DOI: 10.7860/JCDR/2023/61467.17386

Review Article

Dentistry Section

Digital Smile Design- An Overview of 3D Digital Workflow

POOJA MOHAN CHITLANGE[1], PRIYANKA PAUL MADHU[2], AMIT RECHE[3]

ABSTRACT

Smile designing is a branch of cosmetic dental procedure that corrects imperfections of the teeth and restores dental health and appearance of the person. Today Digital Smile Design (DSD) is changing the future of dental practice worldwide. It's a unique approach to modern dentistry is revolutionising smile designing clinics worldwide. DSD is a software which used worldwide, is based on specific photographs and software analysis. DSD is a tool (software) that helps in easy communication and discussion between all the smile designers, dental laboratory technician as well as with patients. DSD especially can be used in a multidisciplinary approach and hence not only used in prosthetic rehabilitation but also used in other branches of dentistry like Orthodontic, Periodontics, etc., The concept of smile designing is not new. The need of aesthetic can be traced from the earliest civilisations of both the Phoenicians (about 800 BC) and Etruscians (about 900 BC). They used to carve animal tusks to simulate the shape, form and hue of natural teeth. Pierre Fauchard (1678-1761) from of France, together with several colleagues modernised and promoted dentistry and also started aesthetic practices. There are many parameters such as dentofacial parameter, gingival parameter, ease of use, documentation ability, cost, time required, systematic digital workflow and organisation, and compatibility of the program with Computer-aided design/Computer-aided Manufacturing (CAD/CAM) or other parameters that may affect the user's decision. DSD helps both clinician and patient to improve treatment planning and stimulate the final results of the treatment. There are many software available, and the clinicians can use any of the software according to their needs. Some software can be used easily as a mobile app. This article reviews the basic principles of smile design, various parameters of smile design, comparison of various software, uses, advantages and limitations of DSD.

Keywords: Aesthetic dentistry, Computer-aided design and computer-aided manufacturing, Cosmetic dentistry, Intraoral scanner, Smile

INTRODUCTION

Cosmetic dentistry has the ability to not only change but also enhance once appearance. Smile designing is a branch of cosmetic dentistry that corrects disturbances of the teeth and restores dental problems and aesthetics of the person. Having a smile you love increases your confidence as well as your self-esteem. Smile is the first to be noticed by someone when they look at you. Now, it is possible to achieve your dream smile with smile designing. Today DSD is changing the future of dental practice worldwide. It's a unique approach to modern dentistry is revolutionising smile designing clinics worldwide. Teeth have always been considered the most important factor for beauty (smile) [1]. The main objective of a smile designing is to fulfil patient's requirements and the results of the procedure should enhance patient's facial aesthetics and smile. Smile designing is an irreversible procedure, so it is difficult to convince and educate through conventional smile design technique but with DSD it is very easy to motivate and educate patient by developing and showing the smile digitally and it helps them to visualise it prior to the treatment by creating and presenting a virtual simulation of their new smile design.

The DSD is a software which used worldwide, is based on particular photographs and software analysis [2,3]. DSD is a tool (software) that helps in easy communication and discussion between all the smile designers, laboratory technician as well as with patients. DSD especially is a multidisciplinary approach and hence, it is not only used in prosthetic rehabilitation but also used in other branches of dentistry like Orthodontic, Periodontics etc., [4]. DSD workflow needs an intraoral scanner and software programs, photographs and videos. Intraoral scanners are dynamic instruments that allow for instant evaluation of impression quality and the ability to submit models to the laboratory via e-mail, minimising money and time [1].

Background

The concept of designing a smile is evolving continuously. The demand for aesthetics can be traced back to the Phoenicians (around 800 BC) and Etruscians (around 900 BC). They used to carve animal tusks to mimic the form, shape and colour of real teeth [2]. Pierre Fauchard (1678-1761) from France, together with several colleagues modernised and promoted dentistry and also started aesthetic practices [3]. The concept of smile designing developed rapidly during 18th century. During 18th century the oral health was affected due to the wide spread of caries, because of high intake of sweets, poisoning due to heavy metals and some systemic diseases. Therefore, over the time, the demand for aesthetics increased more among the high socio-economic groups before spreading among the population. Modern dentistry attempted to satisfy the aesthetic and functional needs by developing a variety of novel treatment alternatives [4]. In recent years, smile design has advanced from traditional (manual) smile design to DSD, which has now improved from 2 Dimensional (2D) to 3 Dimensional (3D). Previously, manual drawings on printed photographs of the patient were used for the demonstration of the end results of therapy; however, this has since been replaced with absolute automated drawing using DSD software on a computer. This is simple to operate, edit and explain to patients [5]. In the year 2017, Christian Coachman has proposed the evolution of Digital Smile Design Software (DSDS) as six generations described in [Table/Fig-1] [6].

Components of Smile Aesthetics

The components of smile aesthetics are divided into four main components which are facial aesthetics, gingival aesthetics, macro-aesthetics and micro-aesthetics [7]. The components of smile aesthetics contain various parameters of analysis which are listed in [Table/Fig-2].

Generation	Advancement	Description
First generation	Analogue drawing over images and no link to the analogue mock up	At that time, the treatment outcome was visualised by scribbling with a hand drawing on a printed copy of a photograph, but that cannot be linked to the digital mock-up. Digital dentistry had not yet been developed at the time.
Second generation	Digital 2D drawing and visual link to the analogue mock up	Some programmes, e.g., powerpoint, became familiar with the advent of the digital era, allowing for digital drawing. Although, it was limited to two-dimensional drawing and was not specific for dentistry, it was more appropriate and required less time than manual drawings. Although, the artwork was aesthetically related to the study model, but there was no true relationship.
Third generation	Digital 2D drawing and analogue link to the mock up	It was the start of digital-analogue conversion. The first dental specific digital drawing application was launched, which linked two-dimensional Digital Smile Design (DSD) to three dimensional models. Facial integration for smile design was also created at this time, but there was no link to the 3D digital world.
Fourth generation	Digital 2D drawing and digital link to the 3D mock up	Digital dentistry has moved from two dimensional to three-dimensional analysis at the time. A 3D digital model was made with facial integration and current aesthetic requirements.
Fifth generation	Complete 3D workflow	Now, it was the time when complete workflow is done digitally and a 3D workflow is done involving all the facial and digital analysis parameters.
Sixth generation	The 4D concept	Including movement in the smile design process.

[Table/Fig-1]: Evolution of DSDS according to Christian Coachman (2017) [6].

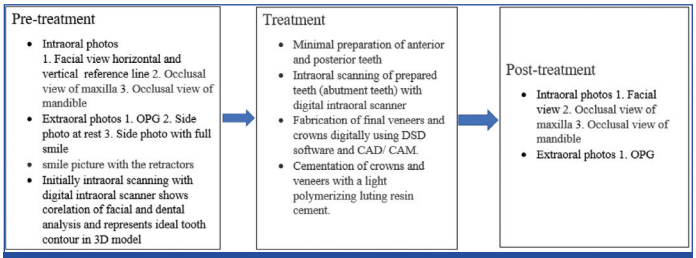
Components	Parameters
Facial aesthetics	Height of face, shape of face, facial profile, gender, age
Gingival aesthetics	Gingival health, gingival architecture, gingival symmetry
Macro-aesthetics	Lip analysis, lip morphology, lip mobility, smile line, midline, balance, length of incisors, incisor angulation, radiating symmetry, incisal embrasure form, buccal corridor
Micro-aesthetics	Specific tooth form and shade matching

[Table/Fig-2]: Various parameters of the components of smile aesthetics [7].

Digital Smile Designing Procedure

The cosmetic aspects in different DSD software vary, but the core method of constructing a smile stays the similar. All of the programmes allow you to build your own smile by drawing reference lines and structures on intraoral and extraoral images. The front image of the face is created using reference lines of facial analysis. The horizontal guiding lines are intercommissural lines and interpupillary lines which offer a perfect balance on the horizontal parts of an aesthetically attractive face, while the vertical guiding lines are the glabella, nose, chin, dental midline and mandible [8,9]. DSD allows a relative analysis of the teeth and face after determining horizontal and vertical proportion. Dentogingival analysis is performed after face analysis. The gingiva shown is determined by the measurement of height of the top lip at rest and during smiling. The smile curve is obtained by connecting the curvature of the incisal margins of the upper front teeth. The proportions of the lower lip and the anterior-posterior curve of the teeth establish the dental contour. This face image's intraoral view is then cropped. On the teeth, three reference lines are drawn: a horizontal straight line from tip of one canine to the tip of another canine, a vertical line crossing the midline (passing from the interdental papillae) and a horizontal line on the incisal margins of central incisors. This helps to reproduce the cross, i.e., the reference facial midline on the face and interpupillary line, onto the intraoral view. A few other lines are drawn for a full dental study, such as the connecting lines of the gingival and incisal battlements and the gingival zenith [5].

Some theories are used for the selection of ideal dimensions of teeth for ideal size of dental length to width ratio, Golden proportion, Pound's theory, Visagism, Dentogenic theory or recurring aesthetic dental proportion [10-15]. After all of the preliminary work has been completed a digital ruler is used to make the necessary modifications. The alterations can be customised to the patient's aesthetic preferences and unique demands [16]. A fresh smile is displayed to a patient once all of the modifications have been completed. This digital smile may be used to prepare a final model that can be visually assessed in the patient's oral cavity. The model not only permits visualisation of gingival architecture, lips and facial shape, but also speech during the try-in phase before any permanent alterations occur [17]. The complete workflow of DSD is shown in [Table/Fig-3] [5,18].



[Table/Fig-3]: Shows the complete workflow of Digital Smile Design (DSD) [5].

Workflow of Digital Smile Design (DSD)

The following are the proportions used in smile designing;

Golden proportion: The golden proportion was initially stated by Lombardi in dentistry and Levin subsequently developed it. When a line is divided into two sections in the golden proportion, the ratio of the small segment to the large segment is equal to the ratio of large section to overall line. The golden proportion or divine proportion, ratio of following terms is about 1:1.618 [19].

Facial proportion: The rule of thirds separates the face vertically into about three equal portions in facial proportion. The lower 3rd of the face is then divided into three parts, with the incisal plane ideally situated at the intersection of the top and middle third [19].

Dental proportion: The height of the ideal central incisor should be one-sixteenth of the height of the face from the ideal hairline to the chin and the width should be one-sixteenth of the interzygomatic width [19].

Golden percentage: Snow analysed the individual apparent tooth width as a proportion of the overall apparent width of the six anterior teeth bilaterally. In order to generate an aesthetically attractive grin, he established the golden percentage, which states that the proportionate width of individual tooth should be 25% central incisor, 15% lateral incisor and 10% canine of the overall width of the anterior section [19].

There are many DSD software developed by different companies. The clinician can use any of the programmes according to the needs. The [Table/Fig-4] shows the list of the DSD software available.

Many aspects, including dentofacial parameter, gingival parameter, documentation capability, cost, ease of use, systematic digital workflow and organisation, time required and application compatibility with CAD/CAM, may impact the user's choice. Many aesthetic criteria, including the facial midline, dentofacial midline, gingival height and contour, facial profile, height and smile curve, as well as intra and interdental proportions, influence smile evaluation and design [20-22].

DISCUSSION

In year 2017, Omar D and Duarte C, conducted a study comparing eight DSD softwares (Photoshop CS6, Keynote, Planmeca Romexis Smile Design, Cerec SW 4.2, Aesthetic Digital Smile Design (ÀDSD),

S. No.	Digital Smile Design Software (DSDS)
1.	Photoshop CS6 (Adobe Systems Incorporated)
2.	Keynote (iWork, Apple, Cupertino, California, USA)
3.	Aesthetic Digital Smile Design (ADSD- Dr. Valerio Bini)
4.	Cerec SW 4.2 (Sirona Dental Systems Inc.)
5.	Smile Designer Pro (SDP) (Tasty Tech Ltd.)
6.	Planmeca Romexis Smile Design (PRSD) (Planmeca Romexis®)
7.	VisagiSMile (Web Motion Ltd.)
8.	DSS (EGSolution)
9.	Microsoft PowerPoint (Microsoft Office, Microsoft, Redmond, Washington, USA)
10.	DSD App (DSDApp LLC by Coachman)
11.	Guided Positioning System (GPS)
12.	NemoDSD (3D)
13	Exocad DentalCAD 2.3

[Table/Fig-4]: List of Digital Smile Design Software (DSDS).

Smile Designer Pro, DSD App and VisagiSMile) [22]. With over 25 parameters but the scoring was done based on 20 parameters. The [Table/Fig-5] shows the 12 face analysis parameters, three dentogingival analysis parameters, five parameters of dental analysis, and five additional parameters that were chosen from the examined literature [10-12,23-30]. Despite the fact that the application was not designed particularly for dental use, it was found that keynote and photoshop CS6 provide a more comprehensive smile design than other professional DSD programmes [23].

Facial parameters	Dentogingival parameters	Dental parameter	Additional parameters
1. Facial midline 2. Smile cant 3. Lower midline 4. Interpupillary line 5. Dental midline shift 6. Horizontal sections 7. Vertical sections 8. Profile angle 9. E-plane 10. H-plane 11. Nasolabial angle 12. Intercommissural line	1. Lower lipline 2. Buccal corridor 3. Gingival line	1. Occlusal plane/ Incisal curve 2. Teeth size 3. Teeth structural changes 4. Teeth characterisation 5. Teeth colour	1. Teeth grids 2. 3D design 3. CAD/CAM 4. Patient interface 5. Mobile app

[Table/Fig-5]: List of various parameters selected by Omar D and Duarte C, (2017) for analysis of different software [22].

According to Omar D and Duarte C, out of 20, photoshop scored 20, followed by keynote which scored 19 out of 20 [22]. Photoshop has capability to fulfil all the parameters of the facial, dentogingival, dental analysis [31-33]. Similar to photoshop, keynote can analyse every parameter but was not able to change and create detailed ideal changes on the tooth structure [34,35]. Both keynote and photoshop are photo editing software hence, cannot be specific for dental use. It cannot be operated by mobile phone and cannot be used with CAD/CAM. The software is not developed for patient documentation and dental use therefore, required special training to operate this software. Similarly, ADSD program scored 18 out of 20, but it contains limited facial analysis parameters [36,37]. The software is specifically developed for DSD and the workflow has been designed for dental use. This software is also not used with CAD/CAM. It requires fewer operative skills to operate software effectively. However, the functionalities are confined to those currently present in the software [32].

Planmeca Romexis Smile Design is a DSD software that may be used to simulate smiles, plan treatments and communicate effectively. It is compatible with both Mac and Windows. It doesn't need any additional software to work. It's quick and easy to use. Designing a smile with a 2D face shot and accurate teeth selection takes only a few minutes. The programme enables the operator to carefully alter the location, shape and size of each tooth in order to obtain perfect proportion and aesthetics [33,35].

Cerec SW 4.2, scored 13 out of 20 [38,39]. This software is not efficient as above-mentioned software in facial and dentogingival parameter analysis. There are very few frontal facial parameters and facial profile parameters incorporated in this software. This software can be used with CAD/CAM but cannot be operated as mobile app. Additionally, DSD App, SDP and VisagiSMile programs had similar scores, 10 out of 20 [34,40-42]. The most significant disadvantages of these programmes were discovered in the analysis of facial component, which is typically employed for picture calibration in these systems. These programmes did not contain frontal face parameters or facial profile parameters. Some of these programmes however, unable to change delicate natural aspects, which can result in a less convincing digital replica of the smile. Later in 2017, the DSD app intended to encompass every area of frontal and facial profile analysis, as well as an orofacial surgical simulation extension [22,42].

Photoshop, keynote and ADSD has a greater number of aesthetic analysis parameters. Other DSD softwares has a smaller number of aesthetic analysis parameters but incorporated comprehensive dentogingival and dental aesthetic functions. The PRSD, Cerec SW 4.2 and DSD App all supported 3D processing moreover, Cerec SW 4.2 and PRSD can be used in conjunction with CAD/CAM. Both the smile designer pro and DSD app can be operated as mobile phone software [22,23].

In the year 2017, Santos FR et al., performed a periodontal surgery for gummy smile with the help of DSD. The results of the surgery were excellent and patient was happy with the end results. He concluded that by the help of DSD it is very easy to demonstrate the end results of the treatment to the patients [43]. Garcia PP et al., published a study report of a maxillary anterior rehabilitation using the DSD system and a direct model technique in 2018. He found that the use of DSD in association with mock-up for diagnostic and treatment planning yielded good results in the cosmetic rehabilitation of the front teeth [44]. Stanley M et al., conducted a case study in 2018. In this scenario, DSD software and CAD/CAM (monolithic lithium disilicate) ceramic veneers and crowns, were used to alleviate vertical dimension loss, aesthetics, and temporomandibular joint diseases (following a minimal tooth preparation technique) [14].

Advantages of Digital Smile Design (DSD)

- DSD assists patients in visualising the predicted outcomes prior to beginning treatment. This enhances the treatment's predictability [45].
- Operator can motivate and educate the patient by showing the final outcome digitally before doing any irreversible procedure this can also serve in crucial medicolegal purposes [5].
- Clinicians and patients can both digitally visualise and analyse gingival, dental and facial characteristics that will decide the final smile and facial aesthetics [46].
- DSD contributes to the personalisation of smile design by exceeding patient's involvement in their own smile designing, results in a more cosmetically motivated, emotive and confident smile [46].
- Before the treatment begins, comparison between before and after treatment images using a digital scale, horizontal and vertical reference lines can be done [46].
- DSD not only helps in better communication between patients and clinician but also helps in better communication between other team members, lab technician, etc.,

Limitation of DSD

- The evaluation and further planning depend only on photos and videos, any variation in documentation may result in distortion of reference image and results in improper diagnosis and treatment planning.
- The treatment with DSD is economically expensive as for complete 3D digital work updated 3D software, CAD/CAM software, intraoral scanner and 3D printer are necessary [5].

- Some software requires specific training to operate software which makes it more costly and time consuming. Although, the complete procedure is time consuming, the results of the software are very good. As the technology is developing the limitations of the system can be overcome.

CONCLUSION(S)

From the above discussion, it can be concluded that as in this new era cosmetics and aesthetics are of more concern, everyone loves to have perfect smile and aesthetics. DSD has made the smile designing very easy. There are many advantages of DSD with limitations. DSD especially is a multidisciplinary 3D approach and can be used in various different branches of dentistry. There are many softwares available. clinician can use any of the software according to their needs. Some softwares can also be used easily as a mobile app. Thus, being user friendly and convenient to use and helping both the clinician and the patient to improve the treatment planning and stimulate the final results.

REFERENCES

[1] Tarantili VV, Halazonetis DJ, Spyropou-Los MN. The spontaneous smile in dynamic motion. Am J Orthod Dentofac Orthop. 2005;128:08-15.
[2] Bhuvaneswaran M. Principles of smile design. J Conserve Dent. 2010;13:225-32.
[3] Aschheim KW, Dale BG. Esthetic dentistry-A clinical approach to techniques and materials. Mosby Publications, 2001.
[4] Roger S, Maria GF, Frank R, Patrick E. Aesthetic dentistry in the 18th century: When beauty counted more than health. Ann Dent Oral Dis. 2018;1:109.
[5] Jafri Z, Ahmad N, Sawai M, Sultan N, Bhardwaj A. Digital smile design-An innovative tool in aesthetic dentistry. J Oral Biol Craniofac Res. 2020;10:194-98.
[6] Evolution of Smile Design. Available online: https://media.digitalsmiledesign.com/christian-coachman-thoughts/smile-design-evolution. (Accessed on 15th February 2020).
[7] Chiche GJ, Pinault A. Aesthetics of anterior prosthodontics. J Exp Clin Med. 2004;13-25.
[8] Cohen SE. Fundamentals of Dental Aesthetics: Analysis. Atlas of Cosmetic and Reconstructive Periodontal Surgery. PMPH; 2007. 217-238.
[9] Priya K, Rahul DP, Varma S, Namitha R. Norms for crafting a beautiful smile. Amirta J Med. 2013;9:01-44.
[10] Kumar VM, Ahila SC, Suganya Devi S. The science of anterior teeth selection for a completely edentulous patient: A literature review. J Indian Prosthodont Soc. 2011;11:07-13.
[11] Ward DH. Proportional smile design: Using the recurring esthetic dental proportion to correlate the widths and lengths of the maxillary anterior teeth with the size of the face. Dent Clin North Am. 2015;59:623-38.
[12] de Oliveira Farias F, Ennes JP, Zorzatto JR. Aesthetic value of the relationship between the shapes of the face and permanent upper central incisor. Int J Dent. 2010;2010:561957.
[13] Pedrosa VO, França FM, Flório FM, Basting RT. Study of the morpho-dimensional relationship between the maxillary central incisors and the face. Braz Oral Res. 2011;25:210-16.
[14] Stanley M, Paz AG, Miguel I, Coachman C. Fully digital workflow, integrating dental scan, smile design and CAD-CAM: Case report. BMC Oral Health. 2018;18:134.
[15] Ahmad N, Ahmed M, Jafri Z. Aesthetics considerations in the selection of teeth for complete denture patients: A review. Ann Dent Spec. 2013;1:4.
[16] Neto AF, Bandeira AS, de Miranda BF, Sánchez-Ayala A. The use of mock-up in dentistry: Working with predictability. Oral Health. 2015;6:256-60.
[17] Goldstein LB. Esthetic rehabilitation in fixed prosthodontics. N Y State Dent J. 2004;70(9):50.
[18] Sharma A, Luthra R, Kaur P. A photographic study on Visagism. Indian J Oral Sci. 2015;6:122-27.
[19] Rangarajan V, Padmanabhan TV. Textbook of Prosthodontics 2nd Edition.pdf.
[20] Davis NC. Smile design. Dent Clin North Am. 2007;51:299-318.
[21] Sousa Dias N, Tsingene F. SAEF-Smile's Aesthetic Evaluation form: A useful tool to improve communications between clinicians and patients during multidisciplinary treatment. Eur J Esthet Dent. 2011;6:160-76.
[22] Omar D, Duarte C. The application of parameters for comprehensive smile esthetics by digital smile design programs: A review of literature. Saudi Dent J. 2017;30:07-12.
[23] Calamia M, Johan R, Mark S. Smile design and treatment planning with the help of a comprehensive esthetic evaluation form Den. Den Clin North Am. 2011;55:187-209.
[24] Camare CA. Camare aesthetics in orthodontics: Six horizontal smile lines. Dental Press J Orthod. 2010;1:118-31.
[25] Naini BF, Gill DS. Facial aesthetics: 2. Clin assessment Dent. Dent Update. 2017;35:159-70.
[26] Naini BF. Facial aesthetics: Concepts and clinical diagnosis. Wiley-Blackwell (ed): 2011.
[27] Nascimento DC, Santos ER, Machado AWL, Bittencourt MAV. Influence of buccal corridor dimension on smile esthetics. Dental Press J Orthod. 2017;5:145-50.
[28] Pedrosa VO, Franca FM, Florio MF, Basting RT. Study of the morpho-dimensional relationship between the maxillary central incisors and the face Braz. Braz Oral Res. 2011;25:210-16.
[29] Prendergast P. Facial proportions advanced surgical facial rejuvenation. Springer. 2012;15-22.
[30] Vaidya N, Seth V, Shankar S. Concepts of dentofacial esthetics: An overview. Indian J Dent Sci. 2014;4:137-40.
[31] Helvey GA. How to increase patient acceptance for cosmetic dentistry: Cosmetic imaging with Adobe Photoshop Elements 4.0. Dent Today. 2007;2:148-53.
[32] Helvey GA. Computer-generated smile analysis: Part 1. Dent Today. 2007;7:148-52.
[33] Helvey GA. Computer-generated smile analysis: Part 2. Dent Today. 2007;8:108-13.
[34] Coachman C, Calamita MA, Sesma N. Dynamic documentation of the smile and the 2D/3D digital smile design process. Int J Periodontics Restorative Dent. 2017;37:183-93.
[35] Coachman C, Dooren EV, Gürel G, Landsberg CJ, Calamita MA, Bichacho N. Smile design: From digital treatment planning to clinical reality comprehensive case studies. Interdisciplinary treatment planning. Cohen, M. (ed): 2012;2:119-74.
[36] Bini V. Aesthetic digital smile design: Software-aided aesthetic dentistry: Part I CAD/CAM. Int Mag Digital Dent. 2014;2:12-17.
[37] Bini V. Aesthetic digital smile design: Software-aided aesthetic dentistry: Part II. Cosm Dent. 2015;1:14-22.
[38] Kurbad S. Cerec smile design: A software tool for the enhancement of restorations in the esthetic zone. Int J Comput Dent. 2013;16:255-69.
[39] Rihal A, Dumore T, Rykiss L. Advantages of digital smile design: A case study. (August 2017). Extracted from: https://www.oralhealthgroup.com/features/advantages-digital-smile-design-case-study/.
[40] Paolucci B, Calamita M, Coachman C, Gürel G, Shayder A, Hallawell P. Visagism: The art of dental composition. Quintessence Dent Technol. 2012;35:187-200.
[41] Feraru M, Musella V, Bichacho N. Individualizing a smile makeover: Current strategies for predictable results. J Cosm Dent. 2016;32:109-14.
[42] Iliev G. Iliev personalised digital smile design for predictable aesthetic results. Balk J Dent Med. 2017;20:172-77.
[43] Santos FR, Kamarowski SF, Lopez CAV, Storrer CLM, Neto AT, Deliberador TM. The use of the digital smile design concept as an auxiliary tool in periodontal plastic surgery. Dent Res J. 2017;14:158-61.
[44] Garcia PP, Costa RG, Calgaro M, Ritter AV, Correr GM, Cunha LF, et al. Digital smile design and mock-up technique for esthetic treatment planning with porcelain laminate veneers. J Conserv Dent. 2018;21:455-58.
[45] Fan F, Li N, Huang S, Ma J. A multidisciplinary approach to the functional and esthetic rehabilitation of dentinogenesis imperfecta type II: A clinical report. J Prosthet Dent. 2019;122:95-103. Doi: 10.1016/j.prosdent.2018.10.028.
[46] Coachman C, Yoshinaga L, Calamita M, Sesma N. Digital smile design concepts. The Technologist. 2014, Apostila DSD (digitalsmiledesign.com).

PARTICULARS OF CONTRIBUTORS:

1. Intern, Department of Public Health Dentistry, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha, Maharashtra, India.
2. Assistant Professor, Department of Public Health Dentistry, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha, Maharashtra, India.
3. Associate Professor and Head, Department of Public Health Dentistry, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Pooja Mohan Chitlange,
Intern, Department of Public Health Dentistry, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha-442001, Maharashtra, India.
E-mail: poojachitlange1999@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Nov 22, 2022
- Manual Googling: Nov 26, 2022
- iThenticate Software: Dec 07, 2022 (9%)

ETYMOLOGY: Author Origin

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? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 14, 2022**
Date of Peer Review: **Dec 05, 2022**
Date of Acceptance: **Dec 12, 2022**
Date of Publishing: **Jan 01, 2023**