2022

Group-Based Diabetes Self-Management Education for Somali population with Type II Diabetes Mellitus

Hamdi Abdi
Seattle University

Group-Based Diabetes Self-Management Education for Somali population with Type II Diabetes Mellitus:

Hamdi Abdi, RN DNP Student

DNP Project Submitted in partial fulfillment of the requirement for the degree of

Doctor of Nursing Practice

Seattle University, Seattle

Seattle, Washington

June 1st, 2022

Approved Jan 2022 by the faculty of IRB for the degree of Doctor of Nursing Practice

Danuta Wojnar 06-03-2022

Approved by: …… …… Date: …….

DNP faculty Mentor: Danuta M Wojnar, PhD, RN, MED, IBCLC, FAAN

Table of Contents

Acknowledgments

I would like to express my sincere gratitude to my faculty mentor Dr. Danuta M. Wojnar, PhD, RN, MED, IBCLC, FAAN, for her continuous support and encouragement throughout the project. Thank you for all the guidance you provided during this project and continues advise on data analysis and adjusting my intervention due to the pandemic. Thank you for your tremendous patience and kindness in each step of this project. I would like to thank all my professors at Seattle University for every piece of advice they provided along this journey. I would like to thank Dr. Perpuse Liza for giving me the opportunity to do my project with HealthPoint and providing me with the materials I needed for my project. Thank you for being wonderful site mentor. Despite the difficulties of the pandemic and its stressors she went above and beyond to get me connected and have access to the resources I needed to complete my project. I'm forever grateful to her and the entire Healthpoint organization.

Thank you to my wonderful mother for her unconditional love even when I could not believe in myself. She would stay up every night and pray for me anytime I had a test or told her I needed to work on my project. Thank you to my wonderful sister for being my support system during this journey and always being there for me and watching my kids whenever I needed it. Thank you to my amazing two boys for being wonderful sons and showering me with their hugs and kisses anytime I was down or was having a difficult day. They were my motivation to get up every morning and go on. Lastly, a huge thank you to my husband, my best friend and my backbone who made everything possible in my life with everlasting support and love.

Abstract

Background and Purpose: Type II Diabetes Mellitus (T2DM) is a serious chronic disease that requires knowledge, daily self-management, and lifestyle modifications. T2DM is a widespread disease in Western world, however, it affects racial minority immigrant populations, including Somalis at disproportionally higher rates than the general population. This quality improvement project was developed and piloted to discern whether culturally appropriate small group-based education program for Somali patients with T2DM may improve self-management skills to alleviate long-term complications.

Methods: This project used descriptive statistics to compare participants' knowledge and T2DM self-management behavior pre and post intervention. Subsequent to Seattle University IRB approval, participants were recruited from HealthPoint Midway clinics in King County, WA. Informed consent was obtained verbally on enrollment and participants were asked to complete demographic surveys and pre-intervention questionnaires at that time. The T2DM intervention topics in the study included general knowledge of T2DM, healthy eating, physical activity, stress management, as well as glucose monitoring and medication regiment. A total of 5 educational sessions, each lasting approximately 1.5 hours were delivered via zoom. Education was provided in the Somali language which the investigator and participants spoke at home.

Results: Tow men and four women (N=6), between ages of 42-55 years old, diagnosed with T2DM participated in the project. All of the participants were of Somali origin. Participants' average pre-intervention A1c level was *M*=10.7 and the average post-intervention A1c level was *M*=9.1 (Appendix A, Table 3). There was also a significant improvement in the

participants' knowledge of T2DM and improvement in confidence related to self-care (Appendix B, Table 4).

Conclusions: This project, carried out with a small sample of Somali immigrants with T2DM demonstrated that culturally appropriate health interventions delivered in the patients' first language and carried out in a small group setting may be an effective health promotion and disease management strategy for this population, contributing to alleviating health disparities long term.

Keywords: Type 2 diabetes mellitus and management; type 2 diabetes mellitus and African immigrant; type 2 diabetes mellitus and dietary practices and East African immigrants/Africans; culturally tailored diabetes education and East African immigrants

Introduction

Diabetes mellitus is a serious chronic disease that is associated with substantial increase in morbidity and mortality and imposes a huge economic burden on society (Li et al., 2019). According to the Centers for Disease Control (CDC) National Diabetes statistics report of 2020, diabetes affects 8.2% of the US population and prevalence continues to increase (CDC, 2020). Diabetes is the seventh leading cause of death in the United States. The International Diabetes Federation (IDF) has predicted that the number of people with diabetes worldwide will increase by 50%, from 366 million in 2011, by 2030 (IDF, 2019). The increasing diabetes prevalence bears a significant financial burden to the healthcare system. According to American Diabetes Association (ADA) the average economic cost per person was projected to be $13,240 for diagnosed diabetes, $4,250 for undiagnosed diabetes, $500 for prediabetes, and $5,800 for Gestational diabetes mellitus (GDM) (ADA, 2019). According to Njeru Njeru, Patten, and Hanza et al. (2015), the incidence of diabetes is higher in immigrant and refugee populations than the general population. Immigrants are also less likely to receive the recommended diabetes related healthcare services and culturally appropriate education, resulting in suboptimal disease management and poor long-term prognosis (Njeru et al., 2015). Compared to non-Hispanic Whites, Blacks in general are almost twice as likely to suffer from T2DM and to experience diabetes-related blindness and lower-limb amputations. Blacks are also two to six times more likely to have kidney disease (CDC, 2020). There is substantial evidence that immigrants from Sub-Saharan Africa, which includes East African Somalis, accounted for the largest US population in the US in 2015 (Carlos & Jeanne, 2020). In addition, between 2010 and 2018, the sub-Saharan African population increased by 52% in the United States, significantly outpacing the 12% growth rate for the overall foreign-born

population during that same period (Carlos & Jeanne, 2020). In general, the African immigrants in the United States are the least studied immigrant group despite the policy efforts to address health disparities in immigrant populations in the United States (Omenka et al., 2020). The disproportionate burden of T2DM on East African immigrants and the limited data available on long term outcomes motivated the following clinical question: "Does implementation of culturally tailored group-based diabetes education specifically among Somali population improve diabetes knowledge, decrease A1c levels, increase behavior change and prevent T2DM complications.

Project Purpose and Aims

The purpose of this DNP project was to improve Type 2 Diabetes Mellitus (T2DM) management among Somali immigrants living in King County, WA. The specifics aims were to: (1) improve participants' knowledge of T2DM; (2) improve participants' understanding of necessary lifestyle modifications; and (3) decrease A1c levels in the sample through adherence to self-management T2DM regiments. Self-Determination Theory (SDT) (Lee et al., 2019) was used as a theoretical framework to guide the intervention.

Background and Literature Review

Diabetes mellitus is a chronic condition characterized by the hyperglycemia-induced triad of symptoms (polydipsia, polyuria, and polyphagia) caused by elevated blood glucose level and metabolic dysregulation (Li et al., 2019). There is evidence that racial/ethnic minorities usually have higher rates of insulin resistance than the non-Hispanic Whites (Caballero, 2018). Although T2DM can be acquired at any age, most often it develops in

middle-aged and older people 45 years of age or older. Risk factors for T2DM include socioeconomic, demographic, environmental, and genetic factors. Other related risk factors are obesity, unhealthy diet, and physical inactivity. In addition, Blacks living in the U.S are nearly twice as likely as Whites to develop T2DM (International Diabetes Federation, 2019; National Institute of Health, 2018). In T2DM the pancreas makes insulin, but it doesn't produce enough, or the insulin doesn’t work properly. Insulin is a hormone that regulates our body's blood sugar. The science indicates this is most likely related to genetic and lifestyle factors. If left untreated chronic hyperglycemia or raised blood sugar over time leads to multiorgan and systemic injury, including the heart, kidneys, nerves, and blood vessels, which impairs the quality of life and increases the death rate caused by diabetes complications (World Health Organization, 2020). Some of these complications play a well-defined role in increasing the mortality of people with diabetes. For instance, people with diabetes have a twofold increased risk for cardiovascular mortality, and also an increased risk of chronic kidney disease, which affects 30% to 40% of individuals with diabetes and is a major predictor of long-term mortality (Choe, et al., 2016).

T2DM is often described as a multifactorial lifestyle disease, linked to dietary habits and sedentary behavior. According to the World Health Organization (WHO) diabetes can be treated and its potential consequences avoided or delayed by proper diet, physical activity, medications, and regular screening for complications (WHO, 2020). Both clinical practice and scientific literature indicate that active participation in self-care, based on knowledge about the disease, is the cornerstone for a person’s self-management of type 2 diabetes. Thus, education should enhance a patients’ knowledge and skills regarding the management and empower them to take an active role in their treatment (Hadziabidic et al., 2020). Yet, there is

a significant gap in culturally appropriate diabetes self-management education (DSME) for East African immigrants. Analysis of the literature indicates knowledge gap of T2DM self-management among the East African Immigrants population (Kindarara et al. 2017). Therefore, a change in education approaches is necessary for better address T2DM knowledge gap for this population (Omenka et al., 2020).

Prevalence of diabetes among immigrants including East African immigrants is increasing more rapidly than in the general population (Njeru et al. 2015). Concurrently, East African immigrants experience unique barriers to care such as linguistic challenges, lack of culturally sensitive care, often leading to uncontrolled blood sugar levels and more negative outcomes of the disease (Commodore-Mensah et al., 2015; International Diabetes Federation, 2020). Due to high prevalence of T2DM in EST African population, CDC promotes improved access to DM self-management education to prevent serious and costly diabetes complications (CDC, 2020). There is scarcity of research specifically addressing the potentially unique needs of East African population. Still, results of studies conducted with other minority populations may guide the current study (National Academies of Sciences, Engineering, and Medicine, 2017). It is important to acknowledge that different ethnic groups' healthcare experiences and needs are unique to their customs and culture, whether they are included in Black racial category or not (Omenka et al., 2020).

The East African and Somali Context

Literature reports that immigrants from Sub-Saharan Africa accounted for the largest countries of origin for US African immigrants in 2015 (Carlos & Jeanne, 2020). Between 2010 and 2018, the sub-Saharan African population increased by 52% in the United States,

significantly outpacing the 12 % growth rate for the overall foreign-born population during that same period (Carlos & Jeanne, 2020). East African immigrants in the United States originate from Ethiopia, Kenya, Eritrea and Somalia and make up 36% of all African Immigrants. Although these countries have different history and cultures, they share many common experiences. Somali refugees constitute the largest group of refugees from sub-Saharan Africa in the US with their numbers doubling in each of the past 3 decades (Anderson, 2017). Forty percent of Somali refugees settled in Minnesota, where they compose the majority of the 21% of the state's foreign-born population that is from Africa (Anderson, 2017). A growing number of Somali immigrants are developing [Type 2 diabetes] within five years of arrival in US, and some as quickly as six months, after their arrival in this country." Dr. Khan attributed the phenomenon to a lack of exercise and a dramatic increase in fat and calories experienced by Somali immigrants (Ethnomed, 2020). Moreover, many African immigrants including the Somalis are unfamiliar and distrust Western healthcare system. Some continue to consult traditional healers to help them address certain health problems. As a result, many Somalis with T2DM delay medical care until symptoms are severe enough to interfere with daily activities (Omenka et al., 2020).

East African immigrants in the United States (U.S.) is an understudied group of people, despite the rapidly increasing size of the population and its unique ethnic, cultural, and socio-economic background (Omenka et al, 2020). Prior research suggests that culturally based group sessions hosting Diabetes Self-management Education (DSME) may be an effective strategy for improving glycemic control, delay in diabetes complications, and improved quality of life in immigrant populations (Grohmann, Espin, & Gucciardi, 2017). To improve accessibility to resources for populations such as the Somali immigrant population,

CDC recommends promotion of DSMES in alternative settings including Community-based organizations, community centers, and faith-based organizations. For healthcare services to be effective in treating this immigrant population, it is also important understand how Sub-Saharan African immigrants living in the U.S. adapt to T2DM diagnosis and their experience with diabetes self-management. Kindarara et al. (2017 attempted to address this important clinical question, using a qualitative design. The analysis of data obtained via semi structured interviews with 10 participants indicated that knowledge of T2DM self-management is generally limited among Somali immigrants affected by T2DM. Authors recommended group education and culturally tailored DSME to decrease barriers and encourage better self-management (Kindarara et al. 2017). Based on these recommendations, Harborview Medical Center, International clinic publish an article on EthnoMed offering number of recommendations for educators when managing diabetes among Somali immigrants (Ethnomed, 2022). However, health education for minority populations continues to be delivered on a one-to-one basis in many healthcare settings across the country. Still, currently there is no adequate evidence in the literature of which education methods are the most effective in improving clinical outcomes of people with type 2 diabetes (Lawal & Lawal, 2016) except for group-based education being shown as a cost-effective alternative to individual education on diabetes (Lawal M. & Lawal F., 2016). Furthermore, a review of 11 studies conducted by Merkaou et al. (2015), indicated that group-based education for people with type 2 diabetes can be effective in improving HbA1c, diabetes knowledge, body weight and supporting nutrition adherence when compared to individual education alone (Merkaou et al., 2015). In addition, group classes have been long recognized as a strategy to empower patients of all walks of life through peer support (Caballero, 2018). Another meta-analysis

(Odjers-Jewell et al., 2017) conducted using data from of 21 studies of group-based diabetes self-management education programs for people with type 2 diabetes also showed a significant improvement in self-management of disease for those who received group based DSME Moreover, overall results showed significant health outcomes such as improved glycemic control, increased diabetes knowledge, self-management skills and self-empowerment. Although the literature supports both individual and group-based education having positive result in clinical outcomes, it seems group education can provide effective knowledge transfer to a larger number of people with DM all at once. (Merkaou et al., 2015). Others argue (Caballero, 2018; Merkaou et al., 2015) that group education is an excellent strategy not only to improve knowledge base but also to empower patients through peer support (Caballero, 2018). On the other hand, the inability of an individual to manage diabetes after receiving individual education, may lead to the development of complications and frequent hospitalizations, thereby affecting their quality of life (Caballero, 2018). Additionally, a qualitative study (Désiré et al., 2017) of N=10 Sub-Saharan African immigrants living in the US explored how this population adapts to T2DM diagnosis and their experience with diabetes self-management. Authors underscored the importance of providing culturally tailored interventions to decrease barriers and encourage self-management (Désiré et al., 2017). To date, no published studies exist that were conducted specifically with Somali immigrants with T2DM. The current project was conducted to close this important gap in knowledge about this important clinical issue.

Theoretical Framework

Self Determination Theory (SDT) (Deci & Ryan, 2012) was selected to guide the project. Diabetes requires daily essential self-care knowledge and behaviors such as healthy eating, being physically active, monitoring of blood sugar, compliance with medications, healthy coping skills and risk-reduction behaviors to ensure long-term positive outcomes of the disease (Piette et al., 2019; Shrivastava, 2013). Self-determination programs can support self- management of diabetes by empowering people through knowledge increase, goal setting, and competence building (Karlsen et al., 2018). According to the Center for Self-Determination Theory, people become self-determined when their needs for competence, connection, and autonomy are fulfilled, leading to their ultimate ability to make choices and manage their own life. SDT suggests that knowledge and skills also have an impact on motivation suggesting that people with increased knowledge and skills tend to be better engaged in their self- care.

Methods

Design

For this quality improvement project descriptive statistics were used to compare participants' knowledge and self-reported behaviors related to T2DM self-management pre and post intervention. After Seattle University IRB approval of the project, participants were recruited from HealthPoint Midway clinic in King County Washington. Informed consent was obtained verbally at the time of enrollment. Participants were asked to complete demographic surveys and pre-intervention questionnaires at that time. Study intervention entailed education about T2DM, importance of healthy eating, physical activity, stress management, as well as glucose monitoring and adherence to medication regiment. A total of 5 educational sessions, each lasting approximately 1.5 hours, were delivered via zoom. Education was provided in the

Somali language which the investigator and participants spoke at home. Pre-intervention A1c and post-intervention A1c was collected using NextGen electronic health records. Additionally, at the end of the T2DM educational program, post-test was administered to measure improvements in the participants' knowledge about T2DM and their adherence to T2DM self-management.

Recruitment

A list of potential participants' contact information was generated from NexGen by the site mentor. Participants were recruited by the study facilitator who called the prospective participants and invited them to the join the program. In addition, flyers were distributed to participating clinics to further recruit participants. Informed consent to participate in the project was obtained verbally on enrollment. Participation was voluntary and participants were told they could leave the program at any point if they wished so.

Sample

Inclusion criteria were: (1) first generation Somali immigrants, men and women; (2) over 18 years of age; (3) diagnosed with type II diabetes mellitus, and (4) with A1C level of greater than 7%. Participants were recruited from Health Point Clinics in SeaTac, Tukwila, Kent, Federal way and Midway. A sample of six (N=6) participants consisting of 2 males and 4 females was enrolled and completed the study.

Setting

The setting for the project was a HealthPoint Midway clinic in King County Washington out of which educational sessions were delivered via Zoom. These classes were in addition to any information that was routinely provided at the study site to all patients. Participants came from Tukwila, SeaTac, Midway and Federal Way clinics and were

administered by zoom.

Data Collection Tools

To identify prospective participants, the investigator used Next-Gen electronic health records. From these records participants' pre and post A1C levels were collected as one of the inclusion criteria was A1c level of over 7. Invitation to participate was subsequently sent to those meeting the inclusion criteria (Appendix A table 2). Home blood sugar readings were not collected because prospective participants were monitoring their blood sugars at home very inconsistently, if at all, prior to intervention. Participants' demographic data such as age, race, education level, employment status, number of years since they were diagnosed with diabetes and participation in any previous group culturally tailored education session were collected and summary is presented in a table (Appendix A Table 1). Additionally, an investigator developed survey consisting of 10 multiple choice questions from 5 domains of diabetes management was collected pre-intervention to evaluate participants' knowledge on diabetes, blood glucose monitoring, medication adherence, diet, and exercise (Appendix A, table 3). The same survey was administered post-intervention to compare changes in the participant knowledge and their perceptions and behaviors regarding self-management skills.

Intervention and Data Collection

Five group education sessions lasting on average 1.5 hours were conducted by the investigator via Zoom meeting from the beginning of April through May 2022. Education provided was based on ethnic/cultural norms, spiritual values, social beliefs, and historical and environmental factors unique to specific to the population studied. For instance, BGM education and diabetes medication resources were modified to meet the patient's literacy level and translated to target language. Printed materials were available in both English and Somali

language. After every session the investigator assured that participants can demonstrate and teach back the key concepts discussed in each session. Images accompanied written materials to help explain concepts. To address potential visual impairment among study participants, educational materials were available using large print. The educational sessions consisted of basic diabetes knowledge; *"What is diabetes? A1c level, symptoms of Hypoglycemia and hyperglycemia",* healthy dietary planning, medications adherence and effects of medication on diabetes control, blood glucose monitoring, and cultural tailored physical activity.

Data analysis

Data were analyzed using descriptive statistics and percentages to identify and describe differences (if any) in A1C before and after intervention and diabetes knowledge before and after intervention. Descriptive statistics were used to analyze demographic data such as the age, race, gender, education, employment and history of diabetes.

Results/Analysis

Demographics

A total of six (N=6) East African (Somali) immigrants participated in the study: 2 males and 4 females. As shown on Table 1 (Appendix A), all participants reported to have T2DM with A1c higher than 7% at the start of the study. For the age of participants, 66.7% (n=4) were aged 41-50 years old, and 33.3% (n=2) were aged 51-60 years old. Among the participants, 33.3% (n=2) were male and 66.7% (n=4) were female. Of those, 50% (n=3) had grade school education, 33.3% (n=2) had high school level education, while 16.6% (n=1) had no formal education. Among study participants, 66.6 %(n=4) were diagnosed with T2DM greater than 5 years ago at the time of the study, 16.6 % (n=1) greater than 2 years but less than 5, and 16.6% (n=1) less than 2 years ago. Fifty percent (n=3) of participants were

employed at the time of data collection, while the other 50% (n=3) were unemployed. None of the participants had prior culturally tailored diabetes education. Although the fasting blood sugar readings were not collected for the data analysis, all participants reported they have been monitoring their blood sugars at home during the study and they have seen improvement in readings. Participants average pre-intervention A1c level was *M*=10.7 and the average post-intervention A1c level was *M*=9.1 (Appendix B, Table 3).

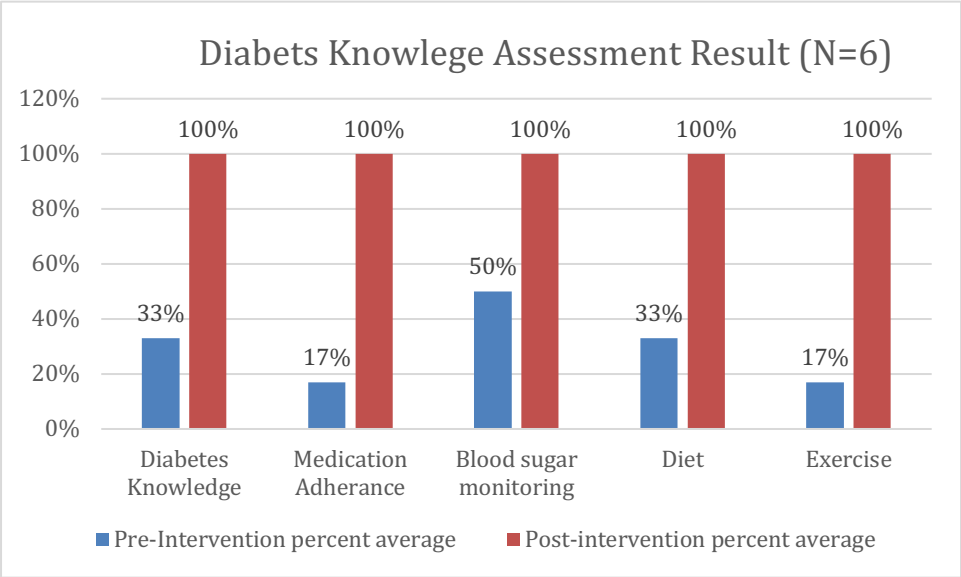
Table 2: Participants percent Pre-Post A1c Levels

Participant ID	Pre A1C (mg/dl)	Post A1C (mg/dl)
1	8.6 %	9.2 %
2	10.6 %	9.2%
3	9.5 %	7.5 %
4	12.9 %	9.4%
5	9.7 %	6.6 %
6	13.4 %	12.7 %

Pre-Intervention Average A1c	Post-Intervention Average A1c
M= 10.87%	M=9.1%

To assess participants' knowledge on diabetes self-management, pre- and post-test surveys consisting of 10 multiple choice questions were administered regarding knowledge and skills on (1) Characteristics of diabetes mellitus (2) Medication adherence, (3) Home blood glucose monitoring, (4) Diabetic diet and (5) physical activity. Prior to intervention only two participants (33%) correctly answered simple questions regarding characteristics of diabetes mellitus, only one participant (17%) reported taking medication as prescribed, only three participants (50%) reported checking their blood sugars at home regularly, one participant (17%) was aware that doing regular exercise was useful in managing diabetes, and

two participants (33%) correctly answered questions about diabetic diet and benefits of diet control in managing diabetes. The same questions were asked post-intervention an improvement of 67% in knowledge, 83% in medication adherence, 50% in blood sugar checks, 83% in doing regular exercise and 67% in diet knowledge and changes was observed. Using descriptive statistics pre-intervention percent average of all domains was *M*=30 (Appendix C, Table 4) and the post-intervention percent average of the same domains was *M*=100 (Appendix C, Table 4).



Discussion

Type II Diabetes Mellitus (T2DM) is a serious chronic disease that requires knowledge, daily self-management, and lifestyle modifications for people all over the world. Although T2DM is a widespread disease in Western world, it affects first generation racial minority populations including Somali immigrants at disproportionally higher rates than the general population. Long-term complications of the disease in racial minority populations are

also more pronounced than in general population calling for designing effective educational approaches to better assist these patients and offset staggering costs of care (CDC, 2020). Therefore, this quality improvement project was developed and piloted to discern whether culturally appropriate small group-based education program for Somali patients with T2DMmay improve self-management skills to alleviate long-term complications.

Consistent with the recent CDC (2020), American Diabetes Association (2019) and recent research (Caballero, 2018) recommendations regarding diabetes education and care for racial minority first generation immigrants in the United States, this project utilized culturally tailored, community-based diabetes education program to improve project participants' knowledge and self-management of diabetes. Self-Determination Theory (SDT) (Deci & Ryan, 2012) guided the intervention. Consistent with the tenets of SDT, special attention was paid to the participants' culture and personal learning needs during the intervention to achieve the desired outcomes. Consequently, findings from this small, localized study demonstrate that participants' knowledge and self-management of diabetes have improved post intervention, underscoring findings from prior studies regarding diabetes education for first generation racial minority patients in the United States (Jalilian et al., 2014; McGuigan, 2010; Merakou et al., 2015). The findings of this study demonstrate participants average knowledge on all domains of managing diabetes increased from 30% to 100% post-intervention. Furthermore, analyzing participant pre-intervention A1c level and post-intervention A1c levels the study found average of 1.8 % reduction in A1c post education session. Current findings add to the body of knowledge suggesting that using group approach to educating patients with T2DM may be a more effective teaching strategy than the traditional, individual patient teaching. Group education approach for patients' education in this study has not only

proven effective in terms of improved participant knowledge as shown by the post intervention survey results, but also improvements in a1c levels among study participants post intervention, suggesting that participants have implemented life-style changes in practice.

Consistent with prior research (Alloh, et. al, 2019; Dungi et. al., 2018) that reported changes in the consumption of fat and foods high in sugar foods among minority populations without prior solid knowledge of diabetes self-management after intervention, findings from this study also demonstrated an improvement in dietary T2DM self-management. Moreover, in the current study, participants reported feeling more comfortable asking questions of their provider regarding their A1c, a better-balanced diet, and exercise. Moreover, all participants reported regular blood glucose monitoring at home post intervention. These findings are consistent with Kindara at al. (2019) and Lee at al. (2017) reports.

In summary, results of this study are encouraging, because all participants reported improved understanding of their condition and better application of knowledge and skills in practice, which may further improve their long-term complications from diabetes. Therefore, based on the findings from this and prior research, community health centers serving racial minorities immigrant populations nation-wide should consider a widespread culturally tailored group-based education sessions as a viable alternative to individual patient education. However, further research with a larger sample sizes is necessary before generalizations may be made.

Limitations

Although the current study showed positive outcomes of culturally tailored group intervention results are not generalizable because of the small sample size. Moreover, the educational sessions were delivered by zoom, because of COVID-19pandemic. If it were

possible to deliver educational sessions in person, other potential participants with no access to internet and computer many have participated adding more diversity to the sample. Consequently, study results may have also been different. For example, the study site facilitator originally recruited 10 eligeable participants, however, 2 prospective participants did not join because they had no access to internet and 2 more participants declined participation because some of the sessions were taking place during Ramadan.

Another study limitation was because of the participants coming from a single health system limited to King County, Washington. It is possible that recruitment from more and more diverse healthcare settings would produce different findings pre and post intervention. More research is needed with larger samples and more diverse Somali patient population (eg. access to internet) and from various geographical locations and healthcare systems before generalization of findings beyond this localized study may be made.

Dissemination of Results

Given the intervention showed the desired outcomes in improving DM self-management skills among study participants, resources used in this small study will be shared with Healthpoint clinics serving Somali population. Results will also be shared with Ethnomed. Sharing the results on EthnoMed will communicate with other health care providers about the positive outcomes of culturally tailored education on diabetes self-management in Somali population.

References

Alloh, F. T., Hemingway, A., & Turner-Wilson, A. (2019). Systematic review of diabetes management among black African immigrants, white and South Asian populations. *Journal of Global Health Reports*, *3*. https://doi.org/10.29392/joghr.3.e2019020

American Diabetes Association. (2019). Statistics About Diabetes. https://www.diabetes.org/resources/statistics/statistics-about-diabetes

Caballero A. E. (2018). The "A to Z" of Managing Type 2 Diabetes in Culturally Diverse Populations. *Frontiers in Endocrinology,* 9, 479. https://doi.org/10.3389/fendo.2018.00479

Centers for Disease Control and Prevention, (2020). Estimates of Diabetes and Its Burden in the United States. https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetesstatistics- report.pdf

Choi, T. T., Walker, K. Z., & Palermo, C. (2016). Culturally tailored diabetes education for Chinese patients: A qualitative case study. *Journal of Transcultural Nursing,* 74, 197-208. doi/abs/10.1177/1043659616677641

Deci, E.L. & Ryan, RM. (2012). Self Determination Theory. Retrieved from: psycnet.apa.org, Jan 15, 2022.

Department of Health. Diabetes Epidemic and Action Report: (2017). https://www.doh.wa.gov/Portals/1/Documents/Pubs/345-349DiabetesEpidemicAction.pdf

Hadziabdic, E., Pettersson, S., Marklund, H., & Hjelm, K. (2020). Development of a group-based diabetes education model for migrants with type 2 diabetes, living in Sweden. *Primary Health Care Research and Development*, *21*, e50. https://doi.org/10.1017/S1463423620000493

International Diabetes Federation. (2019). *Worldwide toll of diabetes.* https://www.diabetesatlas.org/en/sections/worldwide-toll-of-diabetes.html

Jeanne Batalova & Carlos Echeverria-Estrada (2020). Sub-saharan African immigrants in the United States. migrationpolicy.org. https://www.migrationpolicy.org/article/sub-saharan-african-immigrants-united-states-2018

Jalilian, F., Motlagh, F. Z., Solhi, M., & Gharibnavaz, H. (2014). Effectiveness of self-management promotion educational program among diabetic patients based on health belief model. *Journal of Education and Health Promotion*, *3*, 14. https://doi.org/10.4103/2277-9531.127580

Kindarara, D. M., McEwen, M. M., Crist, J. D., & Loescher, L. J. (2017). Health-Illness. Transition Experiences with Type 2 Diabetes Self-management of Sub-Saharan African Immigrants in the United States. *The Diabetes Educator,* 43(5), 506–518. https://doi.org/10.1177/0145721717724725.

Lee, A. A., Piette, J. D., Heisler, M., Janevic, M. R., & Rosland, A. M. (2019). Diabetes self-management and glycemic control: The role of autonomy support from informal health supporters. *Health psychology: official journal of the Division of Health Psychology, American Psychological Association*, *38*(2), 122–132. https://doi.org/10.1037/hea0000710

Li, S., Wang, J., Zhang, B., Li, X., & Liu, Y. (2019). Diabetes Mellitus and Cause-Specific Mortality: A Population-Based Study. *Diabetes and Metabolism Journal, 43*(3), 319–341. Mhttps://doi.org/10.4093/dmj.2018.0060

McGuigan, C., (2010). Diabetes in the Eritrean and Ethiopian Community: Recommendations for Educators. https://ethnomed.org/resource/diabetes-in-the-eritrean-and-ethiopiancommunity- recommendations-for-educators/

Merakou, K., Knithaki, A., Karageorgos, G., Theodoridis, D., & Barbouni, A. (2015). Group patient education: effectiveness of a brief intervention in people with type 2 diabetes mellitus in primary health care in Greece: a clinically controlled trial. *Health Education Research, 30*(2), 223–232. https://doi.org/10.1093/her/cyv001

Mouri, MI., & Badireddy M., (2020). *Hyperglycemia.* https://www.ncbi.nlm.nih.gov/books/NBK430900/

Ngundi, F., Tuitoek, P., & Aboud, A. (2018). Dietary practices, habits and physical activity levels of the Swahili community, Kenya in relation to obesity and chronic diseases of lifestyle. *African Journal of Food Science.* DOI: 10.5897/AJFS2017.1642

Njeru, J. W., Patten, C. A., Hanza, M. M., Brockman, T. A., Ridgeway, J. L., Weis, J. A., Clark, M. M., Goodson, M., Osman, A., Porraz-Capetillo, G., Hared, A., Myers, A., Sia, I. G., & Wieland, M. L. (2015). Stories for change: Development of a diabetes digital storytelling intervention for refugees and immigrants to Minnesota using qualitative methods. *BMC Public Health, 15*(1). https://doi.org/10.1186/s12889-015-2628-y

Odgers-Jewell, K., Ball, L. E., Kelly, J. T., Isenring, E. A., Reidlinger, D. P., & Thomas, R. (2017). Effectiveness of group-based self-management education for individuals with Type 2 diabetes: a systematic review with meta-analyses and meta-regression. *Diabetic Medicine, 34*(8), 1027–1039. https://doi.org/10.1111/dme.13340

Omenka, O. I., Watson, D. P., & Hendrie, H. C. (2020). Understanding the healthcare experiences and needs of African immigrants in the United States: a scoping review. *BMC Public Health, 20*(1). https://doi.org/10.1186/s12889-019-8127-9

Piccinin, D., RD, M., & Lai, K., (2002). Process and Practice of Cross-Cultural Education for Vietnamese and Ethiopian Diabetes Patients. EthnoMED. https://ethnomed.org/resource/process-and-practice-of-cross-cultural-education-forvietnamese- and-ethiopian-diabetes-patients/ Washington State

World Health Organization. (2020). Diabetes. https://www.who.int/news-room/factsheets/detail/diabetes

Appendix A

Table 1: Demographic Characteristics of Participants (N=6)

ID	Age	Gender	Race	Education	Employment	# of years with DM
1	49	F	East African	High school	No	>5 years
2	48	M	East African	Grade School	Yes	>5 years
3	55	M	East African	College	No	>5 years
4	45	F	East African	Grade School	yes	>2 years
5	42	F	East African	High School	Yes	1 year
6	54	F	East African	None	No	>5 years

Table: 1 A &B: Frequency and percent of participants Age

Age	Frequency N=6	Percent
41-50	4	66.7%
51-60	2	33.3%

Gender	Frequency N=6	Percent
Females	4	66.7%
Males	2	33.3%

Table 1 C & D: Frequency and percent of Education

Education	Frequency N=6	Percent
No education	1	16.7%
Grade School	2	33.3%
High School	2	33.3%
College	1	16.7%

Table 1 E &F: Frequency and percent of Employment

Employment	Frequency N=6	Percent
Yes	3	50%
No	3	50%

Table 1 G & H: Frequency and percent of number of years of diagnoses with DM

Number of years diagnose with DM	Frequency N=6	Percent
1-2 years	1	16.7%
2-5 years	1	16.7%
>5 years	4	66.7%

Appendix B

Table 2: Participants percent Pre-Post A1c Levels

Participant ID	Pre A1C (mg/dl)	Post A1C (mg/dl)
1	8.6 %	9.2 %
2	10.6 %	9.2%
3	9.5 %	7.5 %
4	12.9 %	9.4%
5	9.7 %	6.6 %
6	13.4 %	12.7 %

Pre-Intervention Average A1c	Post-Intervention Average A1c
M= 10.87%	M=9.1%

Table 3. Descriptive Statistics of Pre & Post Intervention A1c

Pre-Intervention A1c	
Mean	10.7833333
Standard Error	0.79473965
Median	10.15
Mode	#N/A
Standard Deviation	1.94670662
Sample Variance	3.78966667
Kurtosis	-1.6796268
Skewness	0.55306075
Range	4.8
Minimum	8.6
Maximum	13.4
Sum	64.7
Count	6
Confidence Level(95.0%)	2.04294331

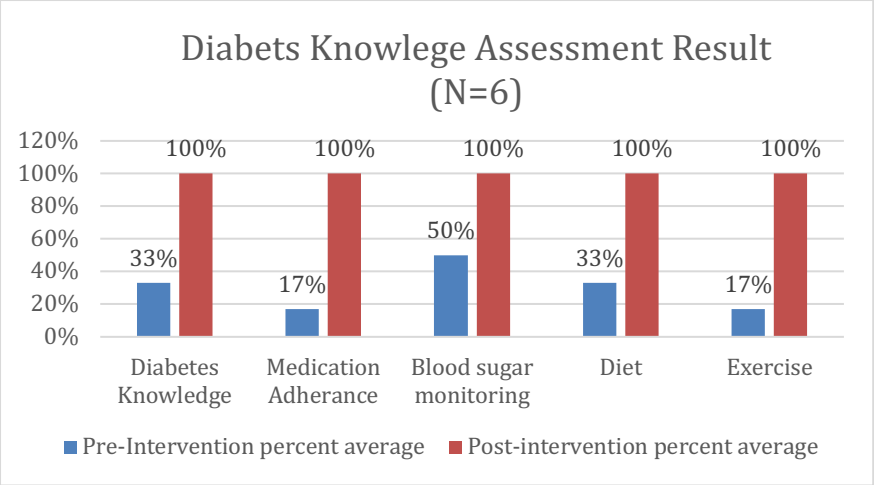
post-Intervnetion A1c	
Mean	9.1
Standard Error	0.85401015
Median	9.2
Mode	9.2
Standard Deviation	2.0918891
Sample Variance	4.376
Kurtosis	1.55757556
Skewness	0.88366897
Range	6.1
Minimum	6.6
Maximum	12.7
Sum	54.6
Count	6
Confidence Level(95.0%)	2.19530297

Appendix C

Table 3. Results of Pre & Posttest of DM knowledge

Assessment Domains	**Pre-intervention Percent average of questions answered correctly in each domain.**	**Post-intervention Percent average of questions answered correctly in each domain.**
Characteristics of Diabetes Mellitus	33%	100%
Medication Adherence	17%	100%
Home blood glucose monitoring	50%	100%
Diabetes diet/nutrition	33%	100%
Physical Activity	17%	100%

Table 4: Descriptive Statistics of pre/post knowledge Assessment



Pre-Intervent Participants Knowledge	
Mean	30
Standard Error	6.14817046
Median	33
Mode	33
Standard Deviation	13.7477271
Sample Variance	189
Kurtosis	-0.3964895
Skewness	0.58691761
Range	33
Minimum	17
Maximum	50
Sum	150
Count	5
Confidence Level(95.0%)	17.0700578

Participants Post-Intervention Knowledge	
Mean	100
Standard Error	0
Median	100
Mode	100
Standard Deviation	0
Sample Variance	0
Kurtosis	#DIV/0!
Skewness	#DIV/0!
Range	0
Minimum	100
Maximum	100
Sum	500
Count	5
Confidence Level(95.0%)	0

Appendix D:

DNP Project Informed Verbal Consent

I am conducting a DNP project to find out if Group-Based Diabetes Self-Management Education for Oromo and Somali population with Type II Diabetes Mellitus will help improve Diabetes understanding and self-management. I am interested in your participation, the intervention will consist of 6 focus interactive group education sessions, each lasting 1-2 hours and delivered twice a month for 3 months. Please keep in mind that your participation is voluntary.

The information provided will remain strictly confidential and you will not be identified by your names. Data will be compiled as a whole with no individual responses tied to your name or any identifying information about you. All information disclosed during the survey will be kept in a secure location. However, focus group intervention restricts confidentiality, therefore confidentiality cannot be guaranteed.

This conversation is not being recorded but notes will be taken. You may choose not to answer any question.

Do you have any questions before we get started?

******All Participants agreed and gave Verbal Consent. *******

Appendix E: Demographic

For the following items, please circle the letter by the answer that best represents you (one per item)

1. Age

    A. 30-40
    B. 41-50
    C. 51-60
    D. 61-70

2. Gender
    A. Male
    B. Female

4. Which of the following best describes your race?
    A. White or Caucasian
    B. Black or African American
    C. Asian
    D. Native Hawaiian or other Pacific Islander
    E. American Indian or Alaska Native
    F. Other_____ (please describe)

5. What is the highest grade you completed in school?
    A. Grade School 1-8 th grade
    B. High School (9-12th grade)
    C. College
    D. None

6. Are you currently employed?
    A. Yes
    B. No
    C. Retired
    D. Disabled

7. How long have you been diagnosed with T2DM?
    A. Less than 1 year
    B. 1-2 years
    C. 2-5 years
    D. More than 5 years

8. During the past year, have you participated in an education program about diabetes?
    A. Yes
    B. No

If Yes, was the DM education culturally based?
Was it
a. One-on-one education
b. Group education

Appendix F: Knowledge Assessment Questioner

-Zoom meeting with each participant was held to develop a rapport and complete survey questions below.

-A survey questioner of 10 multiple questions choices consisting of five domains of diabetes management knowledge was completed during pre-intervention and post-intervention.

Questions

Domain 1: Characteristic of diabetes

1. What is diabetes? Select all that apply
    a. *Your liver doesn't make enough blood sugar.
    b. *Insulin resistance
    c. Impaired insulin release
    d. Your body makes more insulin than it needs
    e. I don't know
2. What is an A1C?
    a. Average blood sugar level for the past 6 months
    b. *Average blood sugar level for the past 3 months
    c. Has nothing to do with blood sugar/diabetes
    d. I don't know
3. If you have high blood sugar symptoms, you should:
    a. Lie down and rest
    b. Exercise
    c. Drink juice
4. If you begin to have low blood sugar symptoms, you should:
    a. Exercise
    b. Lie down and rest
    c. *Drink some juice
    d. Take insulin

Domain 2: Medication adherence

I take my diabetes medications as prescribed.

A. Applied to me very much
B. Applies to me to some degree
C. Does not apply to me

Domain 3: Home blood glucose monitoring

Do you check your blood sugar at home?

a. Yes
b. No

Domain 4: Exercise

I do regular physical activity to achieve optimal blood sugar levels. Q1: Physical activity

A. *Applied to me very much
B. Applies to me to some degree
C. Does not apply to me

What effect does exercise have on blood glucose?

A. *Lowers it
B. Raises it
C. Has no effect
D. I don't know

Domain 5: Diet/Nutrition

How can you best manage your diet for better diabetes control?

a. Watch your food portions

b. Eat from all food groups

c. Increase vegetables and fibers

d. Limit sugars

e. All of the above

Portion size on your plate (vegetables, gains, and protein)?

a. ¼ grains

b. ½ vegetables

c. ½ proteins

d. The whole plate

e. Not sure

Patient's assigned identifying Number: ……

Recent A1C level: …….