

EDUCATIONAL INTERVENTION PROGRAM BASED ON HEALTH BELIEF MODEL TO PROMOTE KNOWLEDGE AND AWARENESS ABOUT THE BI DIRECTIONAL LINK BETWEEN DIABETES AND PERIODONTITIS

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ABSTRACT

Introduction-The interrelationship of periodontitis and diabetes mellitus has been proven, in fact periodontitis aggravates the diabetic status and is considered the sixth complication of diabetes. Patients with diabetes are not adequately informed about the increased risk of oral disorders and the link between diabetes and periodontitis. This study aimed to investigate the effect of training based on health belief model (HBM) on oral hygiene-related behaviors in patients with type 2 diabetes mellitus.

Objectives-To assess pre and post knowledge and to promote the awareness about the bi directional link between Diabetes and Periodontitis based on HBM in patients with Type II Diabetes Mellitus.

Methodology-The study was conducted on patients diagnosed with type 2 diabetes. The data collection was done using a valid and reliable questionnaire based on HBM in which the patients filled the questionnaire pre and post intervention. Educational intervention was in the form of audio-visual presentation after pre-test assessment.

Results-After intervention, awareness of the patients and perceived susceptibility, benefits, self-efficacy, cue to action and performance in oral and dental hygiene-related behaviours had a significant increase ($p < 0.05$).

Conclusion-Implementing the HBM educational intervention program with focus on benefits of self-management has positive impact on diabetic patients.

Keywords-Diabetes, Education, Health Belief Model, Periodontitis

INTRODUCTION

Diabetes mellitus (DM) is a broad category of metabolic conditions that are marked by either insufficient insulin cellular uptake or decreased pancreatic synthesis of insulin, which raises blood glucose levels. Diabetes has an impact on almost all body organs and can pose major health hazards.¹ Diabetes is becoming more common worldwide, with 2.4% of the Indian population suffering from it in rural areas and 11.6% in urban regions.²

Diabetes does not have a specific oral lesion associated with it; however, prolonged hyperglycemia can lead to oral manifestations, including dental caries, burning of the oral mucosa, xerostomia, periodontal disease (gingivitis and periodontitis) and premature tooth loss. Loe et al in 1993 stated that periodontal disease is the sixth consequence of diabetes and is enhanced by hyperglycemia.³

Periodontal disease is an inflammatory disease mainly brought about by gram-negative anaerobic bacteria. It starts with plaque biofilm and progresses to gingivitis, periodontitis, and ultimately tooth loss if not treated. Several studies, reviews, and meta-analyses indicate a bidirectional relation between periodontal disease and diabetes mellitus.⁴⁻⁹ This interrelationship of periodontal disease and glycaemic controls has been extensively studied and it has been proven

that periodontal disease aggravates the diabetic status of the individual.^{5,6}

Past research indicates that diabetics are unaware of the link between diabetes and periodontal disease, as well as their increased risk of oral problems. Enhancing patients' health literacy and providing oral hygiene education to high-risk populations and the general public are crucial components of disease control because they enable patients to make better treatment decisions. Therefore, specialists advise people with diabetes as well as general population to expand their knowledge.^{10,11}

For a long time, a number of concepts have been used to characterize the psychological factors that affect behavior and health promotion. One such theory is the health belief model (HBM), which is made up of six key concepts such as perceived susceptibility, perceived benefits, perceived severity, perceived barriers, cues to action and self-efficacy. It is one of the most widely utilized theories in behavioral science.¹²

The practicality and efficacy of HBM in forecasting oral health behaviors have been supported by numerous studies.^{13,14} Using this paradigm, no prior research has been done to evaluate the beliefs of diabetic patients regarding oral health behaviors and their understanding of the connection

between diabetes and periodontitis. Thus, the goal of this study was to create and validate a particular instrument based on the Health Belief Model that assesses the variables influencing diabetic patients' oral health behaviors.

MATERIALS AND METHODS

Study design

This was educational interventional study. The Institutional Review Board and Ethics Committee gave their approval to the research protocol. The sample size was calculated 125. as per previous studies¹⁵ Prior to the intervention, all individuals provided written, informed consent.

Participants who fulfilled the inclusion requirements and visited the out-patient department were part of this research. These were the conditions for inclusion (i) subjects aged > 18 years; (ii) Patients who are suffering from diabetes and is on medication for same (iii) subjects who could give informed permission and were willing to do so. Exclusion criteria included: (i) Patients with mental illnesses. (ii) Pregnant and lactating mothers. (iii) Participants who decline to take part in the research.

The patients who had been allocated were given the pre-test questionnaire according to the Health Belief Model. After that, they were instructed via an audio-visual presentation. Following that, a post-test was given to assess the impact of education on the participants' behaviors related to oral and dental hygiene as well as their understanding of the connection between diabetes and periodontitis. The key outcomes were the six aspects of HBM (perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy), while the secondary objectives were oral health behaviours.

Pilot study and validity-

The reliability of the study was confirmed by doing a pilot study, where the questionnaire was filled by 10 diabetic patients, and Cronbach alpha was found to be 0.834. Three experts in the field of dentistry verified the validity of the questionnaire, concluding that, after certain statements were removed or modified, the face validity was 91% and the content validity ratio was 0.87. There were three questions on oral health awareness for patients with diabetes in the questionnaire. The HBM questionnaire included the following constructs: perceived

susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy and cues to action consisting of 3,3,3,4,3 and 4 questions respectively.

Data collection-

Questionnaire

The data collection technique for this study was a reliable and accurate researcher-made questionnaire containing questions about demographic details, awareness, HBM components, and oral hygiene-related behavior performance in patients with diabetes. The questionnaire reliability and validity were acknowledged. For correct response a score of one was given and zero for incorrect response was given for the questions on awareness, which constituted of 3 questions. On a five-point Likert scale, the responses to the questions pertaining to the HBM constructs were "strongly agree, agree, neutral, disagree, and strongly disagree," ranging from 1 to 5. As a result, the final score range for each model construct was determined ranging from 1 to 5. Higher levels of awareness, perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy were all linked to higher scores in this study.

Intervention-

The patients received the educational intervention in the form of an audio-visual presentation that focused on the relationship between diabetes and periodontitis, complications of diabetes, and the implications of scaling and root planing on the patients' glycemic control.

SATISTICAL ANALYSIS

The statistical analysis of the data was processed using Microsoft Excel 2016 and SPSS software (version 21, SPSS Inc., Chicago, IL, USA). The mean and standard deviation of each parameter were calculated. For all intragroup and intergroup comparisons, the dependent t-test was employed. The result was deemed significant if $P \leq 0.05$.

RESULTS

The patients with diabetes had an average age of 51.86 ± 11.61 . The additional demographic details of the patients are displayed in Table 1.

A substantial difference was observed in terms of awareness, perceived susceptibility, perceived severity, perceived benefits and barriers, self-efficacy and cues to action after the educational program, according to dependent t-test. (Table 2)

Regarding the gender disparity in oral hygiene behaviors among diabetics, the findings indicated that, following the intervention, both genders' behavior scores considerably increased, with the female group experiencing a greater increase. (Table 3)

DISCUSSION

Periodontal disease is a complex, inflammatory illness which is induced by the interaction of pathogenic bacteria and the host immune system. Several systemic illnesses emerge and directly affect the oral tissues. Diabetes Mellitus (DM) has raised concerns among experts for decades regarding its bidirectional association with periodontitis. Periodontal disease is regarded as diabetes's sixth complication. There is an abundance of data and research demonstrating the link between impaired glycemic control and oral health, particularly periodontal disease.¹

Numerous studies have been carried out worldwide to evaluate diabetic patients' awareness and understanding of dental health, but there is surprisingly little research available in India, particularly in the Belagavi region of Karnataka. Various studies have highlighted the negative correlation between knowledge and awareness regarding the link between the two disease entities which if left untreated may lead to compromised periodontal health but they have only assessed the knowledge and awareness of patients regarding the link between diabetes and periodontitis, without considering patient education.¹⁶⁻²² Thus, much of work still needs to be done at grass-root levels, i.e, creating awareness among general public regarding the same. Therefore, this study's objectives were to assess diabetes patients' attitudes and knowledge about their periodontal health and to provide them with dental health education. This would improve their understanding, which would then improve their ability to regulate their diabetes and, eventually, their quality of life.

Based on the HBM, the current study created and verified an instrument for evaluating factors associated with periodontitis and diabetes and oral health behaviors. This model placed a strong emphasis on preventing health problems by first making the person feel prone to particular illness (perceive susceptibility), then enabling them to predict the possible seriousness of the illness (perceived severity), believing in the benefits of adhering to recommended health behaviors (perceived benefits), and be able to get past

perceived barriers to engage in recommended behavior. In addition, once self-efficacy is established, cues to action can initiate oral health-related behaviors.²³

The questionnaire used in this study was based on the components of HBM and the knowledge of patients regarding the link between diabetes and periodontitis was assessed using pre-test questionnaire. Subsequently, the patients received an educational intervention in the form of an audio-visual presentation that emphasized the connection between diabetes and periodontitis, problems associated with the disease, and the impact of scaling and root planing on the patients' glycemic management. Patients completed a questionnaire following the intervention, and the results indicated a significant rise in the HBM components- perceived susceptibility, severity, benefits, barriers and self-efficacy behaviours.

The results of present study highlighted the poor knowledge and awareness regarding the link between the two disease entities among the patients enrolled in the study for pre-test questionnaire which is in accordance with a study done by Tang et al. Following the educational intervention, there was a notable rise in oral hygiene-related behavior performance, awareness, perceived susceptibility, barriers, self-efficacy, and cues of action. Similar results were seen in studies that conducted an educational randomized controlled trial on individuals with diabetes.²⁴⁻²⁷ This notable shift in awareness demonstrated the effectiveness of the training intervention in improving the patients' knowledge about oral hygiene.

The barriers identified in this study were high cost of dentistry services, dental treatment anxiety, and a lack of knowledge about the many forms of oral healthcare and how to provide them. This can be reduced by informing the patients about the interlinking of two diseases by their physician or dentists. In this study, participants were given educational intervention on techniques to improve oral hygiene and necessary skills needed for oral hygiene. The outcomes corresponded with previous similar investigations on the obstacles diagnosed by patients with diabetes.²⁸⁻³⁰

The presentation of instructive visuals on PowerPoint presentations to patients can empower them to facilitate oral health care, which can be attributed to the increase in the self-efficacy construct. Diabetes patients with higher levels of self-

efficacy were able to regulate and maintain their oral hygiene better, and they continued to do so after the educational program. This result was in accordance with a study by Farahani et al. that improved diabetic patients' self-efficacy in receiving diabetes care. 29

According to the results of this study, women reported engaging in health behaviors more frequently than men. This suggests that women are more mindful with their health than men are, and that they embrace and practice oral hygiene activities more frequently than men. According to the results of this study, women reported engaging in oral hygiene habits more frequently than men did. This suggests that women are more mindful with their health than men are, and that they embrace and practice the taught health behaviors more frequently than men.

In order to affect people's attitudes and create consistency and long-lasting change in health practices, group talks during educational sessions are necessary. Nonetheless, it is advised that the physician or dentist provide some educational material to general public in order to raise their awareness of diseases and methods of prevention.

CONCLUSION

Current educational interventional study was one of its kind where a specific instrument based on HBM was successfully developed to assess the pre-existing knowledge followed by appraising the patient's knowledge regarding the link between diabetes and periodontitis. It proved that teaching diabetic patients about oral hygiene-related practices enhanced their knowledge, which will ultimately benefit them in the future.

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TABLES-

Table 1- Demographic characteristics of the participants

Profile	No of respondents	% of respondents
Age groups		
<=40yrs	22	17.60
41-50yrs	35	28.00
51-60yrs	38	30.40
61-70yrs	23	18.40
>=71yrs	7	5.60
Mean $\pm$ SD	51.86 $\pm$ 11.61	
Gender		
Male	71	56.80
Female	54	43.20
Education		
Primary	49	39.20
Higher secondary	37	29.60
Degree+	17	13.60

Table 2: Comparison of pretest and posttest scores of components of knowledge by dependent t test

Components	Times	Mean	SD	Mean Diff.	SD Diff.	P-value
Perceived susceptibility	Pretest	8.62	2.60	-7.41	2.53	0.0001*
	Posttest	16.03	0.72			
Perceived severity	Pretest	6.59	1.85	-5.52	1.93	0.0001*
	Posttest	12.11	0.53			
Perceived benefits	Pretest	6.44	1.54	-5.86	1.70	0.0001*
	Posttest	12.30	0.75			
Perceived barriers	Pretest	12.87	1.58	4.87	1.58	0.0001*
	Posttest	8.00	0.00			
Cues of action	Pretest	9.99	1.29	-6.64	1.68	0.0001*
	Posttest	16.63	1.18			
Self-efficacy	Pretest	6.78	1.53	-5.50	1.64	0.0001*
	Posttest	12.28	0.79			

*p<0.05

Table 3: Comparison of pretest and posttest scores of knowledges in male and females by dependent t test

Gender	Variable	Changes from	Mean Diff.	SD Diff.	p-value
Total	Knowledge	Pretest to posttest	-26.1	7.3	0.0001*
Male	Knowledge	Pretest to posttest	-25.0	8.0	0.0001*
Female	Knowledge	Pretest to posttest	-27.4	-27.4	0.0001*