Original Article

Evaluation of oral hygiene self-efficacy, knowledge, and motivation among young adults of rural-based tamilian population: A prospective cohort study

Meenalochani Balasuppramaniem, Elanchezhiyan Sundaram, Rajkumar Daniel Gainneos, Vennila Karunamoorthy, Viola Esther Panneerselvan, Pavithra Thiruppathi

Department of Periodontics, Vivekanandha Dental College for Women, Namakkal, Tamil Nadu, India

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Abstract:

Background: Oral hygiene is the most essential factor in the prevention and therapy of many diseases, especially the periodontal disease. The aim of this study was to evaluate the oral hygiene-related knowledge, self-efficacy, and motivation of the young adults of rural-based Tamilian population, with their current oral hygiene practices to assess the effect of patient motivation after initial periodontal therapy. **Materials and Methods:** A hundred patients filled out questionnaires based on their oral hygiene-related knowledge. Plaque index, gingival index, and gingival bleeding index were recorded and correlated with their questionnaire knowledge. Initial periodontal therapy and motivation were done to all patients. After 6 months, oral health status was evaluated again. **Results:** There was a lower correlation value with insignificant *P* value between the questionnaire score and plaque and gingival index score, ($r = 0.125, 0.166$). However, the correlation between questionnaire score and modified papilla bleeding index score was high ($r = 0.254$) with significant ($P = 0.011$). After 6 months following the initial periodontal treatment, significant decrease in all the three indices scores was noted with significant ($P < 0.001$). **Conclusion:** Oral hygiene-related motivational approaches targeting rural young adult population has the potential to predict oral hygiene behavior and influences the clinical outcomes.

Key words:

Initial periodontal therapy, motivation, oral hygiene, periodontitis, self-efficacy

INTRODUCTION

Oral hygiene is the practice of maintaining the oral cavity clean and healthy by the daily oral hygiene practices mainly such as tooth brushing, interdental cleaning aids, usage of mouth rinses, cessation of tobacco usage, and regular dental visits. Every individual's adherence to the recommended oral hygiene regime is a fundamental factor in the prevention and therapy of periodontal diseases associated with tooth loss.[1,2]

Some population groups like well-developed countries have lower prevalence rate of dental diseases while others, especially among rural population suffer from higher incidence of diseases. This notifies the timely need for prevention intervention and motivation. India is a vast country, comprising of both urban and rural population. Empowering and motivating the young budding community, with proper emphasize on health education with individual oral health plan may definitely prevent many of the oral diseases.[3,4]

One of the most common and successful health behavior models is the Social Cognitive Theory which mainly includes the concepts of self-efficacy, outcome expectations, and response efficacy. Self-efficacy is defined as the personal belief of having control over one's health habits.[5] This relates positively to the belief of one's confidence to accomplish the actions to reach the desired outcome. The influence of self-efficacy was explained in many health belief models[6] as an important factor for health-related behaviors such as smoking cessation, diabetes control, and physical exercises.

General health of majority of the population was greatly influenced by the oral health status. Poor oral health may be an important factor

Address for correspondence:
Dr. Meenalochani T. Balasuppramaniem, Department of Periodontics, Vivekanandha Dental College for Women, Elayampalayam, Tiruchengode - 637 205, Namakkal, Tamil Nadu, India.
E-mail: meenalochanitb@gmail.com

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causing some of the chronic systemic diseases such as diabetes, congestive heart failure, chronic kidney diseases, obesity, stroke, and even some coagulative diseases.[7]

Thus, the motivation for the present study was to assess the present knowledge and self-efficacy levels of oral hygiene with positive motivation and reinforcement after initial periodontal therapy and evaluation of outcome measures among young rural adults of Tamilian population.

MATERIALS AND METHODS

This study was designed and conducted in the Institute. Approval from the Institutional Ethical committee was obtained. Rural patients attending the outpatient department of the Institution were recruited.

A total of 100 young adult patients within the age group of 18–26 years were selected initially. All the patients were explained and informed about the study procedures. Patients were physically and mentally capable and efficient to perform tooth brushing and inter dental cleaning.

Patients with any of the following criteria were excluded from the study. (1) History of any active periodontal treatment or surgery within past 6 months, (2) presence of any infectious disease (hepatitis, HIV), (3) pregnant women, (4) xerostomia, and (5) history of any drug intake within last 6 months which may exert its effects on gingival health and bleeding.

Procedure

After obtaining the written consent, every patient of the study was given a questionnaire consisting of 15 questions standardized in their vernacular language of Tamil. The answered questionnaires were returned back to the investigator in a closed envelope. Now the selected baseline indices were measured. Basic professional tooth cleaning was done to all the participants. They were given a complete standardized motivation about oral hygiene by the trained dental professionals.

According to Merin's classification of recall visit for the patients since only young adults were studied with no remaining pockets and no teeth with <50% of alveolar bone remaining. Hence, recall was planned only after 6 months onward. Moreover, oral health promotion measures, patient's attitude, and results of reinforcement on maintenance by the patients after thorough motivation can be assessed accurately only after 6 months. Hence, 6 months after their first visit, all the above patients were recalled and invited for a second visit which analyses the impact of motivation. During the second visit, again the selected indices were measured, and the final oral hygiene outcome was measured.

Questionnaires

Questions were framed and modified from the subscales by Woelber *et al*.[8] All the questions were framed in the vernacular language of Tamil, for better understanding and rapport with the study population.

After evaluation by experts, a pilot test survey was made and all the questions were checked for internal consistency loading onto the same factor. The chronbachs alpha ratio was 0.723 for the final revision of set of questions

For the assessment of task specific self-efficacy, knowledge on certain oral inflammatory conditions, oral hygiene planning of a general community and other variables, different questionnaires were framed mainly under three main categories. (1) Oral hygiene practice, (2) analysis of knowledge on gingival health, and (3) analysis of knowledge on gingival bleeding.

- Category 1: Self-efficacy of oral hygiene practice includes the questions on brushing self-efficacy, interdental cleaning self-efficacy, knowledge on plaque, and method of tooth brushing. This subscale consists of questions mainly to know about how confident the person was to perform tooth brushing and interdental self-cleaning in routine life
- Category 2: Analysis of knowledge on gingival changes includes the questions on their knowledge on visible changes in gingival health. Any changes in color, contour, consistency, and size of gingiva and its associated symptoms of halitosis noticed by the patients in day-to-day life was questioned
- Category 3: Knowledge on gingival bleeding includes questions on bleeding gums which may be provoked while brushing, spontaneous bleeding, frequency of bleeding, measures taken by them to overcome it.

Patients rated their confidence on to a 3-point Likert scale. Each patient was given 10 min time for completing the questionnaire [Figure 1]. The filled out questionnaires were returned back in a closed envelope and given to the investigator. The most appropriate answer was scored as 3 and the least one scored as 1.

Oral hygiene indices

Patient's dental plaque levels were evaluated using Modified Quigley Hein Plaque Index (MQHP).[9] Dental plaque was stained using a disclosing solution of Erythrosine dye.

Gingival inflammation was determined using gingival Index[10] at four levels.

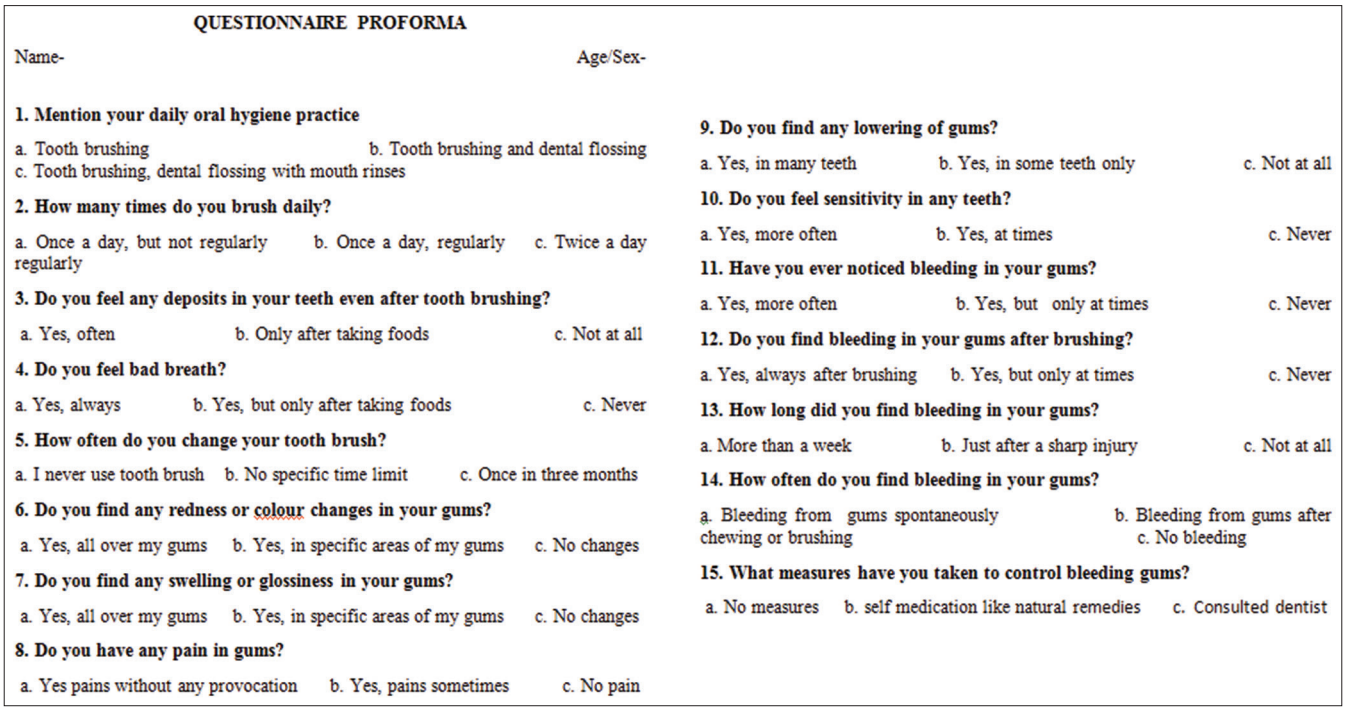
Modified Papillary Bleeding Index[11] was used to determine the gingival bleeding at four different scales.

All the above three indices were assessed by one investigator to eliminate any inter rater discripancies.

The investigator was trained and evaluated for accuracy and reliability until the reproducibility was over 90%[12] which was done before this study. The investigator then compared the questionnaire knowledge of the patients with the clinical examination results.

Motivation and reinforcement of the patient

After the measurement of oral hygiene indices, professional tooth cleaning was done to each and every patient by the trained dental professional. Factual education and rapport with the rural population were made by face-to-face training on proper oral hygiene measures and maintenance along with practical training to improve motor skills by "Tell-Show-Do" approach. Motivation was done based on "Health belief



QUESTIONNAIRE PROFORMA

Name- Age/Sex-

1. Mention your daily oral hygiene practice

a. Tooth brushing b. Tooth brushing and dental flossing c. Tooth brushing, dental flossing with mouth rinses

2. How many times do you brush daily?

a. Once a day, but not regularly b. Once a day, regularly c. Twice a day regularly

3. Do you feel any deposits in your teeth even after tooth brushing?

a. Yes, often b. Only after taking foods c. Not at all

4. Do you feel bad breath?

a. Yes, always b. Yes, but only after taking foods c. Never

5. How often do you change your tooth brush?

a. I never use tooth brush b. No specific time limit c. Once in three months

6. Do you find any redness or colour changes in your gums?

a. Yes, all over my gums b. Yes, in specific areas of my gums c. No changes

7. Do you find any swelling or glossiness in your gums?

a. Yes, all over my gums b. Yes, in specific areas of my gums c. No changes

8. Do you have any pain in gums?

a. Yes pains without any provocation b. Yes, pains sometimes c. No pain

9. Do you find any lowering of gums?

a. Yes, in many teeth b. Yes, in some teeth only c. Not at all

10. Do you feel sensitivity in any teeth?

a. Yes, more often b. Yes, at times c. Never

11. Have you ever noticed bleeding in your gums?

a. Yes, more often b. Yes, but only at times c. Never

12. Do you find bleeding in your gums after brushing?

a. Yes, always after brushing b. Yes, but only at times c. Never

13. How long did you find bleeding in your gums?

a. More than a week b. Just after a sharp injury c. Not at all

14. How often do you find bleeding in your gums?

a. Bleeding from gums spontaneously b. Bleeding from gums after chewing or brushing c. No bleeding

15. What measures have you taken to control bleeding gums?

a. No measures b. self medication like natural remedies c. Consulted dentist

Figure 1: Proforma of questionnaire

model" which includes the identification of susceptible patients under oral disease, understanding the asymptomatic nature of disease, its severity and negative outcomes along with behavioral changes for the prevention and control of disease.

Participants were educated on proper duration, frequency, and method of tooth brushing on models and repeated on their teeth using mirrors. A detailed explanation on the usage of interdental aids, mouthwashes, and tongue scrappers was clearly explained and provided to the participants by the trainer. The areas more prone to plaque accumulation, clinical characteristics of gingiva in inflamed region, and frequency of recall visits were clearly explained. They were highly motivated to improve their self-efficacy in implementing oral hygiene practices. Later, all the patients were motivated once through telephone call.

Reinforcement was done by encouraging the patients after performing proper oral hygiene methods, motivating them based on their behavior and type of disease pattern. Emphasis was made on the importance of maintenance program scheduled after 6 months.

Statistical analysis

Data were entered in Microsoft Excel spread sheet, and analysis was done using SPSS software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. IBM Corp: Armonk, New york). The questionnaire results were correlated with the clinical score.

Pearson correlation was used to find the correlation between questionnaire score and the clinical index score. Wilcoxon signed-ranks test was used to compare the differences in index scores at baseline and follow-up.

RESULTS

This study included 100 patients (44 males, 56 females) aged between 18–26 years from rural-based population. The demographic details of the participants were assessed based on Oberoi *et al*. [Table 1].[13]

On comparing the knowledge on question scores with the MQHP scores revealed a lower correlation value and insignificant *P* value (with correlation $r = 0.125$ and $P = 0.214$) [Table 2].

Similarly, the comparison of question scores with the gingival index scores also showed a lower correlation value and insignificant *P* value ($r = 0.166$, $P = 0.098$) [Table 2].

In contrast, the comparison of question scores with Modified Papillary Bleeding Index scores showed a high correlation value with significant *P* ($r = 0.254$, $P = 0.011$) [Table 2].

Comparison of clinical index scores between baseline and follow-up

Of the 100 participants, one patient failed to participate in the second appointment due to relocation from the study area.

The MQHP index score, gingival index score and Modified Papillary Bleeding score at baseline were 1.800, 1.800, and 0.500, respectively.

After 6 months of initial periodontal treatment, during follow-up, the MQHP index score, gingival index score, and Modified Papillary bleeding index score were measured as 0.650, 0.530, and 0.000, respectively.

The difference in the MQHP index scores, gingival index scores, Modified Papillary Bleeding Index scores between the baseline and after 6 months was given [Table 3]. A significant decrease in the values of all the three clinical scores was noted after 6 months with significant ($P < 0.001$) calculated using Wilcoxon signed-ranks test.

DISCUSSION

The rural-based population was selected as target in this study because of neglect of oral health practices mainly in such group, and they focus mainly on pain relief and emergency care leading to impairment of function and negative quality of life.

Table 1: Demographic details of the participants

Details	Male (%)	Female (%)	Total (%)
Education			
Illiterate	10 (22.32)	13 (23.22)	3 (3)
Primary school (up to 5 standard)	9 (20.04)	12 (21.42)	21 (21)
Middle school (6th-8th standard)	2 (4.5)	4 (7.14)	6 (6)
High school (10th pass)	3 (0.68)	7 (12.5)	10 (10)
Senior secondary school (12th pass)	3 (0.68)	12 (21.4)	15 (15)
Graduate	7 (15.90)	8 (14.28)	15 (15)
Total	44 (100)	56 (100)	100 (100)
Occupation			
Unemployed	3 (0.68)	38 (67.86)	41 (41)
Unskilled worker	16 (36.36)	11 (19.64)	27 (27)
Semiskilled worker	11 (25)	4 (7.14)	15 (15)
Skilled worker	9 (20.04)	3 (5.3)	12 (12)
Semi professional	5 (11.36)	-	5 (5)
Professional	-	-	
Total	44 (100)	56 (100)	100 (100)
Socioeconomic status			
Lower	22 (50)	29 (51.7)	51 (51)
Upper lower	13 (29.54)	23 (41.07)	36 (36)
Lower middle	7 (15.90)	4 (7.14)	11 (11)
Upper middle	-	-	-
Upper	-	-	-
Total	44 (100)	56 (100)	100 (100)

Table 2: Correlation between questionnaire score and modified Quigley Hein plaque index score, gingival index score, and modified papillary bleeding index score

Indices	Questionnaire score		
	Number of subjects (*n*)	Correlation value (*r*)	*P*
MQHP index score	100	0.125	0.214
Gingival index score	100	0.166	0.098
Modified papillary bleeding index score	100	0.254	0.011*

*P <0.05 - significant P value

Table 3: Comparison of difference in modified Quigley Hein plaque index scores, gingival index scores, and modified papillary bleeding index scores at baseline and during follow-up after 6 months

Indices	Median±interquartile range		*P*
	At baseline	After 6 months	
MQHP index scores	1.800±0.75	0.650±0.37	<0.001*
Gingival index scores	1.800±0.75	0.530±0.36	<0.001*
Modified papillary bleeding index scores	0.500±0.50	0.000±0.00	<0.001*

*P<0.5 - Significant P value. MQHP – Modified Quigley Hein plaque

At the baseline, when the oral hygiene and gingival health-related knowledge obtained through questionnaires correlated with their plaque and gingival scores, showed a distinct negative trend ($P = 0.25$ and 0.098). A possible explanation for this trend may be lack of proper knowledge and motivation among the rural population, and no special efforts were made by the people to improve oral hygiene normally.[14] Deinzer *et al*. in 2009[15] made a multistratified, stochastic telephone survey and concluded that there were severe deficits in the knowledge among the participants regarding the periodontitis-related knowledge in a community level.

However, questions referring to the bleeding tendencies showed a significant $P = 0.011$ and positive correlation with the modified gingival bleeding index. This reflects their improved knowledge on bleeding tendencies which are more easily detected even by the normal people.

In the present study at the baseline assessment, most of the questionnaire information given by the patient does not correlate with the clinical findings assessed by the investigator indicating the need for motivation. In some cases, even if the patients had awareness on oral hygiene practice, they had poor efficiency in implementing it.

In the subsequent second visit, a positive correlation was found in the oral hygiene behavior and all the measured indices. There was a significant decrease in all the three measured indices after initial periodontal therapy and motivation. The most important finding of this study was short-term improvement in oral hygiene practices in a positive direction indicating the proper knowledge enforcement in a community. Moreover, reinforcement of health behavior and training learnt in young adult lifehood were deeply ingrained in the minds of the society, and it is resistant to change. Albandar *et al*.[16] made a similar program educating oral health and found reduction of plaque and gingival inflammation in adolescents on a long-term basis. However, the present study was on shorter duration, and it could not evaluate the long-term impact of motivation. Regular follow-ups and constant communication with the study group may yield better and more stable results.

Addo-Yobo *et al*.[17] made a multiple regression analysis on oral hygiene among rural and urban population showed that social class background of a population reflects the need for motivation to improve their confidence and self-efficacy which remains closely similar to this study. A self-administered structured questionnaire study by Jain *et al*.[18] revealed an acute lack of oral hygiene awareness and limited knowledge of oral hygiene practices in Jodhpur, India.

In a vast country like India, a prevention-based oral health-care study would be more useful and advantageous than treatment approach. Dayakar *et al*.[19] insisted on the immediate need for comprehensive educational programs to promote better oral health and correct oral hygiene practices at an elementary level. However, Kay and Locker[20] showed that oral health promotion strategies have not shown any improvement in the behavior and clinical outcome of disease.

A number of major health behavior theories have been academically established and popularized which includes the Health Belief Model (HBM), self-efficacy theory, the protection motivation theory, the theory of planned behavior, locus of control, sense of coherence, and the trans theoretical model.

This study was mainly based on HBM. The health belief model was actually believed to predict the patient's participation in preventive health behaviors.[21] The HBM was later modified to incorporate the concept of self-efficacy which is the strength of an individual's belief that he or she can successfully enact behavioral change improving the ability of the model to predict behavioral outcomes. The results of the present study suggest that translating the theories of self-efficacy and motivation into the field of oral hygiene will have definite positive associations and strengthen the community as a whole.

To the best of our knowledge, this was the first study to assess the oral hygiene knowledge and motivation results in this selected rural population. There was no previous study of its kind to compare so that more stable conclusion can be drawn. Further studies with increased sample size and longer duration may benefit the community as a whole The main limitation of this study includes the absence of multicentric study with multiple-trained examiners which may uplift the large proportion of population adding more values to the study.

CONCLUSION

Within the limitations of the study, this study concludes that oral hygiene education and reinforcement influenced oral hygiene parameters. Patient's effort to receive a professional cleaning and their participation in the second appointment depends mainly on the effect of motivation. The results of our study reinforce the positive effect of motivation and reinforcement which remains the need of the moment in many rural populations in India. Thus, the assessment of oral hygiene-related self-efficacy has the potential for beneficial use in a community and also in dental practice to predict the future oral health behavior.

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Conflicts of interest
There are no conflicts of interest.

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