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An Evaluation of the Effectiveness of the National Diabetes Education Program from the  
Perspective of Registered Dietitians

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## **Abstract**

*Background:* Diabetes is currently the seventh leading cause of death in the United States. While knowledge and awareness of T2DM remains high, the perception of risk is still quite low despite education programs such as the National Diabetes Education Program (NDEP). Diabetes treatment centers incorporate this education program into their patient care to address exercise, diabetes management, emotional issues, and healthy eating and cooking.

*Objective:* To evaluate the effectiveness of the National Diabetes Education Program for T2DM populations from the perspective of registered dietitians in the United States.

*Design:* An anonymous online survey of 24 questions was designed to collect respondents' experiences using the NDEP and their clients' or patients' opinions of the program. The survey was a mix of multiple choice, Likert scale, and open-ended type questions.

*Participants:* The survey was sent via the Commission on Dietetic Registration (CDR) email list to a random sample of approximately 5,000 registered dietitians (RDs) in the United States. To participate in the survey, participants must be credentialed as a RD in the United States of America and an instructor for any part of the NDEP at least once. There were 10 survey respondents.

*Data Analysis:* Data was extracted and downloaded from Qualtrics. Frequency and percentages of the quantitative data were calculated to produce pie charts of survey results and a demographics table. Qualitative data was analyzed and coded for themes, then translated into a descriptive figure of the results.

*Results:* After receiving education from the NDEP, 80% of the RDs responded that on average their patients/clients experienced a decrease in fasting blood glucose levels and 70% of RDs

responded that on average their patients/clients experienced a decrease in HbA1c levels. 78% of RDs responded they were satisfied with the NDEP materials and resources and 60% reported their patients/clients were satisfied. Challenges reported in the instruction of the NDEP were the cost of program supplies, lack of culture or ethnicity options, patient literacy concerns, lack of patient disease knowledge, and limited access to glucose meters. An establishment of community support and quality materials provided by the NDEP were reported as benefits to patient care. Improvements in mental health, diet, and understanding of diabetes management were reported by patients/clients who participated in the NDEP.

*Conclusion:* The NDEP improved diabetes management and quality of life as reported by RDs and patients themselves. However, the low response rate suggests that the NDEP is not used widely enough to have a significant impact on the diabetes population overall.

## **Introduction**

Diabetes is currently the seventh leading cause of death in the United States, and in the last twenty years, the number of adults diagnosed with the disease has more than doubled.<sup>1</sup> According to the Centers for Disease Control and Prevention, there are 34.2 million people living in the United States who have diabetes, and one in five does not know that they have it.<sup>1</sup>

People who have diabetes are at higher risk for certain diseases and complications. Diabetes is the number one cause of kidney failure, lower-limb amputations, and adult blindness. Medical costs for people with diabetes are twice as high as for those without diabetes. In fact, as of 2018 medical costs, lost work and wages for people with diabetes diagnoses had reached \$327 billion.<sup>2</sup> The risk for early death is also 60% higher in adults with diabetes than for those who do not have the disease.<sup>1</sup>

In adults, type 2 diabetes (T2DM) represents approximately 90-95% of all diagnosed cases of the disease.<sup>1</sup> The risk factors for T2DM include being overweight, having a family history of the disease, being physically inactive, and being over the age of 45. There are currently 88 million adults in the United States who have prediabetes and therefore have the chance to avoid progression to full disease state.<sup>1</sup> It is possible to prevent prediabetes from developing into T2DM by losing weight, eating healthfully, and being more active, but without a diagnosis, a patient might progress to full diabetes diagnosis without knowing it. While knowledge and awareness of T2DM remains high, the perception of risk is still quite low despite education programs such as the National Diabetes Education Program (NDEP).<sup>3</sup>

Managing diabetes involves working with a multidisciplinary healthcare team, eating healthfully, and staying active. Medications can be prescribed as needed to control blood sugar

levels. It is also helpful, especially for those with a new diagnosis, to have access to education and medical advice about the best ways to manage diabetes.

Diabetes self-management education (DSME) is one educational tool that is used to assist those with T2DM in lowering their hemoglobin A1C (HbA1c) levels and managing or preventing diabetes complications. The outcomes of this education can vary depending on how it is delivered. Those that receive DSME in a combination setting of both individual and group education have the most significant improvements in HbA1c when compared to individual, group and remote education.<sup>5</sup> Self-management education can include meal planning, planned physical activity, blood glucose monitoring and diabetes medicine management.<sup>6</sup> Strategies used to teach this self-management include motivational interviewing, health coaching/peer support, problem solving therapy, technology-based interventions, lifestyle modification programs, DSME, mindfulness and cognitive behavioral therapy.<sup>6</sup> When used as interventions, these eight strategies have shown small to modest improvements in HbA1c. Due to many of these interventions being multi-model it is difficult to conclude which strategy is superior to the others in terms of improved outcome measures. Another type of education is structured education in diabetes management (SEDM) which focuses on helping T2DM patients adapt to their new diagnosis with the least amount of interruption to their typical daily routines and addresses psychological and emotional burdens of the disease.<sup>7</sup> In a review of thirty-six articles the SEDM was found to have a significant positive effect on glycemic control when compared to controls.<sup>7</sup>

The NDEP incorporates some aspects of DSME and SEDM in order to provide diabetes education resources nationwide. Diabetes treatment centers incorporate this education program into their patient care to address exercise, diabetes management, emotional issues, and healthy eating and cooking. Most people with diabetes still do not feel comfortable managing their

potential hypo- and hyperglycemia, and many reported at least some diabetes-related distress.<sup>8</sup> It is not a requirement for a registered dietitian (RD) or a Certified Diabetes Care and Education Specialist ® (CDCES®) to teach or assist in the NDEP education, however, an RD would be one of the most qualified members of the healthcare team to do so. In fact, according to the 2016 NDEP National Diabetes Survey, “75% of people with diabetes did not report receiving advice or counseling from a diabetes educator in the past year.”<sup>8</sup> An RD can provide in-depth nutrition education for those diagnosed with T2DM and use food as an important management tool for controlling blood glucose.

The Diabetes Prevention Program (DPP), a component of the NDEP, is available as a package of courses that include all that is needed to conduct the sessions, including scripts. The program resources are provided in English and Spanish. According to one study, attendance of these classes is an average of 8.60 of the 22 sessions for attendees overall and each session attended was associated with 0.30% body weight loss.<sup>4</sup> When an RD is an instructor for the NDEP, is it effective in helping T2DM patients better manage their diabetes and HbA1c? What barriers have the participants of the RD’s class faced in applying this program to their daily lives?

To our knowledge no research had been conducted to evaluate the effectiveness of the NDEP when it is taught by an RD. Therefore, the purpose of this graduate student research study was to evaluate the effectiveness of the National Diabetes Education Program (NDEP) for T2DM populations from the perspective of RDs in the United States. We were primarily interested in knowing whether the NDEP as taught by an RD, leads to improvement in concentration of blood glucose as assessed by glycosylated hemoglobin and fasting blood

glucose levels. We were also interested in knowing if the NDEP, when taught by an RD, leads to improved diabetes management and patient wellness.

## **Subjects**

The survey was sent via the Commission on Dietetic Registration (CDR) email list to a random sample of approximately 5,000 RDs in the United States, with an anticipated response rate of 10%. We estimated that a sample of 500 would provide a statistical power of >80% at an alpha of 0.05. To participate in the survey, participants must have been:

- A credentialed registered dietitian in the United States of America.
- An instructor for any part of the National Diabetes Education Program (NDEP) at least once.

All methods and procedures were approved by the Loma Linda University Institutional Review Board.

## **Methods**

An online anonymous survey was completed by RDs who chose to participate in the study. This online survey was developed by graduate students on the Qualtrics Survey Software. The survey questions were a mix of multiple choice, Likert scale and open-ended type questions. The open-ended section was for the RDs to personally evaluate the effectiveness of the NDEP from their perspective, the successes and limitations of the program, and the feedback received from their patients. The survey took approximately five to ten minutes to complete. Sample questions:

- How many times have you taught a NDEP class?
  - 1-5 times



- 6-10 times
  - 11-15 times
  - 16-20 times
  - 20+ times
- In which language(s) do you teach the program? Spanish or English
  - On average what is the observed change in HbA1c value in patients/clients who complete the NDEP?
    - No change
    - Small increase (0.5 – 1%)
    - Large increase (> 1%)
    - Small decrease (0.5 – 1%)
    - Large decrease (> 1%)
    - If you have calculated an average observed change in HbA1c please type the value ( $\pm$ ): \_\_\_\_\_
  - What barriers have you encountered in the instruction of the NDEP?
  - What barriers have your patients/clients reported in understanding and/or applying the NDEP lessons?
  - What benefits have you observed from the NDEP?
  - What benefits have your patients/clients reported?

## **Procedures**

Participants received an email through the Qualtrics Software that introduced the study and provided a link to the anonymous online survey. Within the email it was stated that by clicking the link the RDs would be providing their informed consent to participate in the study. Once they clicked the link, they were taken to the online survey site. The survey took

approximately five to ten minutes to complete, and once submitted, their participation in the study was finished.

## **Data Analysis**

After all data was collected from the survey respondents, it was extracted and downloaded from the Qualtrics Survey Software. Frequency and percentages of the quantitative data were calculated to produce a demographics table and pie charts of the survey results. Qualitative data was analyzed and coded for themes, then translated into a descriptive figure of the results.

## **Results**

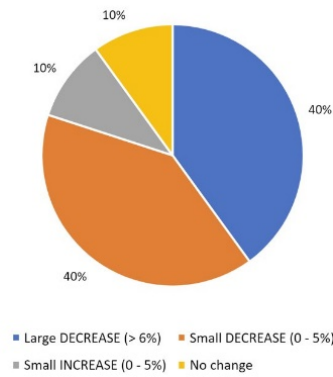
Out of the 5,000 surveys that were sent via email, 57 emails were returned, 1 duplicate email was identified, 4 failed deliveries occurred, and we received ten survey responses. Participant demographics are shown in Table 1. The majority of survey respondents were female, white, and between the ages of 40 – 60 years (Table 1). The highest level of education of the survey respondents was a doctoral degree; however, 70% of the respondents had a master's degree. Most of the survey respondents had an employment status of full-time and had been a registered dietitian for 21 – 25 years. Half of the respondents were Certified Diabetes Care and Education Specialists. Responses were received from RDs in Alabama (n= 2), California (n= 2), Colorado, Michigan, North Carolina (n= 2), Pennsylvania, South Carolina, Texas, and Washington.

**Table 1. Frequencies and percentages of demographic characteristics of survey respondents**

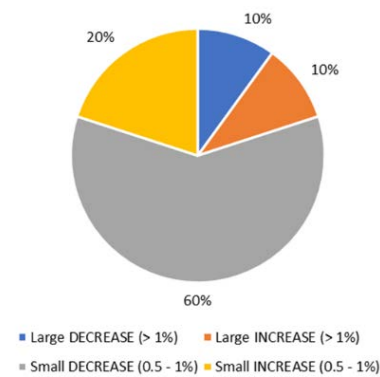
<b>Demographic Variable</b>	<b>Frequency</b>	<b>%</b>	
<b>Gender</b>	Male	3	30
	Female	6	60
	Prefer not to answer	1	10
<b>Age (years)</b>	25-39	1	10
	40-60	8	80
	60+	1	10
<b>Education</b>	Bachelor's degree	2	20
	Master's degree	7	70
	Doctoral degree	1	10
<b>Ethnicity</b>	Hispanic or Latino	1	10
	Asian	1	10
	White	7	70
	Other-Mixed	1	10
<b>Employment Status</b>	Part-time	2	20
	Full-time	8	80
<b>Years as an RD</b>	1-5	3	30
	6-10	1	10
	21-25	5	50
	26-30+	1	10
<b>Years in practice</b>	1-5	3	30
	6-10	1	10
	21-25	6	60

RD: Registered Dietitian

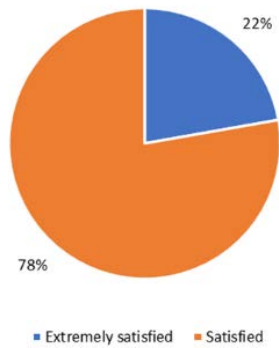
In response to our quantitative questions, 40% of RDs responded that there was a large decrease (> 6%) in the fasting blood glucose levels of patients/clients (Figure 1) and 60% responded that there was a small decrease (0.5-1%) in HbA1c levels of patients/clients (Figure 2). In response to the question regarding satisfaction with the NDEP materials and resources, 78% of RDs responded that they were satisfied and 22% were extremely satisfied (Figure 3). In response to the satisfaction of their patients/clients, 60% of the RDs reported that their patients/clients were satisfied with the NDEP materials and resources (Figure 4).



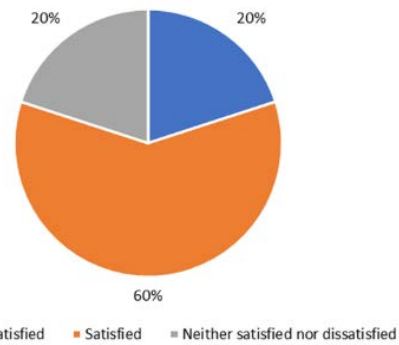
**Figure 1. RD estimation of changes in patient/client fasting blood glucose levels.**



**Figure 2. RD estimation of changes in patient/client HbA1c levels.**

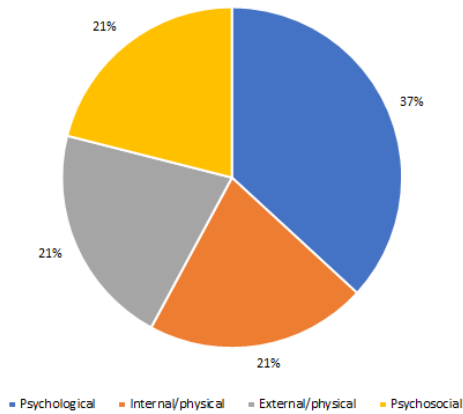


**Figure 3. RD satisfaction with the NDEP materials and resources.**



**Figure 4. RD report of patient/client satisfaction with the NDEP materials and resources.**

The survey contained a question that asked about the barriers that patients/clients have reported in understanding and/or applying the NDEP lessons (Figure 5). Four RDs answered that patients/clients have reported psychological barriers, including Western health belief, motivation, and self-efficacy. Two RDs reported that patients/clients experienced psychosocial barriers, such as group pressure, lack of family support and inappropriate cultural messages. External/physical barriers, such as personal finance, appointment systems and unhelpful health professionals in the past were reported as patient barriers twice in the survey. Internal/physical barriers, such as other health conditions and physical effects of treatment, were reported twice as barriers.



**Figure 5. Barriers that patients/clients reported in understanding and/or applying the NDEP.**

Our survey contained three qualitative questions (Figure 6). The first qualitative question, “What challenges have you encountered in the instruction of the NDEP materials?” included five different categories of responses. Cost of program supplies, lack of culture or ethnicity options, patient literacy concerns, or lack of patient disease knowledge were each featured in two responses. Blood glucose meters, either not understanding their use or lack of a meter, were mentioned in one response. The second qualitative question, “From your perspective as a dietitian, what benefits relating to patient care have you observed from the use of the NDEP?”, two responses noted an establishment of community support and two responses mentioned quality materials provided by the program. The third qualitative question, “What benefits have your patients/clients reported?”, two responses indicated improvements in mental health, two responses mentioned better understanding of diabetes management, and five responses indicated improved diet and eating habits.



**Figure 6. Qualitative data themes.**

## **Discussion**

Diabetes treatment centers incorporate education programs, such as the NDEP, into patient care to address exercise, diabetes management, emotional issues, and healthy eating and cooking. An RD is a qualified healthcare professional who can provide in-depth nutrition education for those diagnosed with T2DM. The purpose of this graduate student research study was to evaluate the effectiveness of the NDEP for T2DM populations from the perspective of RDs in the United States.

When an RD was an instructor for the NDEP, survey participants reported the program to be effective in helping T2DM patients better manage their diabetes and blood glucose control. This result is confirmed by Odgers-Jewell et al. (2017) who found that group-based education has the potential to improve the outcomes of patients with T2DM as well as reduce the burden placed on healthcare by treatment of patients with chronic disease.<sup>9</sup> Additionally, Adachi et al.

(2013) found that when a structured, individual-based lifestyle education program for T2DM was administered by RDs in a primary care clinical setting, it resulted in a reduction in patients' HbA1c levels.<sup>10</sup>

The benefits that RDs reported their patients experienced when applying the NDEP education are supported by previous studies. Comba (2017) observed physical improvements such as weight loss and reduced waist circumference in patients with T2DM receiving a nutrition education program with an additional benefit of an improved perception of quality of life by those patients.<sup>11</sup> This reported benefit of improved quality of life has been known for some time. A study in 2002 (Paul) found that not only did access to “new” nutrition therapy and self-management training improve clinical outcomes for patients with T2DM, but the patients also reported an improved health-related quality of life as compared to usual care.<sup>12</sup>

The barriers reported in our study would vary by location and population. Culture, literacy, and knowledge barriers may be common in certain demographics or socioeconomic groups that are not represented in all communities. The barriers of cost and glucose meters may vary based on insurance type and access by patients as well as socioeconomic factors.

The limitations of this study include the number of responses received from participants. While we expected a 10% response rate of 500, we received far fewer. This affects our ability to apply the results to the population under study. Another limitation is that we did not include a question related to why the RDs did not use the NDEP. This would have provided insight into the ineffectiveness of the NDEP materials for RDs instead of excluding responses from that population. An additional limitation includes the discontinuation of the NDEP during our study duration which may have impacted our response rate.

## **Conclusion**

This study sought to provide insight into the effectiveness of the NDEP from the perspective of RDs. Regarding the effectiveness of the program, the low response rate suggests that either the program is not useful to RDs and needs to be changed, or that RDs are not aware of the NDEP. When used, the NDEP was reported to be beneficial for diabetes management and quality of life for patients with T2DM. However, the low response rate suggested that the NDEP was not used widely enough to have a significant impact on the diabetes population overall. Follow up research is necessary to determine why RDs did not use the program and investigate what other programs or resources RDs prefer to use.

Unfortunately, the NDEP was discontinued during the time of our study. It was evaluated in 2018 and abruptly disappeared sometime in 2020. Although the program has since been discontinued, it did provide beneficial resources to support diabetes management and patient care and some of those resources are still available through the DPP.



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