



Evaluation of Jamaican Knowledge of Diabetes and Health Beliefs

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Abstract

Background & Aims: The International Diabetes Federation (IDF) estimated that over 382 million people worldwide were affected by diabetes in 2013. The Caribbean region consistently is above the global average in regard to diabetes prevalence. Specifically, in Jamaica, researchers have found that the management of diabetes is not consistent with international guidelines, and in Caribbean culture, there are additional health beliefs that may need to be addressed. The purpose of this study is to (1) evaluate patient diabetes-related knowledge and health beliefs and (2) determine the association between diabetes-related knowledge and health beliefs in rural Jamaica.

Methods: Rural Jamaican patients with diabetes (N=48, mean age = 55.16±15.08) were asked to complete questionnaires for cross-sectional examination of knowledge and health beliefs during a medical mission trip to the parish of St. Elizabeth in Jamaica. Participants were asked to verbally complete the Spoken Knowledge in Low Literacy in Diabetes Scale (SKILLD, 10 items) and Health Belief Model-11 (HBM-11, 11 items), as well as a demographic instrument. Analyses were performed in SPSS v. 20.0. Descriptive statistics were performed for all items. Spearman or Pearson correlations, as appropriate, were utilized to assess associations. Differences in HBM subscales by demographic characteristics were assessed using paired t-tests.

Results: Participants had poor knowledge of diabetes, particularly regarding signs and symptoms of hyper/hypoglycemia, importance of foot and eye exams, fasting blood glucose levels, and long-term diabetes complications. Knowledge deficits were associated with educational attainment, as many participants had only completed primary school. Most participants indicated they were ready to take action regarding their health, but they perceived there were significant barriers to doing so. Also, older adults were more likely to believe that they could control their diabetes. There were no other differences in knowledge or health beliefs based on demographic characteristics.



Conclusions: Among this population of rural Jamaican patients, general knowledge regarding diabetes remains low, but patients want to take action regarding their diabetes. These results indicate a continued need to develop programs to provide diabetes-related education to patients living in rural Jamaica, as patients are ready to improve their management of diabetes.

Introduction

Diabetes is not only highly prevalent in the United States but worldwide. The International Diabetes Federation (IDF) estimated that over 382 million people worldwide were affected by diabetes in 2013.¹ IDF anticipates that in less than 25 years that number will climb beyond 592 million. Eighty-percent of the total number of patients affected are living in low and middle income countries and suggest this is a worrying indication for the future impact of diabetes to global development.¹ In regard to mortality, diabetes accounts of 13.5% of all deaths among adults in the North American and Caribbean region; while this includes the United States and Canada, the prevalence of diabetes in the Caribbean islands is consistently above the global average.¹ In 2013, the national prevalence for diabetes in Jamaica was estimated at 10.59%.¹ In addition, a recent cross-sectional study of Jamaican adolescents found that one-third had more than three risk factors for type 2 diabetes, with adolescent girls having more risk than boys.² Researchers have also found that the management of diabetes in Jamaica is not consistent with international guidelines.³

Traditionally, Jamaican patients have relied on the physician for diabetes information and self-management recommendations.⁴ However, research has found patients' adherence, attitude, beliefs, and knowledge about diabetes may affect diabetes self-management.⁵ Improved adherence has been linked to patients who have a higher level of confidence in their ability to follow medical recommendations.⁶ Also, culture and language may influence patients' health

beliefs, attitudes, and health literacy, which may then affect diabetes management.⁵ It is important to identify factors that influence patients' self-management, particularly patients' health beliefs, to provide a comprehensive treatment and education plan for diabetes. The Barrier Analysis model⁷ provides a framework by which to identify and address "behavioral determinants associated with a particular behavior so that more effective behavior change communication messages and support activities (e.g., changing social norms) can be developed." In the 7 steps of this method, community health team members move from defining and developing questions to collecting and analyzing results to using the results to improve care.

The Health Belief Model (HBM) is recognized as a key framework within the Barrier Analysis model⁷ for understanding patient psychological readiness to take positive health actions. The model is based on the theory that perception of reality, instead of reality itself, determines whether individuals take action.⁸ The overall HBM theory recognizes that for an individual to take action to avoid disease, he or she has to believe (1) (s)he is susceptible to it, (2) the presence of disease would have at least a moderate impact on a component of his/her life, and (3) that taking a certain action would be beneficial to improving disease risk or disease progression and would not include overcoming important psychological barriers such as cost, convenience, etc.⁸ Knowledge itself may not be sufficient to promote adherence. Patient beliefs are strong motivators of their behavior; thus, it is imperative practitioners understand a patient's beliefs, especially when

caring for patients whose beliefs may be very different than their own.

Specifically, in Caribbean culture, there are additional health beliefs that are different than typical US-based diabetes management practices and may need to be addressed. A widely used practice of treating with non-prescription and folk remedies for diabetes is found in many Caribbean cultures including St. Vincent and Jamaica.^{4,9} Wint et al. conducted a descriptive study to determine the extent of knowledge, motivation, and barriers to lifestyle changes for control of diabetes in Jamaica.⁴ A few of the barriers to making positive lifestyle changes included: lack of self-monitoring of blood glucose, lack of perceived risk of complications, overweight or obese status, inadequate knowledge, little motivation, non-compliance, use of bush teas, and belief that diabetes can be cured. Jamaican patients also wanted more diabetes-related education and explanations of diabetes-related complications.⁴ Many of these barriers, such as lack of education about the chronic nature of diabetes and use of natural remedies, need to be addressed during diabetes educational efforts in Jamaica. Integrating longitudinal lay educator personnel in communities has led to improvements in hemoglobin A1C (A1C);¹⁰ however, longitudinal diabetes education is not always feasible in rural or underserved areas in Jamaica.

The Parish of St. Elizabeth is a rural area of Jamaica that often receives additional health care support from United States medical mission organizations. Without medical mission teams, many of the patients in this area would go without physician medical care. These organizations have recently shifted their goals from only providing short-term medical teams to finding partners on the ground in the country to continue to carry on work after they have gone home. Assessing knowledge and barriers to care on the mission field will best allow mission organizations to address educational barriers while in the country and continue to develop local

partnerships and train lay personnel to further address educational barriers after leaving. This study was conducted to better understand patient health beliefs about diabetes in the Parish of St. Elizabeth in order to develop proper education and programming to meet their short- and long-term needs, as recommended by the Barrier Analysis model.⁷

Research Objectives

1. To evaluate rural Jamaican patient diabetes-related knowledge and health beliefs.
2. To determine the association between diabetes-related knowledge and health beliefs in rural Jamaican patients with diabetes.

Materials and Methods

Research Design

This cross-sectional, exploratory study using a convenience sample was conducted during a medical mission trip to the St. Elizabeth parish of Jamaica from February 6 to 10th, 2012. A team researcher had previously been on a short-term medical mission trip to St. Elizabeth and identified that there were barriers to diabetes education and care. Based on her experience, and after performing an extensive literature search, the study objectives and corresponding survey instruments were identified (Steps 1-3 in Barrier Analysis).⁷ Survey instruments were verbally-administered by an investigator (pharmacist, nurse, or student pharmacist) after verbal consent was obtained (Steps 4-5 in Barrier Analysis).⁷ After completing the instruments, participants were invited to attend a 30-minute diabetes education session led by one of the investigators. All patients were given the opportunity to attend the educational session regardless of study participation.

Sample

The sample consisted of patients who were at least 18 years of age with type 1 or type 2 diabetes, lived in St. Elizabeth parish

in Jamaica, and came to the medical mission clinic for treatment. All participation was voluntary; patients were asked to participate if they had a diagnosis of diabetes.

Data Collection

Institutional review board approval was obtained by Cedarville University prior to data collection. This project was conducted at the “final step” of the clinic. At that point, patients had been seen by the medical provider and were waiting for their medications. Study investigators identified, approached, and asked individuals who met study criteria to participate. If they declined, they were informed about and invited to the diabetes education class. If they agreed, researchers verbally administered three surveys: a demographic survey, Spoken Knowledge in Low Literacy in Diabetes Scale (SKILLD),¹¹ Health Belief Model-11 (HBM-11).¹²

Once the surveys were completed, study investigators invited participants to attend a diabetes education class. All investigators completed a 1-hour training session going over the information presented during the class to ensure consistency in education. Investigators utilized the International Diabetes Federation as well as the American Diabetes Association standards of care to create the patient education and included the following concepts: types of diabetes, diabetes complications, prescription and herbal treatments for diabetes, exercise, signs and symptoms of hyper/hypoglycemia, and diabetic foot care.¹³

Instruments

Demographic Instrument

The demographic instrument was comprised of questions regarding participant age, sex, education level, race, height, weight, blood pressure, prior diabetes education, diabetes treatment (diet, exercise, insulin, tablets, other remedies), duration of diabetes, and source of information about diabetes.

*Spoken Knowledge in Low Literacy in Diabetes Scale (SKILLD)*¹¹

The SKILLD is a 10-item scale designed to measure knowledge of diabetes in patients with low literacy. The 10 open-ended items relate to the signs and symptoms of hyper/hypoglycemia, treatment of hypoglycemia, foot and eye exams, normal fasting blood glucose and hemoglobin A1c, exercise, and long-term complications. Each question is worth one point, with a maximum score of 10. Higher scores indicate greater knowledge of diabetes. Participants were read the full question and given 10-15 seconds to respond. If the participant responded correctly, then a point was awarded. If the answer was incomplete, incorrect, or not known, then no points were awarded. The SKILLD is found to be valid and reliable for use in low health-literate patients (Cronbach's alpha = 0.72; r=0.22, p=0.007 for literacy level).

*Health Belief Model-11 (HBM-11)*¹²

The HBM-11 is an 11-item scale designed to measure patient psychological readiness to take positive action in diabetes. This scale is theoretically-based on the Health Belief Model and includes perceived susceptibility/seriousness of the health condition (in this case, diabetes) and benefits of and barriers to taking action. Within the scale, 4 items relate to perceived seriousness, 3 items to benefits of taking action, and 4 items to barriers to taking action. Participants are asked to rate their level of agreement with statements using a 5-point Likert-type scale (1=Strongly Disagree, 5=Strongly Agree). Negatively-worded items were reverse scored. Scores range from 11 to 55, with higher scores indicating a readiness to take positive diabetes health actions. The HBM-11 is both valid and reliable and has been successfully utilized in low health-literate patients.^{12,14}

Data Analysis

All data were analyzed using IBM SPSS v. 20.0 for Windows (Armonk, New York) (Step 6 of Barrier Analysis).⁷ An *a*

priori level of $P=0.05$ was used for statistical significance. Descriptive statistics were used to assess participant information, including frequencies for categorical variables, means for continuous variables, and medians for Likert-type data (individual items and total HBM-11 score). Spearman or Pearson correlations, as appropriate, were utilized to assess associations. Paired t-tests were used to examine differences in HBM-11 subscale by demographic characteristics.

Results

A total of 48 patients completed the questionnaires. Participants were mostly female, had a primary school education, and had been diagnosed with diabetes in the last 10 years (see Table 1).

Table 1. Demographic Information

Demographic	N or Mean±SD
Female	32/43
Age	55.16±15.08
Education	
None	4/47
Primary Education	29/47
Secondary Education	12/47
Tertiary Education	2/47
Length of Time with Diabetes	
<5 Years	15/46
5-10 Years	14/46
10-20 Years	13/46
>20 Years	4/46
Received Prior Diabetes Education	32/46
Diabetes Treatment	
Tablets only	37/47
Insulin and Tablets	6/47
Insulin Only	2/47
Diet and/or Exercise Only	2/47
Local Remedies for Diabetes	19/47
Bush Tea	10/19
Cinnamon Leaf	3/19
Other, not specified	6/19
Weight (kg)	78.44±17.69
Systolic Blood Pressure	143.37±22.64
Diastolic Blood Pressure	83.86±13.89
SKILLD Score	3.79±2.26
HBM-11 Score	38.28±5.63

The average diabetes-related knowledge (SKILLD score) of participants was 3.8 out of 10 possible points, and participant mean score on the HBM was 38.28 out of a possible maximum score of 55.

No question on the signs and symptoms of high/low blood glucose, foot/eye exams, fasting blood glucose levels, and long-term complications was answered correctly by more than 25 participants. Only one participant gave a correct answer regarding normal hemoglobin A1c levels (see Table 2).

Table 2. Participant diabetes knowledge, as measured by the Spoken Knowledge in Low Literacy in Diabetes (SKILLD) scale

Question	Answered Correctly
Treatment of low blood sugar	30/48
Exercise length and frequency	28/48
Recommended frequency of foot checks	25/48
Importance of foot checks	23/48
Long-term complications of diabetes	18/48
Signs/symptoms of high blood sugar	17/48
Frequency of eye exams and importance	16/48
Normal fasting blood glucose	14/48
Signs/symptoms of low blood sugar	6/48
Normal hemoglobin A1c	1/48

Participants believed they could control their diabetes (median response = Strongly Agree) but indicated that adhering to diet regimens was challenging (median response = Agree) (see Table 3).

There was a statistically-significant, positive association between educational attainment and diabetes knowledge ($r=0.32$, $p=0.03$, see Table 4). Also, there was a significant positive association between age and item 6 on the HBM-11 scale (Benefit to Taking Action: I believe I can control my diabetes; $r=0.36$, $p=0.01$). There were no other significant associations between demographic characteristics, even when collapsed into binary variables, and diabetes knowledge total score and individual items, readiness to

take action, or any of the HBM-11 constructs (seriousness, benefits, barriers) or individual items ($p>0.05$). Participant diabetes

knowledge and readiness to take action were not associated ($r=0.10$, $p=0.52$).

Table 3. Participant readiness to take action, as measured by the Health Belief Model-11 (HBM-11) scale
4 items relate to perceived seriousness, 3 items to benefits of taking action, and 4 items to barriers to taking action.

Question	Median Score	Strongly Disagree and Disagree	Undecided	Agree and Strongly Agree
Perceived Seriousness/Susceptibility				
Q5. I believe I will always need my diabetes diet and insulin/pills.	4 (Agree)	3	1	43
Q3. My diabetes will have a bad effect on my future health.	4 (Agree)	6	5	35
Q4. My diabetes will cause me to be sick a lot.	4 (Agree)	15	1	31
Q2. My diabetes is no problem to me as long as I feel all right.*	4 (Agree)	12	1	34
Benefits of Taking Action				
Q6. I believe I can control my diabetes.	5 (Strongly Agree)	3	0	44
Q1. I believe that my diet and insulin/pills will prevent diseases (complications) related to diabetes.	4 (Agree)	2	0	45
Q7. I believe that my diet and insulin will control my diabetes.	4 (Agree)	2	1	44
Barriers to Taking Action				
Q8. I would have to change too many habits to follow my diet.*	4 (Agree)	17	1	28
Q9. It has been difficult following the diet prescribed for me.*	4 (Agree)	16	1	30
Q11. Taking my insulin/pills interferes with my normal daily activities.*	4 (Agree)	22	0	25
Q10. I cannot understand everything I've been told about my diet.*	3 (Undecided)	23	2	22

*Reverse-score result shown, as it was utilized for the final HBM-11 score

Table 4. Associations of diabetes knowledge (SKILLD score) and readiness to take action (HBM-11 score) with demographic characteristics

	Readiness to take action (HBM-11)			Diabetes knowledge (SKILLD)		
	N	Correlation	P	N	Correlation	P
Age	45	-0.04 ^a	0.78	45	-0.08	0.60
Gender	43	-0.08 ^b	0.60	43	0.09	0.58
Education	47	0.01 ^b	0.94	47	0.32	0.03
Length of time with diabetes	46	0.07 ^b	0.63	46	0.14	0.35

^aPearson Correlation

^bSpearman Correlation

Discussion

General knowledge of survey participants, based on the SKILLD test, was found to be low. Over half of participants knew how to treat low blood sugar, about exercise recommendations, and how often to check their feet. However, only a few patients

knew the symptoms of low blood sugar, and only one patient knew what their normal hemoglobin A1c should be. Overall, knowledge of signs and symptoms and normal values were low. This can lead to challenges for patients in managing blood glucose and dealing with hyper- and hypoglycemic episodes, and educators should assist with their patients in dealing with these chal-

lenges. Further examination of the HBM-11 scores indicate that while participants tended to agree with statements regarding perceived susceptibility and benefits of taking action, they also agreed that they experienced barriers to action. Given the context of the Barrier Analysis model and that the final steps are to analyze and use the results,⁷ it is important to examine these findings in context of the literature.

For example, these findings reflect previous surveys of Jamaican individuals that suggest a continued need for diabetes-related education.⁴ Indeed, examining the broader context of the literature suggests that many patients with low health literacy, irrespective of cultural group or geographic location, lack diabetes-based knowledge.^{14,15} Lower educational attainment has consistently been found to be related to lower health literacy and less disease-based knowledge.^{16,17} The participants in this study were similar, as lower educational attainment was associated with less knowledge.

However, in spite of this low overall knowledge regarding diabetes, greater knowledge regarding diabetes was not associated with an increased readiness to make changes related to the disease. Knowledge simply is not enough to induce change. Other researchers have found that regardless of literacy level or knowledge, patients can perceive disease severity, see the positives, and overcome barriers associated with therapy adherence.¹⁴ Likewise, participants in this study perceived that their disease was serious and possessed an overall readiness to take action regarding their diabetes. However, these participants perceived that barriers to action were significant and may have been unsure as to whether these aspects could be overcome. Patients perceiving that barriers to action are too high, typically, have poorer diabetes self-management.^{18,19} Education for patients with diabetes, irrespective of geographic location, may need to focus on how to overcome barriers.

One of the greatest barriers seemed to be dietary changes, which is consistent with the literature.^{18,19} However, participants did see the benefits of a proper diet, combined with use of pills and/or insulin, in leading to better control of diabetes and preventing complications. The International Diabetes Federation (IDF) advocates nutritional therapy and physical activity to prevent and manage Type 2 diabetes but recognizes that these measures are only effective in a small percentage of diabetics due to difficulties with adherence and physiological conditions requiring pharmaceutical intervention.²⁰ Indeed, Duff and colleagues studied self-care and diabetes management adherence in Jamaicans and found that only 45% were compliant with their medications and only 56.4% to the recommended diet.²¹ Similar barriers of dietary and medication adherence were reported in our participants as well.

Instead, many participants surveyed reported using bush teas for diabetes control. Bush teas, such as Cerasee, are frequently utilized among Jamaicans to lower blood glucose levels.³ There have been limited studies, in animal models alone, demonstrating their efficacy²² and may, instead of being efficacious, be contaminated with toxins and produce unwanted side effects.²³ Until further information is available, patient beliefs about bush teas need to be assessed, and patients need to be informed of risks and benefits of consumption.

Educational programs in rural Jamaica would be beneficial if used to improve disease-related knowledge among individuals with diabetes as well as focusing on how to overcome barriers to positive action. Since increases in disease-related knowledge have been linked to improvement in self-management of diabetes⁶ and because it appears that many Jamaicans are ready and willing to take steps to manage their diabetes, programs to equip individuals with the tools to do so must be developed. Particularly, these tools should address overcoming the

barriers to taking effective action but will need to be expanded to more thoroughly address all the complexities that undergird patient decision-making. The high prevalence of diabetes in Jamaica¹ and the lack of accessibility to healthcare services for many rural patients further increase the challenges of identifying barriers to self-care management and determining solutions. While addressing the components identified in this study during short-term mission trips may be beneficial, longer term solutions also are necessary, yet outside the scope of this study. However, other researchers, such as Less and colleagues, suggest training individuals in the community to provide education training and reinforcement.¹⁰ This type of programmatic development could be considered by missions organizations.

Limitations to this study include a potential for self-selection bias, since participation in the survey was voluntary. Additionally, the sample size was small and consisted mostly of women. Knowledge scores had a large variability, which makes inferential analyses challenging. Finally, this study serves only to highlight the need for future education of this group of people and does not assess the impact of the educational session provided. Future studies should assess varying techniques of providing patient education to Jamaican individuals to determine the most effective method.

Conclusions

This study of rural Jamaican individuals indicates that while knowledge of disease is important and often less than desired, patients understand the seriousness of diabetes and the benefits of making changes. However, the challenges of making changes proved to be a noteworthy barrier. Results of these surveys can be used to encourage more in-depth assessments of patient barriers to self-management using the Barrier Analysis method and development of future educa-

tional initiatives that provide individuals with both the knowledge and tools needed to begin self-management of diabetes, ultimately improving diabetes-related outcomes in Jamaica.

This project was conducted on the mission field, where a team of US-based health care providers served this region by providing primary care services. This team returns to the same location every year, and this information gives the team and future teams a great foundation to continue to evaluate patient needs and challenges as well as for preparing diabetes education materials and continuing to empower this population to make changes in their behaviors to improve the diabetes epidemic in Jamaica.

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