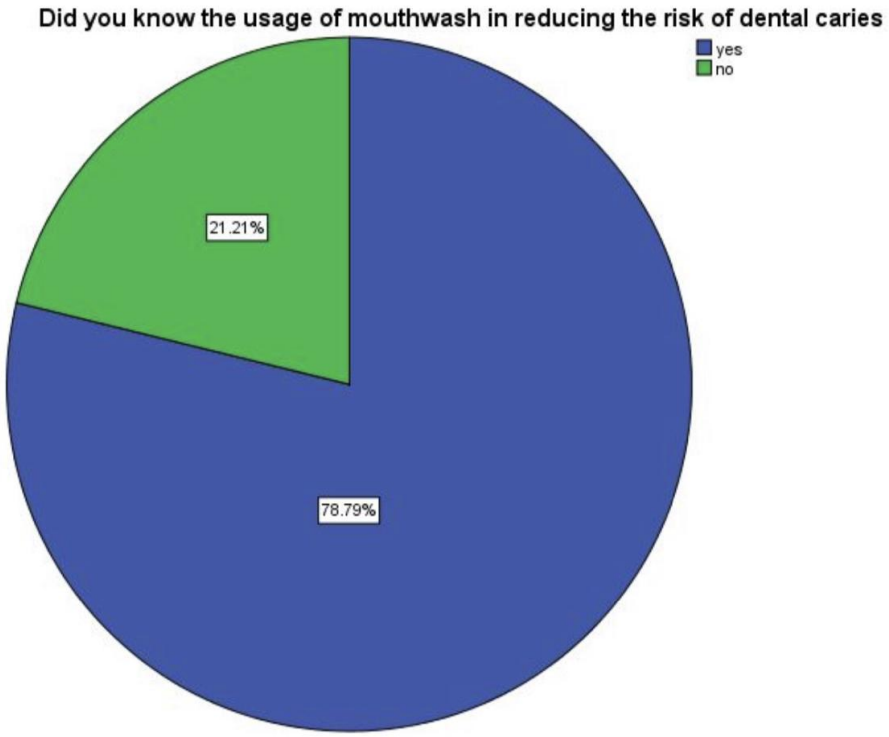

Fig.10 : The Pie chart shows the awareness of usage of mouthwash in reducing the risk of dental caries among the students (100). Based on the survey 78.79% know the usage of mouthwash in reducing dental caries (Blue), 21.21% are not aware about the usage of mouthwash in reducing the risk of caries (Green).

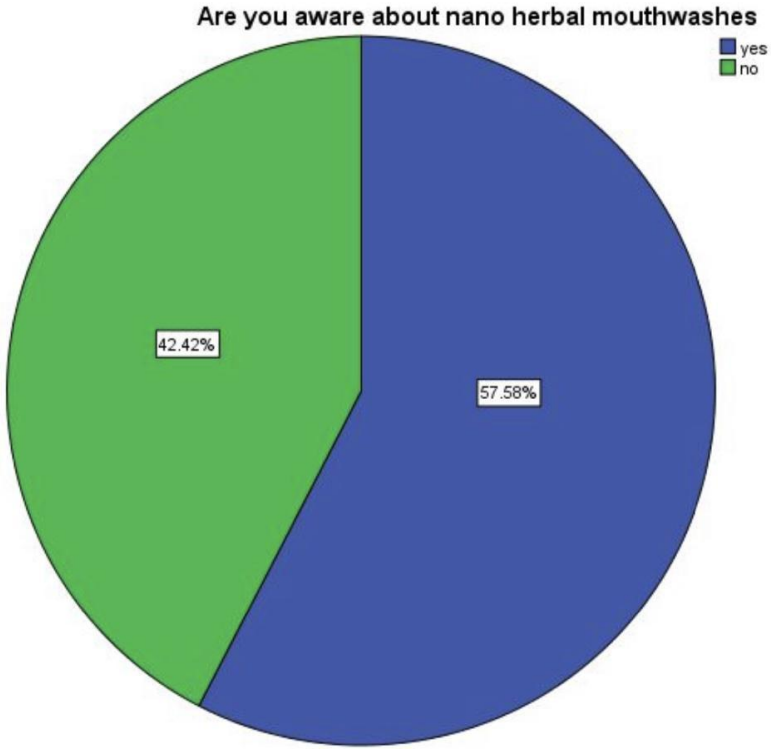

Fig.11: The Pie chart shows the awareness about the nano herbal mouthwash among the students (100), 57.58% aware about nano based herbal mouthwashes (Blue), 42.42% is not aware about the nano herbal mouthwash (Green).

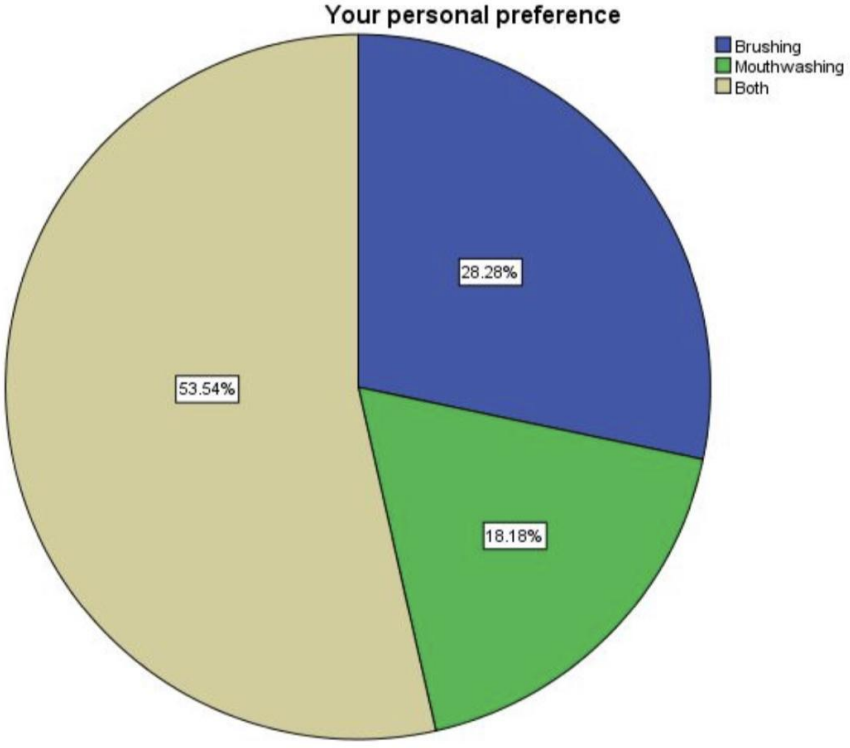

Fig.12 : The Pie chart shows the personal preference of brushing,mouth washing, both among total students (100). Based on the survey, for the majority of participants, personal preference of oral hygiene was to perform brushing and using mouthwash 53.54%(Cream).

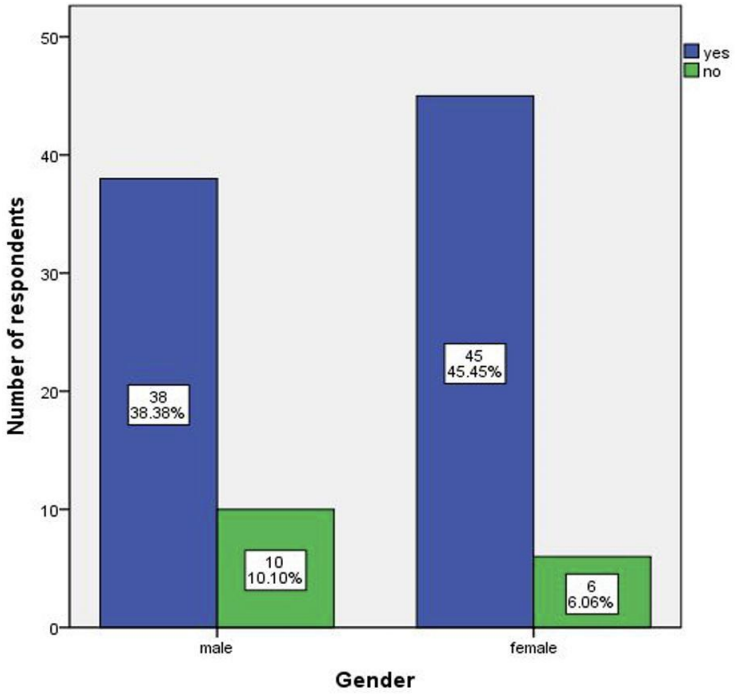

Fig.13: Bar graph represents the association between gender and awareness about using mouthwash daily. X-axis represents the gender and Y-axis represents the number of responses. Majority of females(38.38%) are aware (blue) about using mouthwash daily than males(38.38%). Chi square test was done and association was found to be statistically not significant.Pearson's chi square value=1.501, DF=2, (P value > 0.05). Both male and female participants were equally aware about the use of mouthwash.

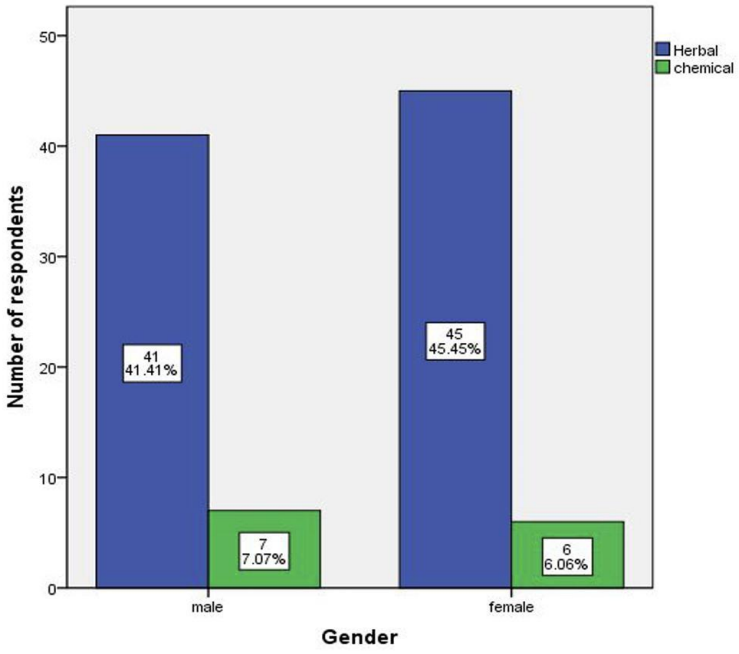

Fig.14: Bar graph represents the association between gender and preference of herbal and chemical mouthwashes. X-axis represents the gender and Y-axis represents the number of responses. Majority of females(45.45%) prefer herbal (blue) mouthwash when compared to males(41.41%). Chi-square test was done and preferences were found to be statistically not significant. Pearson's chi square value=0.172, DF=2, (P value >0.05). Hence there is no significant association between gender and preference of mouthwash.

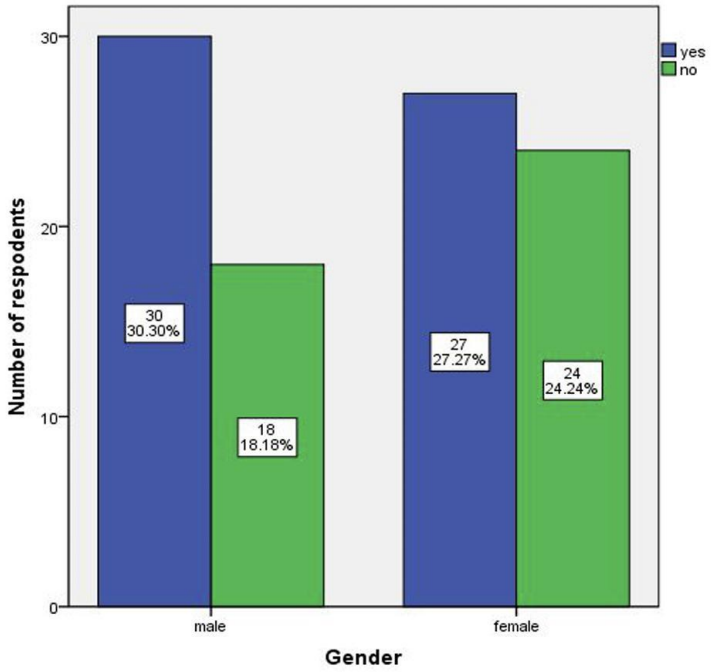

Fig.15: Bar graph represents the association between gender and awareness about nano based herbal mouthwashes. X-axis represents the gender and Y-axis represents the number of responses. Majority of males (30.30%) are aware (blue) of the nano based herbal mouthwashes than females(27.27%). Chi square test was done and the association was found to be statistically not significant. Pearson's chi square value=0.925, DF=1, (P value >0.05). Hence there is no significant association between gender and awareness about nano based herbal mouthwash.

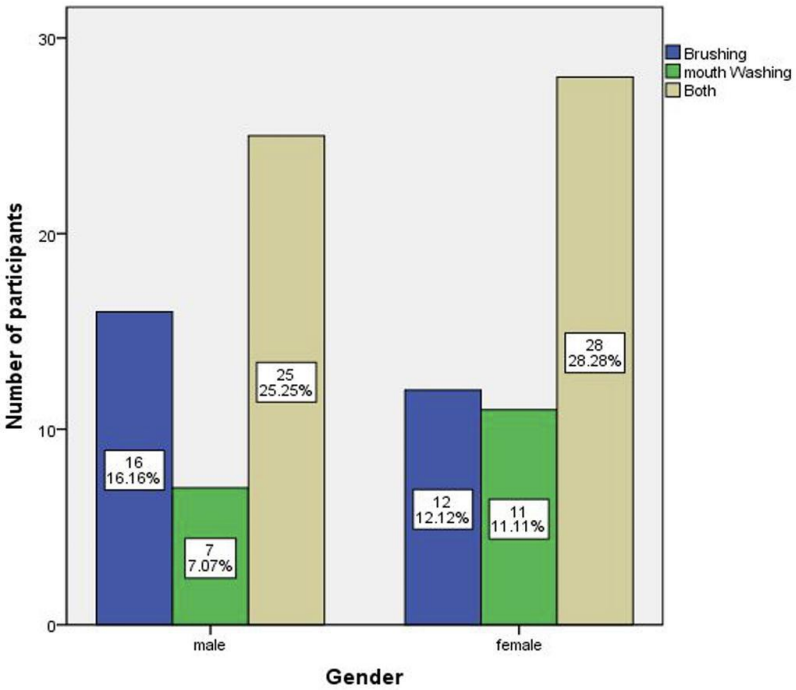

Fig.16: Bar graph represents the association between gender and personal preference of Brushing, Mouth Washing or both. X-axis represents the gender and Y-axis represents the number of responses. Majority of the male and female participants personally preferred brushing and the use of mouthwash (cream). Chi square test was done and association was found to be statistically not significant. Pearson's chi square =1.541, DF=2 , (P value > 0.05). Hence there is no significant association between gender and personal preference of oral hygiene.