DOI: 10.7860/JCDR/2023/63758.18581

Original Article

Dentistry Section

Comparative Evaluation of the Accuracy, Operator Comfort and Time Taken for Implant Placement among Different Practitioners under Dynamic Navigation

SAHANA SELVAGANESH[1], THIYANESWARAN NESAPPAN[2]

ABSTRACT

Introduction: Dynamic Navigation (DN) can be an effective alternative in cases where there are anatomical limitations. It can serve as an advanced training tool for young practitioners in implantology. The learning curve with the DN system can be steep; however, with practice and proper protocol implementation in an institutional set-up, DN can become an invaluable tool for implant placement in challenging situations.

Aim: To evaluate operator comfort, accuracy, and time taken for implant placement among different practitioners using DN.

Materials and Methods: This prospective cohort study was conducted at the Department of Implantology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India, from October 2022 to February 2023. Three groups, each consisting of five practitioners, were included: Group 1 (experienced practitioners), Group 2 (intermediate practitioners), and Group 3 (beginners in the field of implantology). The practitioners underwent orientation to the DN system through lectures and digital planning sessions. They performed hands-on in-vitro implant placement on 3D printed models and one implant placement each on live patients. Surgical time, operator comfort, and accuracy of implant placement were assessed among the three groups. Statistical analysis was performed using the Kruskal-Wallis test.

Results: In comparison to the digitally planned position, beginners in implantology showed the least variation in implant placement position. The apico-coronal variation was 0.494±0.428 mm in implant placements for patients in the beginners group, while the maximum variation was 2.140±1.355 mm in the experienced practitioners group. There was a sequential increase in accuracy and lesser deviation from the originally planned implant sites when comparing the virtual simulation device, model, and patient implant placement. Beginners took significantly less time for implant placement in patients (p=0.004).

Conclusion: There was a sequential improvement in the accuracy in implant angulation from virtual simulation to placement of implants in patients. The beginners group exhibited the shortest implant placement time in patients.

Keywords: Haptic feedback, Implant angulation, Learning curve, Real time navigation, Virtual simulation

INTRODUCTION

Prosthetically driven implant placements are a key factor for the survival and success of implants. Thus, planning prosthetically is of the utmost importance [1]. This harmonises with the surrounding soft tissues and hard tissues, while also assessing the proper force distribution to the surrounding soft tissues and bone. It helps achieve proper tooth contours and allows for the rehabilitation of patients with appropriate aesthetics and function [1,2]. To meet the ever-rising aesthetic demands of patients and achieve their expectations, it is necessary to formulate a formal diagnosis, design, and properly place the implants in terms of apical, coronal, mesial, and distal angulation. Prior planning and digitalisation assist practitioners in visualising the end result postsurgery. Freehand placements without prior prosthetic planning can have a negative impact on the angulation and positioning of dental implants [3].

Thus, these variations and risks can be significantly reduced with digitised Computer-aided Design/Computer-aided Manufacturing (CAD/CAM)-based planning and printing of static surgical stents or by utilising DN software [4]. A comprehensive treatment plan considering all aspects should be thoroughly designed and executed to achieve appropriate and stable outcomes. Over the last decade, navigation systems in implantology have evolved and improved, addressing and resolving previous problems and complications. Each design has evolved from its predecessor. The initial weaknesses, such as device size, complicated handling, calibration errors, and hardware and software issues, have been significantly improved in newer DN system variants. Modern navigation systems provide a valuable means to visualise the precise location of bone drilling. Anatomical imaging (CBCT Data - Cone Beam Computed Tomography) is merged with the Standard Triangle Language (STL) file of the prosthetically planned implant site, either through direct intraoral scanning or scanning of the cast with the mock-up of the tooth to be replaced [5]. DN allows for presurgical correction of implant positioning and real-time adjustments based on anatomical visualisation. This technique substantially reduces the risk of injury to vital anatomical structures such as nerves [6], blood vessels, maxillary sinus, nasal floor, etc. Unlike static guides, DN enables the operating surgeon to consider intraoperative situational changes [4]. However, DN is a system that requires experienced surgeons to undergo training, which may be a reason for hesitancy in adopting DN for day-to-day practice. On the other hand, with the newer generation of dental practitioners, dental implant surgery is expected to become less time-consuming and more accurate, thanks to the assistance of navigation systems.

However, certain decisions and anatomical situations may require an expert opinion and the surgical skills of an experienced surgeon, rather than relying solely on navigation systems. Optimal and ideal implant placement necessitates sufficient surgical skill and experience. Younger dentists should receive proper orientation regarding hand-eye coordination before they can proceed with practicing DN. Therefore, students should be trained in virtual simulation. Newer devices are available to improve hand-eye coordination and provide haptic feedback, which would be beneficial for students to gain a clear understanding of how the navigation system works before practicing implant placement using it.

Previous studies have focused on younger professionals intending to perform implant placements and have primarily assessed the accuracy of their placements [7-9]. However, these studies did not compare the accuracy between practitioners nor assess the comfort of the operators. Hence, the current study aims to evaluate the comfort, accuracy, and time taken for implant placement among different practitioners utilising DN.

MATERIALS AND METHODS

This prospective analytical study was conducted in the Department of Implantology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India, from October 2022 to February 2023. The study protocol was approved by the Institutional Ethical Committee (1904/22/017).

Inclusion criteria:

- Fifteen dental professionals were included in the study and were divided into three groups. Group 1 consisted of experienced implant practitioners who had placed more than 60 implants. Group 2 comprised five intermediate-level practitioners who had placed 30 or more implants. Group 3 included five practitioners who had placed five implants using the freehand technique.
- Patients with a unilateral edentulous space requiring dental implants were included.

Exclusion criteria:

- Patients with multiple missing teeth were excluded.
- Practitioners who had placed less than five implants were not included in the study.

Sample size calculation: The sample size of fifteen dental professionals for the study was estimated using G*Power software, with a previous study by Spille J et al., as the reference [7].

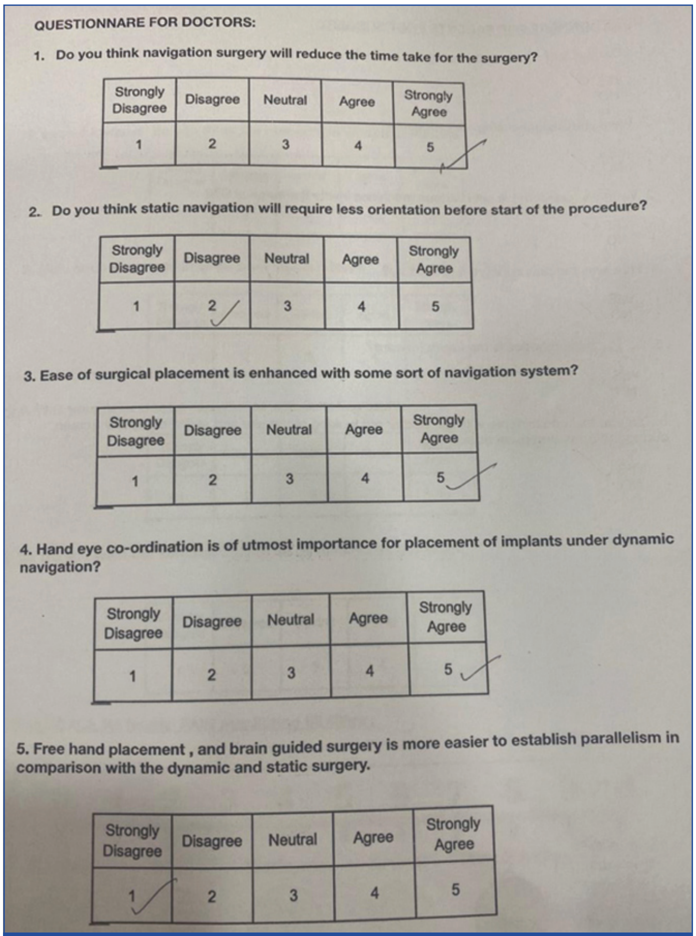
Study Procedure

The doctors received a detailed lecture on the components of the DN machine, including its various components. They were also provided with hands-on experience using the virtual simulation device to assess aspects such as hand-eye coordination and accuracy of the drilling protocol. This helped the practitioners adapt to working with the DN device while looking at the computer screen rather than the patient. Once the practitioners were familiarised with the workflow on the virtual simulation device, they received hands-on training using models. Each dentist placed two implants in the models, resulting in a total of 30 implants being placed. The accuracy of the implants was assessed by merging pre and postoperative CBCT scans.

Each dental surgeon proceeded to place implants in the patients, with several factors measured including accuracy, adaptability to the DN system, adaptability to the software, and the time taken from the start to finish of the procedure.

Lecture: Initially, all 15 dental practitioners received guidance on DN through a detailed lecture. The lecture covered the introduction of the Navident system and its various components, as well as an explanation of the background and mechanism of action behind navigation surgery. Practitioners were provided with a detailed explanation of camera positioning, jaw positioning, and the Navident system in relation to the patient's anatomy. The lecture also included an explanation of the sequential planning of the implant site. The various attributes of the Navident software, such as "saw mode" and "endo mode," were further illustrated.

After completing the lecture, practitioners received hands-on training in planning using the software. The time taken for each practitioner to plan from start to finish was recorded, and the ease with which practitioners handled the software was assessed using a questionnaire [Table/Fig-1].


QUESTIONNARE FOR DOCTORS:

1. Do you think navigation surgery will reduce the time take for the surgery?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

2. Do you think static navigation will require less orientation before start of the procedure?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

3. Ease of surgical placement is enhanced with some sort of navigation system?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

4. Hand eye co-ordination is of utmost importance for placement of implants under dynamic navigation?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

5. Free hand placement , and brain guided surgery is more easier to establish parallelism in comparison with the dynamic and static surgery.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

[Table/Fig-1]: Modified questionnaire for assessment of operator comfort.

Hands-on training on virtual simulation: Following the lecture, all participants enrolled in the study received training on the drilling protocol using the virtual simulation device. This provided an alternative experience of working while looking at a screen, rather than directly in the patient's mouth. Prior to the training, the patient's CBCT data and cast scan were imported into the virtual simulation software to create a virtual solid model. The virtual simulation device included a haptic feedback handpiece that provided a simulated effect similar to working on actual patients. The patient's model was displayed on the screen, with a 3D screen covering the haptic handpiece placed below. The training aimed to enhance the understanding of working while looking at the screen and improve hand-eye coordination, as these skills are crucial for using the DN system effectively.

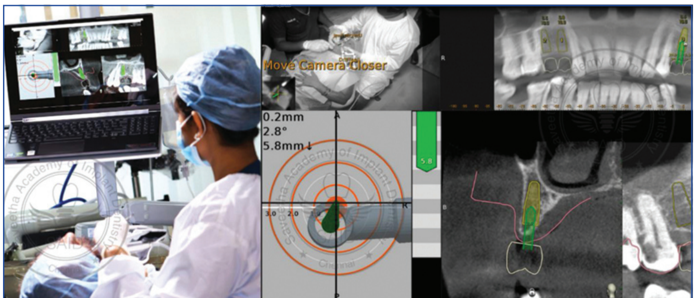
During the training, the ease of operation, accuracy of the drilling protocol, and the time taken for the operator to complete the drilling sequence were recorded.

Hands-on training on models: Due to the steep learning curve associated with using DN and the difficulties in adapting to the various components of the DN system, hands-on training with 3D printed models was conducted [Table/Fig-2]. The DN system commissioned for use at Saveetha Dental College is Navident, which includes components such as the jaw tracker, head tracker (for the maxilla), drill tag, tracer pen, and calibrator device. Each drill had to be calibrated separately during each step. This initial training allowed participants to understand the placement of the calibrator in relation to the camera and the waiting time required for calibration, as the machine and its associated structures are sensitive to the surrounding environment. Proper placement of the jaw tracker was crucial, as it enabled the main camera to track jaw movements and guide the operator to the correct position for implant placement.

[Table/Fig-2]: This represents working on a phantom head and a 3D printed cast under Dynamic Navigation (DN).

The time taken by each operator to complete the calibration and drilling sequence was recorded, and the ease of operating with DN was assessed using a questionnaire. The questionnaire was developed based on guidance from an article by Long E and Kew F on patient satisfaction with robotic surgery [10]. It consisted of five questions rated on a Likert scale [Table/Fig-1]. The accuracy of implant placement was evaluated by comparing the preoperative plan with the postoperative CBCT using the built-in Evalunav software. Mesiodistal variations, apicocoronal variations, and angular deviations were assessed.

Surgical live implant placement: Each practitioner performed implant placement in a single edentulous space that was indicated for ideal implant placement. The time taken for the entire procedure, including calibration and sequential drilling, was recorded. After implant placement, the accuracy of the placement was assessed using the inbuilt Evalunav software, which superimposes two Digital Imaging and Communications in Medicine (DICOM) data sets [Table/Fig-3].



[Table/Fig-3]: Figure represents, working of Dynamic Navigation (DN) on a live patient.

STATISTICAL ANALYSIS

The statistical analysis was performed using Statistical Package for Social Sciences (SPSS) software version 23.0. The Kruskal-Wallis test was conducted, with a significance level set at p<0.05.

RESULTS

Among the 15 patients included in the study, seven were males and eight were females. When comparing the time taken for implant placement in the three groups in different situations (virtual simulation software and machine, model implant placement, and implant placement in patients), the duration of adaptation and procedure varied. In virtual simulation, where the case was preloaded, practitioners easily oriented themselves and started the drilling protocol. The maximum time taken was 5.120±1.093 minutes by the experienced practitioners group. Group 3 (starters) took an average time of 3.182±0.909 minutes to complete the drilling protocol for implants.

In hands-on training on models, the starters showed an advantage in understanding and remembering the various components and steps involved in the navigation process. They took 24.40±5.177 minutes to complete the entire procedure and place the implants. The intermediate practitioners took 45.20±20.83 minutes, and the experienced practitioner group took 39.00±17.64 minutes to complete [Table/Fig-4].

Time taken (in minutes)	Mean±SD			p-value
	Experienced practitioners	Intermediate practitioners	Starters	
Virtual simulation	5.120±1.093	4.818±1.367	3.182±0.909	0.056
Model analysis	39.00±17.64	45.20±20.83	24.40±5.177	0.093
Patient data	46.20±10.31	34.20±6.457	22.40±3.782	0.004*

[Table/Fig-4]: Comparison of the duration of the procedure between the three groups with virtual simulation device, model analysis and live patient implant placement with Dynamic Navigation (DN).
SD: Standard deviation; *Significance p-value <0.05; Kruskal-Wallis test

The mesiodistal and apicocoronal angulation between the three groups were significantly different, as DN allows practitioners to align the handpiece within the confines of 1-3 mm of the previously planned implant site in terms of mesiodistal and apicocoronal variation. When comparing the mesiodistal angulation between the three groups in virtual simulation, the beginners had the least variation (1.540±1.535 mm) [Table/Fig-5].

Mesiodistal variation (in mm)	Mean±SD			p-value
	Experienced practitioners	Intermediate practitioners	Starters	
Virtual simulation	1.980±0.808	2.660±1.189	1.540±1.535	0.265
Model analysis	2.700±1.151	2.520±1.205	2.320±0.630	0.854
Patient data	2.234±1.840	1.492±1.147	1.268±1.773	0.445

[Table/Fig-5]: Comparison of mesiodistal variation of the procedure between the practitioners.
*Significance p-value <0.05; Kruskal-Wallis test

In comparing the apicocoronal deviation between the groups, a negligible amount of deviation was observed with patient data. In the virtual simulation group, there was a significant difference between the three groups of practitioners (p=0.029). The beginners had the least apicocoronal deviation when operating on patients (0.494±0.428 mm) [Table/Fig-6]. [Table/Fig-7] represents the angular deviation between the three groups of practitioners in virtual simulation, model analysis, and on patients. No significant difference was found in angular variation between the three groups in any of the working models.

Apico-coronal deviation (in mm)	Mean±SD			p-value
	Experienced practitioners	Intermediate practitioners	Starters	
Virtual simulation	4.520±0.968	3.780±1.397	1.840±1.474	0.029*
Model analysis	2.580±1.026	2.300±0.854	1.900±0.648	0.409
Patient data	2.140±1.355	0.712±0.814	0.494±0.428	0.084

[Table/Fig-6]: Comparison of apico-coronal deviation of the procedure between the practitioners.
*Significance p-value <0.05; Kruskal-Wallis test

Angular deviation (in mm)	Mean±SD			p-value
	Experienced practitioners	Intermediate practitioners	Starters	
Virtual simulation	4.580±3.407	1.940±1.426	1.360±0.719	0.112
Model analysis	4.020±1.962	2.500±1.253	2.080±0.962	0.194
Patient data	1.978±2.372	2.220±1.535	1.822±2.766	0.645

[Table/Fig-7]: Comparison of angular deviation in the procedures between the groups.
*Significance p-value <0.05; Kruskal-Wallis test

Ease of using Dynamic Navigation (DN): The ease of using DN by various practitioners was tabulated in [Table/Fig-8]. Almost all practitioners (n=14) agreed that navigation surgery reduces the time taken for surgery. 80% (n=4) of experienced practitioners agreed that freehand placements were easier to establish parallelism compared to dynamic and static surgery, while 80% (n=4) of beginners disagreed with this.

Questions	Group 1 (n)	Group 2 (n)	Group 3 (n)
1. Do you think navigation surgery will reduce the time take for the surgery?	Strongly agree-60% (3) Agree- 40% (2) Neutral-0 Disagree-0 Strongly disagree-0	Strongly agree-40% (2) Agree-40% (2) Neutral-20% (1) Disagree-0 Strongly disagree-0	Strongly agree-80% (4) Agree-20% (1) Neutral-0 Disagree-0 Strongly disagree-0
2. Do you think static navigation will require less orientation before start of the procedure?	Strongly agree-0 Agree-0 Neutral-0 Disagree-60% (3) Strongly disagree-40% (2)	Strongly agree-0 Agree-0 Neutral-0 Disagree-60% (3) Strongly disagree-40% (2)	Strongly agree-40% (2) Agree-40% (2) Neutral-20% (1) Disagree-0 Strongly disagree-0
3. Ease of surgical placement is enhanced with some sort of navigation system?	Strongly agree-40%(2) Agree-40% (2) Neutral-20% (1) Disagree-0 Strongly disagree-0	Strongly agree-40%(2) Agree-40% (2) Neutral-20% (1) Disagree-0 Strongly disagree-0	Strongly agree-60%(3) Agree- 40% (2) Neutral-0 Disagree-0 Strongly disagree-0
4. Hand eye co-ordination is of utmost importance for placement of implants under DN?	Strongly agree-100% (5) Agree-0 Neutral-0 Disagree-0 Strongly disagree-0	Strongly agree-100% (5) Agree-0 Neutral-0 Disagree-0 Strongly disagree-0	Strongly agree-100% (5) Agree-0 Neutral-0 Disagree-0 Strongly disagree-0
5. Free hand placements are more easier to establish parallelism in comparison with the dynamic and static surgery.	Strongly agree-40%(2) Agree-40% (2) Neutral-20% (1) Disagree-0 Strongly disagree-0	Strongly agree-0 Agree-0 Neutral-20% (1) Disagree-40%(2) Strongly disagree-40% (2)	Strongly agree- 0 Agree-0 Neutral-20% (1) Disagree-40%(2) Strongly disagree-40% (2)

[Table/Fig-8]: Assessment of operator comfort between the three groups, the assessment was marked with Likert scale (N=15).

DISCUSSION

The present study demonstrated that the use of auxiliary aids prior to introducing DN to dental implant practitioners can be effective in understanding the method of implant placement. Similarly, the study showed significant improvement in the implant placement skills of beginners and young professionals. Deeb JG et al., also found similar results, with young professionals showing significant improvement in mesiodistal placement and angulation of implants when using the DN system [11]. The study also revealed a steep learning curve for experienced professionals, similar to the results reported by Sun TM et al., indicating the difficulties experienced by experienced practitioners in adapting to the DN software and machine [12].

Another important consideration for successful implant placement under DN is hand-eye coordination. Marques-Guasch J et al., found a flat learning curve for young and inexperienced surgeons and concluded that the navigation technique requires a lot of practice to learn the correct hand-eye coordination [13]. Additionally, prior clinical knowledge is necessary to shift to freehand placement if there are issues with the DN. DN can be an effective alternative and can help young practitioners achieve targeted and precise implant placement that is comfortable for patients. In the early days of introducing DN, it was restricted to partial edentulism until Feng Y et al., used temporary mini screws as tracer points for orientation and calibration for full arch implant placement [14]. Full arch implant placement under DN is still a challenge but is being practiced by many professionals, although the accuracy needs to be assessed in further clinical trials.

In the present study, the accuracy of implant placement was higher in patients compared to prior placements under virtual reality simulators or models by beginner practitioners. This improvement can be attributed to the learning curve, as young professionals in the beginner group were able to adapt to hand-eye coordination and the haptic feedback mechanism [15]. One of the main difficulties faced by all practitioners is the weight of the handpiece. This is due to the tracers attached to the handpiece, and practitioners need to adapt to using DN on a daily basis. This is part of the learning curve because if the weight is not managed properly, there can be shifting of the drill and the osteotomy site. The longer time duration taken by experienced practitioners may be due to the difficulty of adapting to working while looking at the screen. On the other hand, starters who are millennials have less experience with implant drilling protocols but are more adapted to working while looking at the screen.

Ultimately, a higher level of practice with DN will improve the accuracy of implant placement for both experienced and young practitioners. DN can be an effective alternative in daily practice to improve the accuracy of implant placement in compromised cases and cases requiring adjacent implant placements. The dynamic computer-aided system helps practitioners quickly and digitally plan cases. However, the cost factor of the DN unit is something to consider, but it can be treated as a one-time investment compared to surgical templates, where payment is required for each case. Surgical stents do not provide a solution for cases with significant anatomical considerations, where DN can be an effective alternative.

Limitation(s)

There is a significant drawback in the present study as it was limited to only 15 practitioners. A broader understanding could be gained by increasing the number of surgeons participating in the study. Additionally, the number of implants placed by each practitioner was limited to only one. The working protocol for other anatomical limitations will likely vary, and further studies are required to assess the adaptability of practitioners to such situations and varying surgical procedures.

CONCLUSION(S)

In the present study, the accuracy of implant placement improved in patients compared to prior placements under virtual reality simulators or models by beginner practitioners. Interestingly, experienced practitioners took significantly more time for implant placement in patients. About 93.3% of the practitioners agreed that navigation surgery reduces the time required for the procedure. According to the present study, DN can be adapted by practitioners through repeated practice. The accuracy of implant drilling and placement significantly improved under DN. Navigation surgery for implant placement may have a steep learning curve, and freehand surgery practice is essential for adapting to the DN system. Ultimately, DN can be considered an advanced technology that can be introduced to young professionals in an institutional setting, as it allows them to stay updated with the latest advancements in dentistry.

REFERENCES

[1] Antono J, Suwandi T. The importance of prosthetic driven approach for implant placement. JKGT. 2021;3(2);12-15. Doi: 10.25105/jkgt.v3i2.12614.

[2] Straub JR. Prosthetic driven implant therapy to ensure esthetics. Implant Dentistry. 1996. https://doi.org/10.1097/00008505-199600530-00021.

[3] Grafelmann HL. From prosthetic planning to disaster: An analysis of common implant- prosthetic errors. Implant Dent. 1997;6(4):304. Doi: 10.1097/00008505-199700640-00017.

[4] Ochandiano S, García-Mato D, Gonzalez-Alvarez A, Moreta-Martinez R, Tousidonis M, Navarro-Cuellar C, et al. Computer-assisted dental implant placement following free flap reconstruction: Virtual planning, CAD/CAM templates, dynamic navigation and augmented reality. Front Oncol. 2021;11:754943. Doi: 10.3389/fonc.2021.754943, PMID 35155183.

[5] Galante JM, Rubio NA. Digital dental implantology: From treatment planning to guided surgery. Springer Nature. 2021.

[6] Chen LW, Zhao XE, Yan Q, Xia HB, Sun Q. Dynamic navigation system-guided trans-inferior alveolar nerve implant placement in the atrophic posterior mandible: A case report. World J Clin Cases. 2022;10(12):3907-15. Doi: 10.12998/wjcc.v10.i12.3907, PMID 35647174.

[7] Spille J, Helmstetter E, Kübel P, Weitkamp JT, Wagner J, Wieker H, et al. Learning curve and comparison of dynamic implant placement accuracy using a navigation system in young professionals. Dent J (Basel). 2022;10(10):187. Doi: 10.3390/dj10100187, PMID 36285997.

[8] Wang F, Wang Q, Zhang J. Role of dynamic navigation systems in enhancing the accuracy of implant placement: A systematic review and meta-analysis of clinical studies. J Oral Maxillofac Surg. 2021;79(10):2061-70. Doi: 10.1016/j.joms.2021.06.005, PMID 34245701.

[9] Wei SM, Zhu Yu Z, Wei JX, Zhang CN, Shi JY, Lai HC. Accuracy of dynamic navigation in implant surgery: A systematic review and meta-analysis. Clin Oral Implants Res. 2021;32(4):383-93. Doi: 10.1111/clr.13719, PMID 33540465.

[10] Long E, Kew F. Patient satisfaction with robotic surgery. J Robot Surg. 2018;12(3):493-99. Doi: 10.1007/s11701-017-0772-3, PMID 29288373.

[11] Golob Deeb J, Bencharit S, Carrico CK, Lukic M, Hawkins D, Rener-Sitar K, et al. Exploring training dental implant placement using computer-guided implant navigation system for predoctoral students: A pilot study. Eur J Dent Educ Off J Assoc Dent Educ Eur. 2019;23(4):415-23. Doi: 10.1111/eje.12447, PMID 31141291.

[12] Sun TM, Lee HE, Lan TH. The influence of dental experience on a dental implant navigation system. BMC Oral Health. 2019;19(1):222. Doi: 10.1186/s12903-019-0914-2, PMID 31623636.

[13] Marques-Guasch J, Rodriguez-Bauzá R, Satorres-Nieto M, Hom-Lay W, Hernández-Alfaro F, Gargallo-Albiol J. Accuracy of dynamic implant navigation surgery performed by a novice operator. Int J Comput Dent. 2022;25(4):377-85. Doi: 10.3290/j.ijcd.b2588207, PMID 35060374.

[14] Feng Y, Yao Y, Yang X. Effect of a dynamic navigation device on the accuracy of implant placement in the completely edentulous mandible: An in vitro study. J Prosthet Dent. 2022. Doi: 10.1016/j.prosdent.2021.12.012, PMID 35000696.

[15] Ziane-Casenave S, Mauroux M, Devillard R, Kérourédan O. Influence of practical and clinical experience on dexterity performance measured using haptic virtual reality simulator. Eur J Dent Educ. 2022;26(4):838-48. Doi: 10.1111/eje.12767, PMID 34990073.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Implantology, Saveetha Dental College, Chennai, Tamil Nadu, India.
2. Professor, Department of Implantology, Saveetha Dental College, Chennai, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Sahana Selvaganesh,
Assistant Professor, Department of Implantology, Saveetha Dental College,
Ponamalle High Road, Chennai-600077, Tamil Nadu, India.
E-mail: sahanas.sdc@saveetha.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Mar 07, 2023
- Manual Googling: May 17, 2023
- iThenticate Software: Aug 30, 2023 (7%)

ETYMOLOGY: Author Origin

EMENDATIONS: 9

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Feb 25, 2023**
Date of Peer Review: **Apr 28, 2023**
Date of Acceptance: **Sep 02, 2023**
Date of Publishing: **Oct 01, 2023**