

Original article

Interventional study effectiveness in increasing diabetes knowledge and awareness

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Abstract

Applying the Health Belief Model (HBM) as a theoretical basis, the examiner applied the National Diabetes Prevention Program (NDPP) to increase diabetes awareness. The study's goal was to see how effective the NDPP program was for young people. A convenience sample of 100 dental students from the final year of dental surgery was enlisted from the dental college. Data was gathered by applying the Michigan Diabetes Research and Training Center's Diabetes Knowledge Test (DKT). Educational sessions were conducted before the post-test. Pre-test and post-test scores were compared to assess enhancement in the participants' awareness and understanding after the rendering of education sessions. Education and understanding scores were analyzed by calculating percentages and frequencies. The t-test results ($p < 0.000$) revealed a statistically significant difference between the patients' pre-test and post-test understanding and knowledge ratings. The NDPP program was applicable in enlightening diabetes education and understanding among dental students. The proposal of this study was the countrywide implementation of the NDPP program, which will refine understanding and knowledge of diabetes among the general population, which would upsurge their involvement in lifestyle and behavioral alteration programs, thus reducing the occurrence of diabetes.

Keywords: National Diabetes Prevention Program, diabetes, education, understanding.

Introduction

The Health Belief Model (HBM) implies that an initiative or a reminder is important for inspiring the practice of positive health activities. An initiate can come from the outside or from within. External initiates include actions or materials from advertisements, relatives and friends, as well as health professionals involved in mental well-being activities. Internal signals include physiological signals such as discomfort warning signs [1].

The HBM module has been implied to diabetes to explain the consciousness as well as the precautionary measures of the health condition. HBM encourages agreement and following the right behavior, like nutrition regimens, decreasing short-term and long-term diabetes threats [2].

The health belief model supports Indian people to follow precautionary behavior because we have a:

- Perceived threat that is "Asian Indian phenotype" in Indians and rapid development and altered lifestyle make diabetes a rising epidemic issue among Indians unless crucial precautionary steps are taken [3].
- Perceived barriers, like there is an association among Indians with a small amount of health information and greater loads of diabetes [4].
- The perceived benefit is that research indicates that Diabetes self-management education aids in lowering the cost of diabetes control [5].

In India, there is a lack of interventional studies done on the general population where they have assessed the perceived benefit after undergoing training sessions by NDPP based on the health belief system



framework [6]. A lack of techniques to reduce the incidence of pre-diabetes would indicate a major increase in health costs, morbidity, and other related health problems [5].

The present study was created on the Health Belief Theory and signifies that perceived susceptibility, perceived threat, and perceived benefits all play a role in the likelihood of individuals following the precautionary methods. We utilized the presently designed educational program created based on ADA guidelines on diabetes self-management education for refining awareness and knowledge concerning diabetes amongst young individuals.

Aim of the study

After performing pre-tests on dental students, the surveyor aimed to determine the participants' levels of diabetes awareness and knowledge. The answers from the pre-test were used to quantify the increasing need for interventions that enriched personal understanding and education about diabetes.

The efficiency of the NDPP informative program was verified by organizing post-test scores and comparing them with pre-test scores after teaching the young individual about diabetes self-management practices by means of the DTK.

Material and methods

Population and sampling

The study was conducted at a dental college situated in Mangalore, where convenience sampling of 100 students fourth-year students were used. Sample size estimation was performed based on $d=0.5$ and $\alpha=0.05$ assumptions. The study took three days to complete.

Research design and methods

The project used a descriptive research design to measure participants' knowledge and awareness of Type 2 diabetes.

Data collection

A pre-test was conducted for the participants where they were provided with a Diabetes Knowledge Test (DKT) questionnaire developed by the Michigan Diabetes Research Training Centre (MDRTC) to test general knowledge of diabetes [7]. For reasons of confidentiality, each participant was given a unique identifying code. Because the DKT questionnaire is available to the public, no authorization is required before using it. Only closed-ended questions were included in the survey. The study's chief investigator was in charge of administering the questionnaires.

Study intervention

After the pre-test, an educational session like a presentation, group discussion and lecture regarding diabetes awareness was conducted for the total participants by the chief examiner for one day. Post-test was conducted the next day after the educational session. The chief examiner was able to compare the pre-and post-test scores of each participant of the study using the unique identifying codes previously issued to each participant.

Data analysis

Descriptive statistics such as percentages and frequencies were produced to determine the variation in the sample's level of Diabetes knowledge and awareness. Descriptive statistics such as percentages and

Table 1: Test scores of DKT questionnaire.

Items	Pre-test		Post-test	
	N	%	n	%
1. The diabetes diet is				
a. The way most people eat.	44	44%	17	17%
b. A healthy diet for most people	30	30%	70	70%
c. Too high in carbohydrate for most people	23	23%	3	3%
d. Too high in protein for most people	2	2%	10	10%

Table 1: Continued.

Items	Pre-test		Post-test	
	N	%	n	%
2. Which of the following is highest in carbohydrate				
a. Cooked chicken	20	20%	10	10%
b. Cheese	33	33%	3	3%
c. Cooked potato	44	44%	87	87%
d. Peanut butter	3	3%	0	0%
3. Which of the following is highest in fat?				
a. Low fat (2%) milk	13	13%	63	63%
b. Orange juice	33	33%	20	20%
c. Corn	27	27%	7	7%
d. Honey	27	27%	10	10%
4. Which of the following is a “free food”?				
a. Any unsweetened food	20	20%	7	7%
b. Any food that has “fat free” on the label	13	13%	3	3%
c. Any food that has “sugar free” on the label	37	37%	23	23%
d. Any food that has less than 20 calories per serving	30	30%	67	67%
5. A1C is a measure of your average blood glucose level for the past				
a. Day	40	40%	13	13%
b. Week	17	17%	10	10%
c. 6-12 week	20	20%	74	74%
d. 6 months	23	23%	3	3%
6. Which is the best method for home glucose testing?				
a. Urine testing	20	20%	13	13%
b. Blood testing	43	43%	54	54%
c. Both are equally good	36	36%	33	33%
7. What effect does unsweetened fruit juice have on blood glucose?				
a. Lowers it	34	34%	30	30%
b. Raises it	23	23%	50	50%
c. Has no effect	43	43%	20	20%
8. Which should not be used to treat low blood glucose?				
a. 3 hard candies	27	27%	10	10%
b. 1/2 cup orange juice	3	3%	0	0%
c. 1 cup diet soft drink	9	9%	87	87%
d. 1 cup skim milk	11	11%	3	3%
9. For a person in good control, what effect does exercise have on blood glucose?				
a. Lowers it	30	30%	64	64%
b. Raises it	27	27%	13	13%
c. Has no effect	43	43%	23	23%

Table 1: Continued.

Items	Pre-test		Post-test	
	N	%	n	%
10. What effect will an infection most likely have on blood glucose?				
a. Lowers it	27	27%	7	7%
b. Raises it	30	30%	63	63%
c. Has no effect	43	43%	30	30%
11. The best way to take care of your feet is to				
a. Look at and wash them each day	27	27%	81	81%
b. Massage them with alcohol each day	37	37%	13	13%
c. Soak them for one hour each day	23	23%	3	3%
d. Buy shoes a size larger than usual	13	13%	3	3%
12. Eating foods lower in fat decreases your risk for				
a. Nerve disease	27	27%	3	3%
b. Kidney disease	23	23%	7	7%
c. Heart disease	20	20%	84	84%
d. Eye disease	30	30%	6	6%
13. Numbness and tingling may be symptoms of				
a. Kidney disease	14	14%	3	3%
b. Nerve disease	20	20%	7	7%
c. Eye disease	33	33%	3	3%
d. Liver disease	33	33%	87	87%
14. Which of the following is usually not associated with diabetes?				
a. Vision problems	30	30%	6	6%
b. Kidney problems	20	20%	10	10%
c. Nerve problems	10	10%	16	16%
d. Lung problems	40	40%	68	68%
15. Signs of ketoacidosis (DKA) include				
a. Shakiness	30	30%	7	7%
b. Sweating	13	13%	6	6%
c. Vomiting	43	43%	87	87%
d. Low blood glucose	14	14%	0	0%
16. If you are sick with the flu, you should				
a. Take less insulin	20	20%	3	3%
b. Drink less liquid	30	30%	0	0%
c. Eat more proteins	27	27%	10	10%
d. Test blood glucose more often	23	23%	87	87%

Table 1: Continued.

Items	Pre-test		Post-test	
	N	%	n	%
17. If you have taken rapid-acting insulin, you are most likely to have a low blood glucose reaction in				
a. Less than 2 hours	20	20%	73	73%
b. 3-5 hours	23	23%	7	7%
c. 6-12 hours	30	30%	7	7%
d. More than 13 hours	27	27%	13	13%
18. You realize just before lunch that you forgot to take your insulin at breakfast. What should you do now?				
a. Skip lunch to lower your blood glucose	23	23%	0	0
b. Take the insulin that you usually take at breakfast	23	23%	17	17%
c. Take twice as much insulin as you usually take at breakfast	17	17%	6	6%
d. Check your blood glucose level to decide how much insulin to take	37	37%	77	77%
19. If you are beginning to have a low blood glucose reaction, you should				
a. Exercise	20	20%	10	10%
b. Lie down and rest	27	27%	7	7%
c. Drink some juice	30	30%	70	70%
d. Take rapid-acting insulin	23	23%	13	13%
20. A low blood glucose reaction may be caused by				
a. Too much insulin	20	20%	94	94%
b. Too little insulin	13	13%	0	0%
c. Too much food	44	44%	3	3%
d. Too little exercise	23	23%	3	3%
21. If you take your morning insulin but skip breakfast, your blood glucose level will usually				
a. Increase	27	27%	7	7%
b. Decrease	40	40%	80	80%
c. Remain the same	33	33%	13	13%
22. High blood glucose may be caused by				
a. Not enough insulin	27	27%	60	60%
b. Skipping meals	27	27%	0	0%
c. Delaying your snack	23	23%	34	34%
d. Skipping your exercise	23	23%	6	6%
23. A low blood glucose reaction may be caused by				
a. Heavy exercise	30	30%	64	64%
b. Infection	27	27%	3	3%
c. Overeating	16	16%	20	20%
d. Not taking your insulin	27	27%	13	13%

frequencies were calculated using Microsoft Excel. Frequencies and percentages were used to analyze the knowledge and awareness ratings. The knowledge ratings ranged from 0 to 23, with 0-10 indicating weak knowledge, 11-17 indicating moderate knowledge, and 18-23 indicating strong knowledge. The investigator documented the questions that more than half of the patients answered wrong in order to discover knowledge gaps among the patients. T-tests were also used to compare the results of the pre-and post-tests. The researchers used Excel to do paired sample t-tests to see if the respondents' diabetes awareness and knowledge had improved. The statistical tests were carried out at a significance level of 0.05. Fitzgerald (1998) conducted a study to determine the reliability of the DKT questionnaire and discovered that both the 14-question general test and the 9-question insulin use sub-scale had a Cronbach's coefficient of 0.70, indicating that the questionnaire is reliable [8]. The Diabetes Knowledge Test (DKT) is useful in a number of contexts and for a wide range of people [7].

Results

All the percentages and frequencies for correct responses to each question and the pre-test and post-test scores of the DKT questionnaire are provided in Table 1.

The distribution of the pre-tests and post-tests is provided in Table 2. Pre-test findings revealed that 99 percent (n=99) of the participants had a poor understanding of diabetes, whereas 1 percent (n=1) had average knowledge. On the other hand, none of the accused had extensive expertise in diabetes. None of the respondents said they had a poor understanding of diabetes after participating in the NDPP educational session. According to the post-test results, 67 percent of participants (n=67) had average diabetes knowledge, whereas 33 percent (n=33) had extensive diabetes knowledge. There was a significant statistical change between the

pre-test and post-test knowledge ratings of the patients (p 0.000). As a result, the NDPP program successfully improved the patients' diabetes knowledge.

The pre-and post-test scores shown in Table 3 are based on awareness. When it came to diabetes awareness, 36 percent (n=36) of the participants had a low level of awareness, whereas 40 percent (n=40) had a moderate level of awareness. Finally, 24 percent (n=24) of the participants had a high level of diabetes awareness. According to the post-tests, all participants (N=100) had a good level of diabetes awareness.

The t-test results (p 0.000) revealed a significant statistical difference between the patients' pre-test and post-test awareness levels. As a result of the NDPP program, patients' diabetes awareness increased.

Discussion

The reports of this study specified a substantial enhancement in the participants' information as well as the consciousness of diabetes after receiving the educational session. Hence, the efficiency of the National Diabetes Prevention Program (NDPP) curriculum in educating facts and data on diabetes among young individuals was established.

The current health promotion programs suggest that health belief models on diabetes, as well as other chronic conditions, should enlighten health consciousness and recent approaches for curing and controlling type 2 diabetes and other chronic conditions [8]. Previous studies have mentioned that insufficient knowledge and negligence regarding health cause an increased burden in managing diabetes [9].

Hence studies and literature have mentioned the importance of

- Implementing new health belief models in the treatment plan [1];
- Gathering data regarding subject awareness and analysis [1].

Table 2: Knowledge scores.

Knowledge score	Frequency	
	Pre-test	Post-test
0-10 (Poor knowledge)	99	0
11-17 (Average knowledge)	1	67
18-23 (High knowledge)	0	33
P (T≤t) two tail	0.00	

Table 3: Awareness scores.

Awareness score	Frequency	
	Pre-test	Post-test
0-5 (Low awareness)	36	0
5-7 (Moderate awareness)	40	0
7-23 (High awareness)	24	100
P (T≤t) two tail	0.00	

The present study was framed theoretically based on the health belief model and the education session delivered successfully decreased the knowledge gap regarding diabetes.

Appraising the outcomes of such programs assists diabetes trainers in determining the curriculum's effectiveness, explaining the curriculum's consequences on the participants, and deciding areas that need improvement [10]. Regularly assessing consequences at numerous intermissions is essential as this manages the data to make scientific as well as theoretical conclusions [1]. The result of the present study will encourage diabetes instructors to implement an interventional curriculum amongst the general population at high risk of developing diabetes.

Reports mention that half of the American population have failed to attend official diabetes training session, though it is validated to be successful. To upsurge the awareness ratio to greater than 70% by 2018, Duncan *et al.* in 2009 mentioned that community-based programs are validated and effective approaches [11]. Literature evidence has mentioned that for efficient diabetes regulation as well as its handling, various healthcare institutions, both medical and paramedical, should implement complete evidence-centered diabetes enlightening curricula [4]. The present study has targeted young individuals from dental college, which can be a small task community-based approach.

Implications of practice/action of such health belief models for health promotions

As specified in the reports of this study

- Progress in patient knowledge and awareness of diabetes advances to efficient behavioral and lifestyle variations that decrease the threat of diabetes;
- Adequate information about diabetes is essential in forming diabetes regulation and avoidance strategies.

Thus, the results of this study can be a significant basis of proof for upcoming trials on diabetes management and its control.

However though the NDPP curriculum efficiently improved the members' information and consciousness of diabetes, the study was in some way deficient

- The minor sample size deals only with healthy young individuals;
- On the other hand, we require additional studies in our region on new applicable learning in-

terventions amongst the healthy and diabetic general population.

Conclusion

The NDPP program considerably upgraded the members' awareness and understanding of diabetes as well as self-controlling habits. Hence, implementing a learning program for the continuous education of healthy individuals was suggested. It was also suggested that healthcare providers must take the upper hand to deliver encouragement and teach individuals, both healthy and diagnosed with diabetes, the significance of sustaining healthful activities as well as routines. The present study also delivered evidence of the efficiency of the NDPP learning curriculum. Hence, a community-wide acceptance of the NDPP platform can suggestively decrease the threat of incidence of diabetes amongst high-risk individuals, thus, decreasing the occurrence of diabetes in our region.

An upsurge in individual familiarity and consciousness of diabetes will considerably decrease the danger of developing pre-diabetes into Type 2 diabetes.

Conflict of interest

The author declares no conflict of interest.

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