



Knowledge and awareness on the use of gold and silver nanoparticles in endodontics practice - A survey

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ABSTRACT

To make mindfulness and teach professionals about the impact of consolidating gold and silver NPs on the shear bond quality in endodontics. Silver and Gold nanoparticles have uncommon attributes that settle on them as great decisions as fillers for dental caries filling. They could remain in nanoscale in the nearness of appropriate stabilizers which implies little collection or bunching and consistently dispersed particles. They have high synthetic dependability and make them simple to be integrated and controlled. Biocompatibility makes them nontoxic for living beings. Some considered the nearness of nanoparticles could redirect the miniaturized scale split and viably increment the protection from the applied force to diminish the clinical disappointments because of less bond quality composite. This study will be helpful. This overview assesses the information and mindfulness on the utilization of gold and silver nanoparticles in endodontic practice. An absolute number of 20 articles were chosen—period (or) term considered for reference articles 2000 to 2020. The information for this article was gathered from web search tools like Pubmed, Google Scholar, Mesh, Cochrane, Semantic Scholar. Through this examination, we have talked about the mindfulness utilization of gold and silver nanoparticles in endodontic practice. It makes professionals know about the benefits of gold and silver nanoparticles.



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INTRODUCTION

Silver and Gold nanoparticles have uncommon qualities that settle on them as great decisions as fillers for dental caries filling. They could remain in nanoscale in the nearness of reasonable stabilizers which implies little collection or bunching and consistently appropriated particles. They have high substance security and make them simple to be integrated and controlled. Biocompatibility makes them nontoxic for organisms (Al-Hasnawy, 2020; González-Luna, 2016; Anitha and Ashwini, 2017).

The nano-fillers can improve grip at the interface between the therapeutic material and the tooth structure through expanding the mechanical quality

of the cement layer and giving basic reinforcement. The nano-fillers are pressure retaining and have the job of a flexible layer between dental composite and enamel (Ashwini *et al.*, 2017; Lakshmi, 2015).

Mechanical, electrical and attractive glue practices were relied upon to be changed. Entomb molecule powers, for example, van der Waals and electrostatic powers, just as attractive fascination, become more grounded (Corrêa, 2015; Sharma *et al.*, 2019; Ezhilarasan, 2017). Effect of including gold NPs and silver NPs on lacquer surface vitality by expanding minor galvanic current inside the material likewise proposed.

The nearness of nanoparticles likewise improved the coefficient of warm extension and gave progressively dimensional security (Reidy, 2013; Kushwaha, 2018). Looking over the information and mindfulness on the utilization of gold and silver nanoparticles on endodontic practice among professionals will expand the utilization of gold and silver nanoparticles in the endodontic dentistry (Pulit-Prociak and Banach, 2016; Perumalsamy, 2018; Mehta, 2019).

Some considered the nearness of nanoparticles could avoid the small scale break and successfully increment the protection from the applied force (Samiei, 2016) to diminish the clinical disappointments because of less bond quality composite Ag-Nps and Au-Nps can be utilized as another option.

MATERIALS AND METHODS

This overview assesses the information and mindfulness on the utilization of gold and silver nanoparticles in endodontic practice. A complete number of 20 articles were chosen—period (or) term considered for reference articles 2000 to 2020. The information for this article was gathered from web crawlers like PUBMED, GOOGLE SCHOLAR, MESH, COCHRANE, SEMANTIC SCHOLAR. The inquiry terms are gold nanoparticles, silver nanoparticles, and endodontic filling. Articles identified with nanoparticles, articles identified with gold and silver Nps, articles identified with endodontic filling are incorporated. Articles not identified with gold and silver nanoparticles, Articles not identified with endodontic filling are rejected. A poll containing a lot of 11 inquiries was arranged and given to specialists. Reactions are gathered.

Data analysis

Data analysis was performed utilizing the SPSS application.

RESULTS AND DISCUSSION

Figure 1 represents gold and silver nanoparticles fillings, of those 157 responses-79% responded YES and 21% responded NO. Figure 2 indicates about high chemical stability and easy manipulation, of those 157 responses, 74.5% responded YES and 25.5% responded NO. Figure 3 inquires about non-toxicity for organisms, of those 157 responses, 66.2 % responded YES and 33.8% responded NO. Figure 4 shows about the filling used in teeth, of those 157 responses, 82.8% responded YES and 17.2% responded NO. Figure 5 concerns improving adhesion interface between the tooth and restorative material, of those 157 responses 66.9% responded YES, and 33.1% responded NO. Figure 6 represents coefficients of thermal expansion, of those 157 responses, 55.4% responded YES and 44.5% responded NO. Figure 7 highlights the increasing minor galvanic current, of those 157 responses 58.4% responded YES and 41.6% responded NO. Figure 8 is to know about the awareness created by this survey, of those 157 responses, 93% responded YES and 7% responded NO.

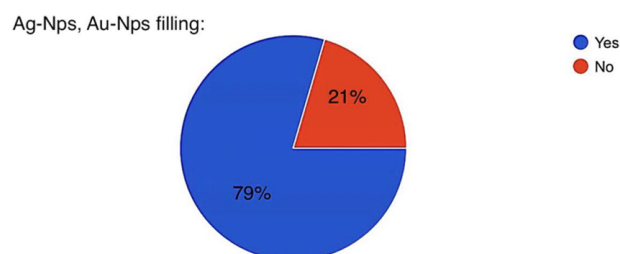


Figure 1: This chart deals with the knowledge about gold and silver nanoparticles fillings, of those 157 responses-79% responded YES and 21% responded NO

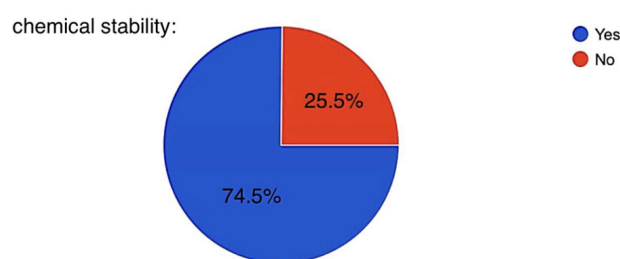


Figure 2: This chart is about the high chemical stability and easy manipulation, of those 157 responses, 74.5% responded YES and 25.5% responded NO

(Figure 9) Bar graph representing analysis on the view on the stability of nanoparticles. The X-axis represents the gender and Y-axis represents the No.of. Students who responded YES and NO. Chi-square test, the P-value was 0.179 (>0.05) hence not

non-toxic:

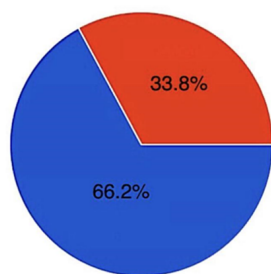


Figure 3: This chart is about non-toxicity for organisms, of those 157 responses, 66.2% responded YES and 33.8% responded NO

galvanic current:

● Yes
● No

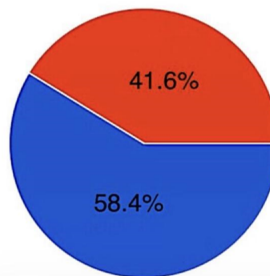


Figure 7: This chart highlights the increasing minor galvanic current, of those 157 responses 58.4% responded YES and 41.6% responded NO

tooth filling:

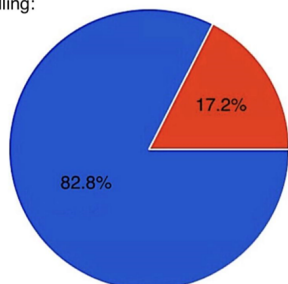


Figure 4: This chart shows the filling used in the tooth, of those 157 responses, 82.8% responded YES and 17.2% responded NO

awareness created:

● Yes
● No

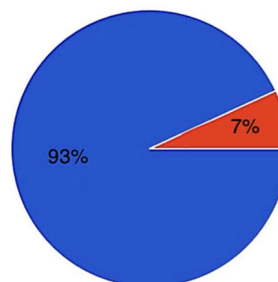


Figure 8: This chart is to know about the awareness created by this survey, of those 157 responses, 93% responded YES and 7% responded NO

improves adhesion:

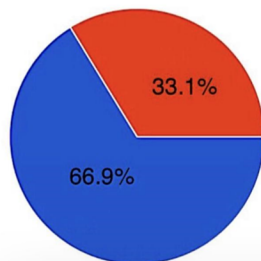


Figure 5: This chart concerns improving adhesion interface between the tooth and restorative material, of those 157 responses 66.9% responded YES and 33.1% responded NO

● Yes
● No

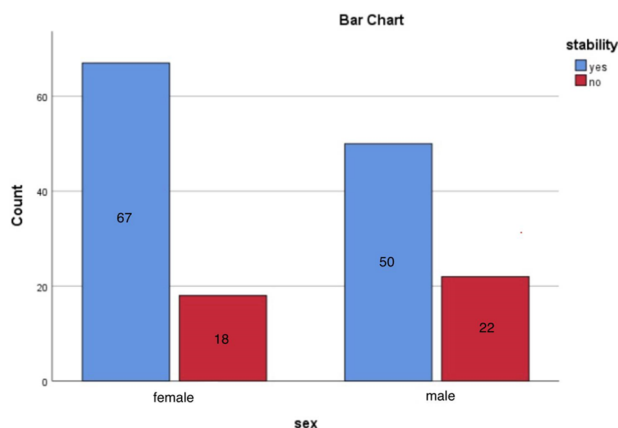


Figure 9: Stability of nanoparticles

thermal expansio:

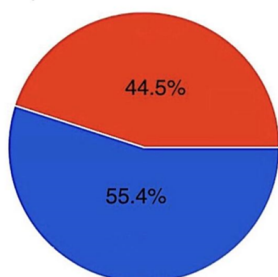


Figure 6: This chart concerns the coefficients of thermal expansion, of those 157 responses, 55.4% responded YES and 44.5% responded NO

● Yes
● No

statistically significant. Out of 74.5% (117) students who are aware 57% were female and 43% were male.

(Figure 10) Bar graph representing the view of the adhesive property of nanoparticles. The X-axis represents the gender and Y-axis represents the No. of Students who responded YES and NO. Chi-square test, the P-value was 0.036 (>0.05) hence statistically significant. Out of 67% (105) students who are aware 60 % were female and 40 % were male.

(Figure 11) Bar graph representing view on galvanic current produced by nanoparticles. The X-axis rep-

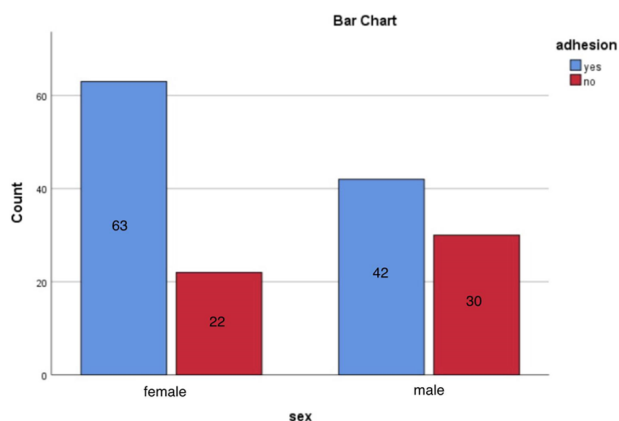


Figure 10: Adhesive property of nanoparticles

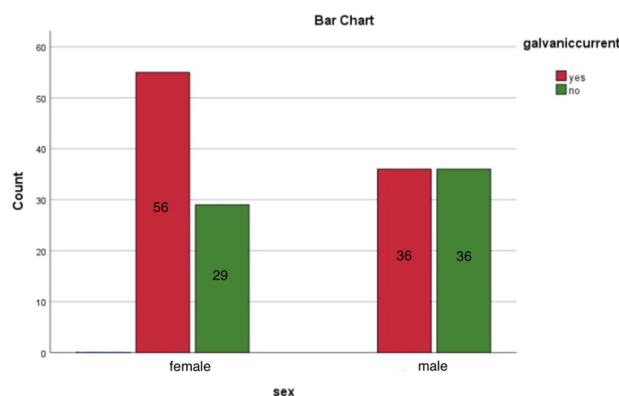


Figure 11: Galvanic current produced by nanoparticles

resents the gender and Y-axis represents the No.of. Students who responded YES and NO. Chi-square test, the P-value was 0.096 (>0.05) hence not statistically significant. Out of 58.5% (92) students who are aware 60% were female and 40% were male.

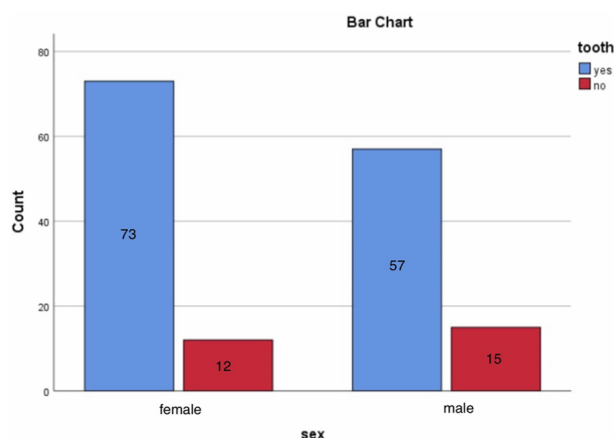


Figure 12: Tooth filling nanoparticles

(Figure 12) Bar graph representing the view of tooth filling nanoparticles used in dentistry. The X-axis represents the gender and Y-axis represents the No.of. Students who responded YES and NO. Chi-square test, the P-value was 0.267 (>0.05) hence not

statistically significant. Out of 83% (130) students who are aware 56% were female and 44% were male.

Different nanoparticles are nanopores, nanotubes, quantum spots, nano shells, lipo some, nano rods, fullerenes, nano spheres, nano wires, nanobelts, nanorings, and nanocapsules (Figure 1) (Luckie *et al.*, 2018; Lakshmi *et al.*, 2017; Ezhilarasan, 2018). A few examinations have indicated that silver, in its nanoparticulated structure, has an inhibitory impact against numerous microscopic organisms and parasites, including *S. mutans*, *C. Albicans*, *P. aeruginosa*, *E. faecalis*, and *S. aureus*, among others, which could diminish the event of optional caries, parasitic disease, flops on endodontic treatment, and dental embed misfortunes (Figure 2) (Khan *et al.*, 2012; Pagonis *et al.*, 2010; García-Contreras, 2011). Despite the fact that AgNP is a promising antimicrobial to be utilized in dentistry.

AgNP has additionally been ending up being biocompatible with mammalian cells, proposing that its application on dental materials doesn't speak to a danger to human wellbeing (Figure 3) (Shrestha and Kishen, 2016; Ezhilarasan *et al.*, 2018; Gheena and Ezhilarasan, 2019). Studies are expected to research the Ag particle discharge and long haul properties of the new AgNP-containing dental materials (Figure 4) (Takamiya *et al.*, 2016; Menon *et al.*, 2018; Rajeshkumar and Kumar, 2018). We likewise urge scientists to examine and explain the ideal methods of silver joining just as the conceivable negative impact of its expansion in dental materials, particularly with respect to shading changes and mechanical properties (Figure 5) (Bhushan and Maini, 2019; Karthiga *et al.*, 2018)

Gold is known to create an antibacterial impact by following up on various (Figure 6) (Priyadarsini *et al.*, 2018). They executed planktonic microbes fundamentally better-contrasted targets beginning from cooperation and the sulfhydryl gatherings of proteins and DNA, adjust the hydrogen holding/respiratory chain, loosen up DNA, and meddle with cell divider blend/cell division (Figure 7) (Neel *et al.*, 2015; Rajeshkumar *et al.*, 2018). Au-NPs are known to additionally destabilize the bacterial layer and increment porousness, prompting spillage of cell constituents (Braz *et al.*, 2012; Song and Ge, 2019). Au-NPs with noteworthy antibacterial movement could be utilized for root. Trench purification. Nonetheless, the drawn-out collaboration time required by Au-NPs for compelling bacterial killing should be considered (Figure 8) (Mantri and Mantri, 2013; Janahan and Sahayadhas, 2020)

CONCLUSION

Through this examination, we have talked about the familiarity with the utilization of gold and silver nanoparticles on endodontic practice. It makes specialists mindful of the benefits of gold and silver nanoparticles, utilize the points of interest and causes them to give greater quality treatment. Some considered the nearness of nanoparticles could redirect the miniaturized scale split and adequately increment the protection from the applied power. To diminish the clinical disappointments because of less bond quality composite, Ag-Nps and Au-Nps can be utilized as another option. The outcome may contrast in the greater populace.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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