British Journal of Bio-Medical Research Vol.02, Issue 04, Pg.409-419, May-June 2018

Available Online at http://www.bjbmr.org

ISSN:2456-9739

BRITISH JOURNAL OF BIO-MEDICAL RESEARCH

Cross Ref DOI: https://doi.org/10.24942/bjbmr.2018.265 Volume 02, Issue 04, July -August 2018

Research Article

Impact of 'Selfie-Video Recording While Brushing' On Oral Hygiene Improvement - A clinical Trial

Dr. Rashmi Thakral[1], Dr. Jyoti Singh[2], Dr. Mohit Dadu[3], Dr Amit Reki[4], Dr. G.K. Thakral[5] , Dr. Noopur Gupta[6]

[1]Professor, Public Health Dentistry, UDMRI, Dehradun, Uttrakhand, India
[2]Senior Lecturer, Public Health Dentistry, UDMRI, Dehradun, Uttrakhand, India
[3]Senior Lecturer, Public Health Dentistry, IDST, Modinagar, Uttar Pradesh, India
[4]Senior Lecturer, Public Health Dentistry, UDMRI, Dehradun, Uttrakhand, India
[5]Professor, Prosthodontics, SGRRIMHS, Dehradun, Uttrakhand, India
[6]PG Student, Public Health Dentistry, ITS, Muradnagar, Uttar Pradesh, India

ARTICLE INFO

Article History:
Received on 13th July 2018
Peer Reviewed on 25th July 2018
Revised on 11th August 2018
Published on 25th August 2018

Keywords:
Smart Phone Video Selfie (SPVS), Tooth Brushing (TB), Oral Hygiene, Brushing Technique, Information Motivation and Behavior-skills (IMB)

ABSTRACT

Background: An attempt was made to change the tooth brushing habits ingrained in adults through self-appraisal. It needs newer ideas and proactive barriers to inculcate proper manner of tooth brushing in adults. Keeping these ideas in mind, a 13 days clinical study was designed to investigate tooth brushing behavior, the improvements in tooth brushing technique after training & its effect on oral hygiene. Smartphones are in big use for taking selfie videos and selfie pictures. Smartphone video selfies are also finding their way in the field of medical and dental science for the purposes of research and development. **Materials and Methods:** Smartphones Video Selfies were used to study tooth brushing behaviors in a sample of 30 volunteers. The participants were trained for the most commonly used tooth brushing technique - Modified Bass Technique. The baseline data was collected after the oral prophylaxis. Tooth brushing behavior of volunteers using self-captured selfie video over a period of next13 days was observed. A brief intervention on day 7 was also made. **Results:** A marked improvement in tooth brushing skills was observed following a brief intervention on the 7th day of the study. **Conclusion:** Use of selfie-videos on personal smart phone can help in hygiene education, improvement in oral hygiene and prevention of oral diseases like gingivitis and periodontitis.

INTRODUCTION

Oral health is a functional, structural, aesthetic, physiologic & psychosocial state of well being and is essential to an individual's good health and quality of life. Oral health is an integral part of general health.[1] Oral health problems become more common in older adults but are not a result of aging. Studies have shown that people having good oral health may need less general health care measures.[2] Regular brushing has always been linked with good oral hygiene. It has been established that regular twice a day brushing habits have greater impact on caries prevention in young children than restricting their sugary foods habits.[3] On the other hand, poor oral hygiene practices involving brushing less than twice a day with frequent exposure to cariogenic food have been found to be chief predictors for dental caries amongst children.[4] Oral health can be promoted by changing the tooth brushing behaviors which may help to avert preventable oral diseases such as dental caries and periodontal diseases. People are aware about their oral hygiene but often follow the wrong brushing technique. A proactive interference can effectively influence the learning and adaptation of correct tooth brushing skills.[5] Studies have shown that the effective tooth brushing technique can reduce the chances of dental diseases, if followed properly.[6] Information-Motivation- Behavioral Skills (IMB) model is a recent concept that helps in promotion of health related behavior change in individuals.[7] The theory emphasizes the positive role of awareness through relevant information and education about a disease and its prevention in a person in order to motivate and encourage a behavioral change for taking corrective actions. Reinforcement of brushing duration from a typical 45 seconds to the recommended 2 minutes has been found to have a significant impact on removal of dental plaque. [8] A significant difference in the plaque index scores before and after having given written, verbal and videotape instructions highlights the importance of dental hygiene education.[9]

In modern times of digitalization, the uses of mobile phones are increasing. A craze for self recording of still pictures and videos using smart phone cameras has grown tremendously. In was envisaged that use of self recorded videos or "selfie-video" using Smartphone may be helpful in changing the tooth brushing habits and behaviors. It has been established that people who were given demonstration on brushing technique adapted better than those who were given verbal/written instructions to follow.[10] The practical visuals are always more effective way of learning than mere instructions. Thus the present study focuses to evaluate the change in tooth brushing behaviors by way of self assessment using selfie videos by the participants themselves. However as of now, there is no adequate literature on the use of selfie videos recordings to assess its influence on oral hygiene improvement.

MATERIAL AND METHODS

Study Design

A total of 40 volunteers – resident dental students completing their internship period were interviewed, out of which 30 volunteers were enrolled and they completed the study. The Study participation was voluntary and there were no financial or other incentives. All participants were right handed and used their right hand for brushing. Only those participants were chosen who were interested to participate in the study and were willing to cooperate regarding their tooth brushing behavior. The Ethical approval for the study was taken from the Ethical committee of Uttaranchal Dental and Medical Research Institute Majri Grant, Dehradun and written informed consent was obtained from all participants. The present study comprised of a 13 days clinical trial. The study was conducted among dental students in the Department of Public Health Dentistry, Uttaranchal Dental and Medical Research Institute, Majri Grant, Dehradun. Aim of the study was to assess the change in tooth brushing behaviors (including brushing strokes, hand position, wrist position) over a period of 13 days by using 'selfie-video' taken by the

participants with the help of their own Smart Mobile phones.

Inclusion Criteria

i) Those who were interested to take part and cooperate in the study.

ii) Those in the age between 20-30 years.

iii) Those having Smartphones with minimum 3-8 megapixels camera.

Exclusion Criteria

i) Those having orthodontic braces.

ii) Those suffering from any systemic diseases.

iii) Those having any gingival health problem or any other medications.

iv) Those not having smart phones and/or were unable to handle smart phones effectively.

Training Session:

Oral prophylaxis was done to obtain the baseline data. At baseline and prior to the training, Oral Hygiene Index (OHI), Plaque Index and Gingival Index scores were recorded. An observation was made about the brushing pattern of the participants. The widely recommended modified Bass technique[11] was demonstrated to train the volunteers to standardize the exact tooth brushing technique, but it did not form part of the study. Based on the general consensus amongst oral health care professionals, they were instructed to brush their teeth for 2 minutes. However, the actual and habitual brushing time varies between 30 seconds to 60 seconds.[12,13]

Volunteers were asked to use new regular toothbrush for the study. The participants were reinforced for the modified bass technique on the 7th day to improve tooth brushing skills. No further reminders, instructions, or feedbacks were given to the participants. The brushing methods were not checked or reviewed during the study period.

Training was also conducted to demonstrate quality video recording by the participants while brushing their teeth using their own cell phones. The mobile phones were kept on a plain area at the level of the face so that the volunteers could observe their actions while front camera would record the videos. Participants were trained and instructed to correctly record the mouth with the brush handle, bristles and motion of the hand. Training was given to shoot the selfie-video of brushing without imparting the full face or eyes or any other personal identifying mark on the face. Thus, the participants recorded tooth brushing video with maximum attention on the brushing angulations. Each participant was asked to record the tooth brushing procedure every alternative day, beginning with day 3 of the study period.

Oral hygiene index, plaque index and gingival index scores were recorded at the 7th day and 13th day of the study. And all the selfi videos of each participant were reviewed. Tooth brushing skills were assessed for quality and accuracy as per the recommended parameters.[14,15]

Assessment of Tooth Brushing Quality:

A total of six sextants that included maxillary and mandibular teeth of each subject – Right posterior teeth (Premolars and Molars), Anterior teeth (Canine to Canine), Left posterior teeth (Premolars to Molars), each with buccal and lingual surfaces were considered separately. Each subject was given a score of 1 in each sextant if majority of the strokes were found to be correct in an advised rhythmic manner, failing which the score given was zero. All the three parameters (Correct brushing stroke, Angulation and Positioning of the Toothbrush) totaled to a maximum score of 36 points [12 sextants (6 sextant having 2 surfaces each - buccal and lingual) x 3 parameters = 36].The cumulative score was converted to an average score by dividing it by 12 to yield an overall score range from 0 to 3. The score 3 therefore, refers to the observation that the subject has been able to meet all the three parameters as per the training session.

Assessment of Tooth Brushing Accuracy:

Total number of strokes and maintaining the prescribed angulation of 45^0 against the tooth surfaces in each sextant formed the basis of assessment for tooth brushing accuracy. The values were calculated in percentage for each extant using the following formula:

$$= \frac{\text{Number of Correct strokes}}{\text{Total Number of strokes}} \times 100$$

$$= \frac{\text{Number of Correct angulations}}{\text{Total Number of angulations counted}} \times 100$$

$$= \frac{\text{Number of Correct Brush positions}}{\text{Total Number of Brush position counted}} \times 100$$

The accuracy of the tooth brushing skills was calculated by the mean of the percentage of correct strokes, correct angulations and correct brush positions.

$$= \frac{\text{Percent of Correct Strokes} + \text{Percent of Correct Angulations} + \text{Percent of Correct Brush positions}}{3}$$

The overall accuracy of tooth brushing for each subject was calculated by taking all 12 sextants into consideration for each subject as under-

$$\text{Accuracy of Tooth Brushing} = \frac{\text{Sum of Accuracy of all 12 Sextants}}{12}$$

Data Analysis:

The data was analyzed using Statistical Package for Social Services (SPSS, IBM, IL, USA), version 20.0 or R Statistical Software, version 3.2.4 (Open source software, www.r-project.org, The R Foundation). A one-way ANOVA for ranks (Non-parametric Kruskal-Wallis Test) was used to assess the difference between the above described outcome parameters during study intervals for evaluation of significant differences.

RESULTS:

Each of 30 volunteers completed all six selfie videos. A total of 180 SPVSs were included in the analysis. Mean age of participants was 21.50 ± 0.5 years.

The selfi-video was recorded by the volunteers that depicted the number and direction of brushing strokes, the angulation at which the brush was being held against the tooth, and brush position. The selfie videos for the entire duration were analyzed after completion of the study. The analysis revealed that initially the participants were not able to follow the correct technique as they were habituated with their own brushing style. It was also noted that motion of the hand, position of the brush and the bristles were not correct. After the brushing technique was reinforced at a brief intervention on the 7th day, a marked improvement in their brushing skills including brush angulations, position and strokes was observed. However, the tooth brushing was limited to the palatal surfaces and more coverage was given to lower posterior teeth. None of the participants followed the recommended brushing time of 2 minutes.

Tooth brushing quality and accuracy results

The quality and accuracy scores regarding the effectiveness of tooth brushing over the time period of the study are depicted in Fig / Tables 1 and Fig / Table 2(A – F). Evaluation of mean differences over longitudinal time points of the outcome scores yielded no statistically significant differences despite the appearance of episodic decreases and increases. The tooth brushing quality from the baseline data to 13th day of the study was not significant but a marked increase in the accuracy of tooth brushing was observed. The time spent on tooth brushing (duration measured in seconds) at different time points across the study is also shown in Table 1.

Exploratory analyses

It was observed that there was an increase in the number of strokes performed till the 7th day and then this value began to decrease. Fig / Table 3 depicts the changes in the mean ± standard deviation, median, number of strokes for each of the surfaces in all sextants in the study. However, the difference between the number of strokes over longitudinal time points was not statistically significant [Friedman $\chi 2$ = 53.2 df = 59, P = 0.12 (the tests satisfy different assumptions for small repeated measures data)]. Although we did not measure stroke length, it was qualitatively observed that the strokes were relatively shorter and the speed of strokes had increased.

Fig / Table 1: Analysis of outcome parameters with Kruskal Wallis non-parametric test

	Time Point	Mean	SD	p – value
Quality score (maximum 3)	3rd day	1.9	1.2	0.43
	5th day	1.9	1.0	
	7th day	2.0	1.1	
	9th day	2.1	1.0	
	11th day	2.2	0.9	
	13th day	2.2	0.9	
Percent of correct strokes	3rd day	54.8	38.2	0.78
	5th day	56.8	32.8	
	7th day	60.2	39.1	
	9th day	60.7	39.6	
	11th day	61.1	40.3	
	13th day	61.6	38.5	
Percent of correct angulations of toothbrush	3rd day	39.4	27.3	0.71
	5th day	40.2	28.4	
	7th day	44.3	32.5	
	9th day	44.6	29.3	
	11th day	45.1	29.6	
	13th day	45.4	28.9	
Percent of correct toothbrush positions	3rd day	37.2	32.2	0.69
	5th day	38.4	34.4	
	7th day	42.6	35.6	
	9th day	42.8	36.2	
	11th day	43.4	37.2	
	13th day	43.5	35.4	
Overall accuracy (%)	3rd day	44.5	24.5	0.58
	5th day	44.8	27.4	
	7th day	48.2	28.2	
	9th day	48.3	28.8	
	11th day	48.8	29.3	
	13th day	49.2	27.3	
Time (seconds)	3rd day	78.4	16.2	0.88
	5th day	74.2	12.4	
	7th day	78.2	10.5	
	9th day	75.5	12.8	
	11th day	74.2	12.2	
	13th day	74.4	11.8	

Fig / Table 2(A to F): Outcome of various changes observed in Tooth Brushing over the time period

Figure 2-A:

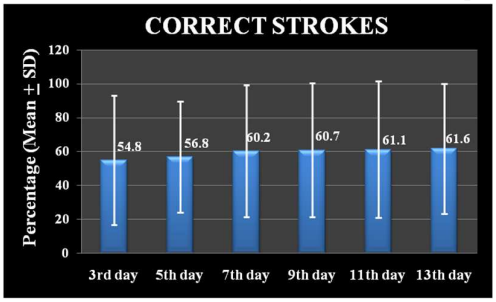

Figure 2-B:

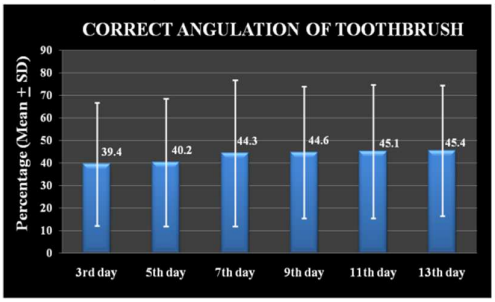

Figure 2-C:

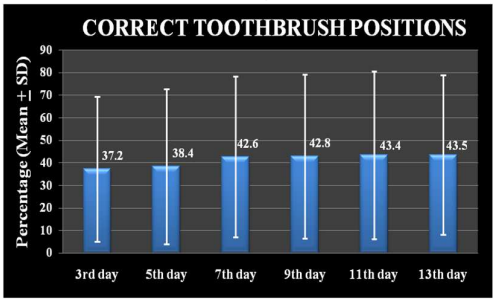

Figure 2-D:

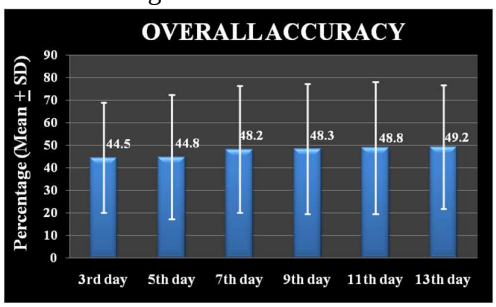

Figure 2-E:

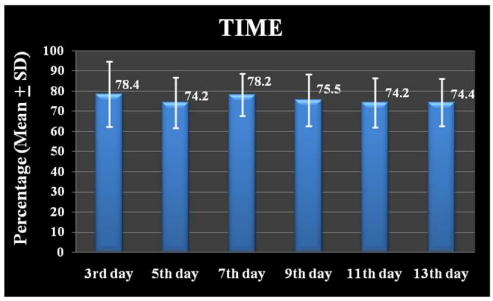

Figure 2-F:

Fig / Table 3: Number of tooth brushing strokes by participants at five time points in 12 sextants of teeth.

Sections and surface		3rd Day	5th Day	7th Day	9th Day	11th Day	13th Day
Right maxillary posterior – Buccal	Mean	9.8	11.6	8.7	10.4	13.8	10.2
	SD	7.9	10.2	6.4	10.1	11.7	9.9
	Median	9.5	10	7	9	13.5	6
	Minimum	3	2	4	4	2	3
	Maximum	20	26	18	25	30	24
Right maxillary posterior – Palatal	Mean	0.7	2.6	2.9	2.7	2.1	2.4
	SD	1.1	3.7	3.8	3.1	2.7	2.8
	Median	0	0.5	1.0	1.0	0.5	2.0
	Minimum	0	0	0	0	0	0
	Maximum	2	8	10	8	6	7
Maxillary anterior – buccal	Mean	8.9	9.2	8.8	8.6	8.2	7.4
	SD	9.2	7.6	6.7	6.6	5.8	4.6
	Median	7	7.0	7.5	7.5	8.0	4.5
	Minimum	2	4	4	3	2	3

	Maximum	22	18	16	15	13	12
Maxillary anterior – Palatal	Mean	1.8	1.5	3.0	2.6	2.0	2.3
	SD	1.2	2.1	3.3	1.6	1.8	1.5
	Median	1.8	1.4	1.8	1.6	1.5	1.4
	Minimum	0	0	0	0	0	0
	Maximum	3	4	8	5	4	3
Left maxillary posterior – Buccal	Mean	14.0	9.5	7.3	8.5	9.3	10.0
	SD	12.4	7	7.3	7.8	10.4	8.8
	Median	13.5	9.5	4.5	4.8	5.5	8.0
	Minimum	2	3	2	3	2	2
	Maximum	27	16	18	21	24	22
Left maxillary posterior – Palatal	Mean	1.3	3.8	3.8	3.6	2.5	3.0
	SD	1.9	2.2	4.4	2.2	2.7	2.9
	Median	0.5	4.0	2.5	3	2.0	3.0
	Minimum	0	1	0	0	0	0
	Maximum	4	6	10	8	6	6
Right mandibular posterior – Buccal	Mean	8.5	8.3	8.5	8.2	7.5	7.3
	SD	6.0	4.7	7.9	7.8	7.9	5.4
	Median	7.0	7.0	5.5	5.0	5.0	5.5
	Minimum	3	4	3	3	1	3
	Maximum	17	15	20	18	19	15
Right mandibular posterior – Lingual	Mean	7.8	7.5	6.3	6.8	6.5	4.3
	SD	8.1	4.2	5.1	4.5	4.1	3.0
	Median	5.5	7.5	5.5	5.0	6.0	4.0
	Minimum	1	3	2	3	3	1
	Maximum	19	12	12	13	11	8
Mandibular anterior – Buccal	Mean	7.5	7.0	8.0	8.2	7.8	8.0
	SD	4.4	5.0	6.6	6.5	6.9	6.7
	Median	6.5	6.5	6.0	6.0	5.0	5.0
	Minimum	4	2	3	3	3	4
	Maximum	13	13	17	18	18	18
Mandibular anterior – Lingual	Mean	4.3	5.3	4.0	4.2	2.3	2.8
	SD	3.4	4.1	3.4	3.4	1.7	2.1
	Median	3.5	6.0	2.5	3.0	2.5	3.0
	Minimum	1	0	2	1	0	0
	Maximum	9	9	9	6	4	5
Left mandibular posterior – Buccal	Mean	10.5	9.0	9.3	10.3	12.0	8.5
	SD	8.3	7.0	6.9	8.4	10.5	10.3
	Median	9.0	9.0	8.5	9.0	11.0	3.5
	Minimum	3	2	2	3	3	3
	Maximum	21	16	18	18	23	24
Left mandibular posterior – Lingual	Mean	3.8	6.0	5.3	5.5	5.3	5.0
	SD	1	1.6	2.9	2.6	3.2	2.5
	Median	3.5	6.0	4.5	4.5	5.5	4.5
	Minimum	3	4	3	3	2	3
	Maximum	5	8	9	9	8	8

Fig / Table 4: Plaque Index, Gingival Index and Oral Hygiene Index

	Baseline		1st Week		2nd Weeks	
Study Group (N=20)	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Plaque Index	0.000	0.000	0.220	0.2700	0.320	0.2200
Gingival Index	0.000	0.000	0.210	0.2410	0.240	0.1420
Oral Hygiene Index	0.000	0.000	0.290	0.2500	0.480	0.3410

Oral Hygiene, Plaque and Gingival score assessment:

Fig / Table 4 depicts that the baseline data was obtained at the beginning of the study. The difference between the mean values of first and second week of the plaque score shows that plaque score increased at second week which indirectly means the volunteers were not following the correct technique initially but after reinforcement of the brushing technique on the 7th day, they started correcting their mistakes. At 1st week of the study, the mean gingival score was 0.210 that increased to 0.240 in the 2nd week. For oral hygiene index score, there was a great difference in the mean values from 0.29 to 0.48 which means the volunteers did not focus on all the surfaces of the teeth or they skipped some teeth by which the oral hygiene index score increased within a week.

DISCUSSION:

A computer system recording of the brushing technique, duration and force has revealed that only 25% participants fulfilled the complete brushing criteria that emphasized the need for oral hygiene education.[16] Assimilation of a behavioral change approach in integrative oral health coaching has been found to promote internal motivation and to enhance individual's self efficiency to adapt and practice proper oral hygiene self-care habits.[17] This study, utilizes the IMB Model to discover a new means of behavioral change by use of selfie video for self-motivation and improvement of oral hygiene while brushing. The authors in any ways do not promote the extensive use of mobile phones since studies have shown the potential harmful effects of mobile phone radiation on human health.[18,19] There is no substantial literature available on use of smart phones for using self evaluation in dentistry. However, videos recordings by a third person have been used with effectiveness to record, monitor and evaluate changes over a given time in the mouth.[20] Present study emphasizes the positive impact of self monitoring and self evaluation of tooth brushing habits using selfie-video, for improvement in oral hygiene. After our brief intervention however, a modest increase in accuracy and a decrease in number of strokes per sextant has been observed in the second week of the study.

Studies have shown that a majority of people are not aware of the adequate brushing technique and its benefits.[21] In this study, all the participants were aware of brushing method and its advantages but they were not following the appropriate strokes, timing and hand position which was corrected by using selfie-video. A study on the brushing timings has reported that about 64.3% participants were brushing their teeth in <60 second.[22] In the present study participant brushed their teeth for an average of 75.81 seconds against recommended time of 2 minutes as instructed by the authors.

There is large diversity about recommendations made by professional, commercial establishments and text books about methods of tooth brushing.[23] For this study we have suggested "Modified bass technique", possible reasons for the high frequency of recommending the Modified Bass technique is that it has been found to be more effective in removal of supra gingival plaque and reduction in gingival inflammation.[24] As it was reported, the difference between the mean values of first and second week of the plaque score shows an increase in second week which indirectly means the volunteers were not following the correct technique initially but after

reinforcement of the brushing technique they started correcting their mistakes.

During 1st week of the study, the mean gingival score was 0.210 and it increased to 0.240 in the 2nd week. For oral hygiene index score, there was a great difference in the mean values from 0.29 to 0.48 which may be suggestive of the fact that the volunteers did not focus on all the surfaces of the teeth or they skipped some teeth by which the oral hygiene index score increased within a week.

In addition, from the patient's perspective, selfie video made the patient an active and contributing participant in the endeavor and not just a passive observer or follower to carry out instructions of the oral health care provider. Active involvement may motivate and increase the likelihood of patients sticking with the process of re-learning and refining their tooth brushing skills.[25]

Further, the use of 'Smart Phone Video Selfie' is more likely to make the patient more conscious of the tooth brushing behavior. Self viewing of the selfie videos may also offer the patient an opportunity for self evaluation and thereby encouraging the individual to indulge into self induced corrective actions for improving the technique.

Thus, effective and regular use of SPVS at home could also serve as a resource for reinforced tooth brushing monitoring and improvement.

In a very recent study people's adaptation to smart phone based health applications (apps) to motivate and inform the users about oral hygiene has shown very promising results.[26] Watching oneself while recording a video selfie during a habitual practice may disrupt ingrained habits, making a person conscious of brushing leading to behavioral change, including the process of creating new muscle memory.[17] The strength of this study lies in the vision that the self appraisal approach using SPVS at regular intervals can be advocated to larger populations for education and intervention in identification of habitual oral hygiene behaviors and their improvement.

CONCLUSION:

The new technology in this fast changing world is making inroads into not only our personal and social lives but also in the field of medicine and dentistry. Smart phone applications can be effectively used in the health segment for the benefit of professionals as well as general population. Use of a very simple software like selfie-videos on personal smart phone, can help in hygiene education and prevent the oral diseases like gingivitis and periodontitis. The scope of this study can further be enlarged by using larger sample sizes over longer periods of time to investigate more avenues of oral hygiene and to draw further conclusions. This very simple, easy to use and cheap technology may also be helpful in detecting the hidden soft tissue lesions or diseases in the mouth.

Limitations:

- Age limitation.
- Phone stand may be more helpful.
- Only smart phones are needed.
- Well skilled participants are needed.

REFERENCES:

1. US Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General‑Executive Summary. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institute of Health; 2000
2. Haumschild MS, Haumschild RJ. The importance of oral health in long-term care. J Am Med Dir Assoc. 2009;10(9):667-71
3. Gibson SA, Williams S. Dental Caries in Pre–School Children: Associations with Social Class, Tooth brushing Habit and Consumption of Sugars and Sugar–Containing Foods. Caries Res 1999;33:101–113
4. Amin TT, Al-Abad BM. Oral hygiene practices, dental knowledge, dietary habits and their relation to caries among male primary school children in Al Hassa, Saudi

Arabia. International Journal of Dental Hygiene 2008:6(4):361–370
5. Aunger R. Tooth brushing as routine behavior. Int Dent J 2007;57:364-76
6. Wainwright J, Sheiham A. An analysis of methods of tooth brushing recommended by dental associations, toothpaste and toothbrush companies and in dental texts. Br Dent J 2014;217:E5
7. Fisher JD. The information-motivation-behavioural skills model of HIV preventative behavior. In: Crosby RA, Diclemente RJ, Kegler M, editors. Emerging Theories in Health Promotion Practice and Research. 2nd ed. San Francisco, CA: Jossey-Bass, a Wiley Imprint; 2009. p. 22-63
8. Gallagher A, Sowinski J, Bowman J, Barrett K, Lowe S, Patel K, Bosma ML, Creeth JE. The Effect of Brushing Time and Dentifrice on Dental Plaque Removal *in vivo*. J Dent Hyg. 2009;83(3):111-116
9. Lees A, Rock WP. A Comparison Between Written, Verbal, and Videotape Oral Hygiene Instruction for Patients with Fixed Appliances. Journal of Orthodontics 2000; 27(4): 323-328
10. Schlueter N, Klimek J, Saleschke G, Ganss C. Adoption of a toothbrushing technique: A Controlled, Randomized Clinical Trial. Clin Oral Investig 2010;14:99-106
11. Greene JC, Vermillion JR. The simplified oral hygiene index. JADA 1964;68:7-13
12. Vander Weijden FA, Timmerman MF, Snoek IM, Reijerse E, Vander Velden U. Tooth-brushing duration and plaque removing efficacy of electric toothbrushes. Am J Dent. 1996;9:S31-S36
13. Emling RC, Flickinger KC, Cohen DW, Yankell SL. A Comparison of estimated versus actual brushing time. Pharmacol Therapeut Dent. 1991;6(3-4):93-98
14. P Pujar. Evaluation of the tooth brushing skills in children aged 6-12 years. Eur Arch Paediatr Dent. 2013 Aug;14(4):213-9
15. Pejman Mahmoodi , Payman Salimi , Rozita Davari Ashtiyani, Naser Valaii, Marjan Azarshab,Nasim Shafizadeh. Assessment of Fine Motor Skills and Tooth Brushing Skills in 5-6 Year Olds in Tehran. J Res Dent Sci Autumn 2014;11(3):176-181
16. Ganss C, Schlueter N, Preiss S, et al. Tooth brushing habits in uninstructed adults—frequency, technique, duration and force. Clin Oral Invest. 2009;13:203
17. Vernon LT, Howard AR. Advancing health promotion in dentistry: Articulating an integrative approach to coaching oral health behavior change in the dental setting. Curr Oral Health Rep 2015;2:111-22
18. Mitra, Rajdeep. A STUDY ON EFFECT OF MOBILE PHONE RADIATION ON HUMAN HEALTH. Exploratory animal and Medical Research. 2014;4:246-252.
19. Volkow ND, Tomasi D, Wang GJ, et al. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. JAMA 2011;305(8):808–813
20. Sanderson TR, Kearney RC, Kissell D, Salisbury J. Evaluating Student Self-Assessment through Video-Recorded Patient Simulations. J Dent Hyg.2016 Aug;90(4):257-62
21. Rehana YB, Khan AU, Khalid MT, Rasheed D. Evaluation of Tooth Brushing Technique and Oral Hygiene Knowledge at AFID, Rawalpindi. Pakistan Oral & Dental Journal 2012; 32(1):124-27
22. Rahardjo A, Maharani DA, Kiswanjaya B, Idrus E, Nicholson J, Cunningham PJ, Schäfer F. Measurement of Tooth Brushing Frequency, Time of Day and Duration of Adults and Children in Jakarta, Indonesia. Journal of Dentistry Indonesia. 2015;21(3): 87-90
23. Wainwright J, Sheiham A. An analysis of methods of tooth brushing recommended by dental associations, toothpaste and toothbrush companies and in dental texts.BDJ. 2014; 217(E5):1-4
24. M Poyato Ferrera, JJ Segura Egea, P Bullon Fernandez. Comparion of Modified Bass Technique with normal Tooth Brushing

practices for efficacy in Supra-gingival Plaque Removal. Int J Dent Hygiene 2003 (1); 110-114

25. Winterfeld T, Schlueter N, Harnacke D, Illig J, Margraf‐Stiksrud J, Deinzer R, et al. Toothbrushing and flossing behaviour in young adults– A video observation. Clin Oral Investig 2015;19:851-8
26. Underwood B, Birdsall J, Kay E. The use of a mobile app to motivate evidence‐based oral hygiene behaviour. Br Dent J 2015;219:E2

How to cite this article:
Rashmi Thakral, Jyoti Singh, Mohit Dadu, Amit Reki, G.K. Thakral, Noopur Gupta. ***Impact of 'Selfie-Video Recording While Brushing' On Oral Hygiene Improvement - A clinical Trial*** **Br J Bio Med Res , Vol.02, Issue 04, Pg.409-419, July-August 2018. ISSN:2456-9739 Cross Ref DOI : https://doi.org/10.24942/bjbmr.2018.265**

Source of Support: Nil **Conflict of Interest:** None declared.