

Original Research Article

Exploring Type 2 Diabetes Patients' Perception and Understanding on the Usage of Diabetes Conversation Map at Hospital Tuanku Jaafar, Negeri Sembilan, Malaysia

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ABSTRACT

Introduction: Diabetic patients should be exposed to effective learning methods to educate them on self-management without expecting solely on the help from health professionals. This study aims to see the perception of patients' acceptance of the Diabetes Conversation Map among type 2 diabetes patients as an alternative learning method in addition to the existing educational methods.

Methods: This qualitative study was conducted from September to November 2014 with type 2 diabetes patients who were recruited from the Diabetes Clinic, Hospital Tuanku Jaafar Seremban, Negeri Sembilan, Malaysia. A group of 15 respondents were selected through purposive sampling which comprised of seven males and eight females. They were guided in a group on how to use the Diabetes Conversation Map which focussed on healthy eating habits and active living lifestyles. Data collection was conducted by using in-depth interview technique.

Results: In our study, it was observed that most respondents showed positive acceptance and understanding towards healthy eating habits and active living lifestyles. This map could help them to change their eating habits and lifestyle to be more active. Majority respondents stated that among the benefits of healthy eating habits were to prevent weight gain and regulate blood sugar content. They aware that healthy eating habits can prevent complications from chronic diabetic diseases. Besides, most respondents claimed that among the benefits of adopting an active living lifestyle is to control weight and the body mass index, having a healthy body with a smart brain and able to control blood sugar levels. Moreover, learning techniques such as discussions enabled them to easily understand and relate to their personal experiences. They were comfortable to give their opinions even though they were meeting for the first time.

Conclusions: Majority of respondents showed their preference and positive acceptance towards the Diabetes Conversation Map as compared to other methods of learning. They exhibited more interest in interactive discussion which delivers new experiences and found that this learning experience were more effective and better than individual education.

Keywords: perceptions, learning process, social support, conversation map

INTRODUCTION

Effective diabetes care is based on diabetes self-management education and ongoing self-management support which

significantly contributed to the metabolic and psychological outcomes of people with type 2 diabetes and these approaches vary among countries, care sites, and health care

professionals. [1] Most of Diabetes Self-Management Education (DSME) methods around the world include one-on-one interactions between patients and healthcare providers especially during clinical appointments and group lectures (patient education classes). Besides, there are other methods which include web-based information and provision of audio, video and printed materials. [2]

Patients should be exposed to effective learning methods so that they can act accordingly to the information obtained through self-management to assist them in self-care without expecting the help from the healthcare professionals. Previous studies found health education on self-management was associated with glycaemic control for diabetic patients. [3] Moreover, an appropriate health education intervention can assist diabetic patients in coping with their condition and enhancing their self-care ability. [4] Besides, the traditional method for DSME, the Diabetes Conversation Map (DCM) has been used recently as a new approach to educate diabetic patients.

Diabetes Conversation Map

The Diabetes Conversation Map (DCM) is a group-based diabetes education method endorsed by the International Diabetes Federation in 2008. DCM is an education visual tool in delivering DSME and was designed to engage patients in making health behavioural changes. According to Ghafoor et al, DCM is an effective education tool for delivering DSME and encouraging behavioural change in people with diabetes which in turn, may improve their chances of attaining the desired level of controlling diabetes. He also found that participants preferred DCM as a mode of diabetes education over other educational methods. The participants felt more confident and were ready to make behavioural changes after attending the DCM sessions. [2]

Similar findings were noted in a study from the United States which reported that 80 patients who participated in the

learning session using the DCM had given positive feedbacks in the study conducted with 97% assessing the overall session as "valuable" or "very valuable" while 98% reported they felt better when talking about diabetes management with a doctor. [5] While Figueira et al found that DCM could be one of the educational strategies to improve patients' knowledge on diabetes, treatment adherence and control of glycaemic. [6]

Another previous findings at Al-Noor Makkah Hospital in Saudi Arabia found that DCM is proven to be effective as a self-management education tool as assessed by increased glucose control and healthy diet management among type 2 diabetics. [7] The results showed that there was a slight decrease (1.05%) of blood glucose level during fasting and a significant increase ($p = 0.027$) in fibre intake and regular meal times.

Similarly, a study conducted by Haus on Effectiveness of U.S Diabetes Conversation Map Patient Education Program in improving Glycaemic control showed that a decrease in post intervention HbA1C was seen in 68% of the participants. Results of the study proved that U.S Diabetes Conversation Map is effective in improving Glycaemic control. [8]

Diabetes Conversation Map (DCM): Healthy Eating Habits and Active Living Lifestyles

Diabetes Conversation Map tools consist of four visual maps but this study focuses on topic 'Healthy Eating Habits and Active Living Lifestyles'. This map provides information about dietary choices, portion sizes, and nutrition components along with different types of physical activities. A study by Carvalho et al found that the diabetic patients experienced a huge lack of knowledge on the intake of diabetic food, including the types, quantity and quality while sharing of stories in the group discussion before using the map. [9] a study by Shih et al found that after three months of the DCM programme, there were

improvements in dietary knowledge and healthy eating habits and also behavioural exercise among patients who participated in the programme as compared to the usual care group. [10]

In addition, the DCM programme helped them to further understand the importance of healthy eating habits and adopt active lifestyle. Thus, the main purpose of this study is to explore and understand the perceptions of type 2 diabetes patients towards DCM with regards to healthy eating habits and active living lifestyles.

MATERIALS AND METHODS

This qualitative study involved diabetic patients under treatment at the Diabetes Clinic at Hospital Tuanku Jaafar Seremban, Negeri Sembilan, Malaysia. A total of 15 respondents were selected through purposive sampling which comprised of seven males and eight females. The average age for all respondents was 39.5 ± 7.3 , ranging from 24 to 47 years old. Data collection was conducted from September to November 2014 and the criteria for this study were Malaysian citizens, able to understand and speak Malay language, patients with type 2 diabetes and were exposed to Diabetes Conversation Map.

In addition, the method of data collection is through an In-depth Interview which is prepared according to the specific objective of the study. The first procedure for data collection was to gather the respondents and briefed them on the background of the study. Thereafter, the researcher divided them into smaller groups to learn about healthy eating habits and active living lifestyles by using the DCM. In this session, the large map was placed on the table with respondents gathered around it. The purpose is to engage respondents in open discussions so that it will encourage them to share ideas, knowledge and experiences in managing diabetes with a guidance of a health care professional who

served as a facilitator to avoid any misleading information.

For topic of healthy eating habits, each respondent was taught "the hand portioning method" which developing skills on how to use both hands as portion control the amount of food required by an individual. For example, a handful of carbohydrate, a two-handed for vegetable, a handful of fruits, a palm of hand of proteins, while sugar and oil are just a thumb-size. This simple guideline taught them to take all these food groups daily with limited quantities. However, for topic active living lifestyles, all respondents have been taught about different types of physical activity, the benefits of being active and the difference of staying active and doing exercise. They need to discuss and giving ideas on how to be more active and avoid sedentary lifestyle.

The respondents were interviewed about their perceptions after trying this learning method for the first time. The interview was conducted in Malay Language and the identity of the respondents was kept confidential. The In-Depth Interview (IDI) questions consisted of patient's perception regarding their feelings towards the usage of map, learning process, openness in giving an opinion and DCM's presentation. IDI transcripts were analysed based on the thematic analysis. This study was conducted with the authorisation from the National Medical Research Register (NMRR), Ministry of Health Malaysia.

RESULTS

This study explored the perceptions of type 2 diabetes patients towards the Diabetes Conversation Map (DCM) regarding healthy eating habits and active living lifestyles. In-Depth Interview analysis in this study revealed several main themes:

a. Perceptions towards the usage of DCM
(i) Patient's feelings of acceptance: All respondents were asked about their emotions that described their preferences in using the DCM as compared to other

educational methods. The findings showed that all respondents expressed their love and accepted the way of learning by using this map. They also felt that this map could help them to change their dietary habits. This was demonstrated through the description of several respondents:

"Yes, I like it! It helps. From today onwards I must change; I can change. Before this, I was not in control of my food intake where I just controlled it by taking medication. But when I learned, now I think I can control my diet. I ate plenty of vegetables, high protein, drank plenty of water, reduced my sugar intake and consumed high nutritional food. But it was still difficult to reduce the fat intake. But now I know what to eat and what needs to be controlled to practice healthy eating habits." (Mr. K, 47 years old).

"I like it and it helps! I think it can help me because before this I just ate only (without knowing the right portions). By studying the map, this class showed me how much carbohydrates I can eat with a little bit of fat and furthermore, we can learn something." (Mr. A, 47 years old)

(ii) Learning techniques: Majority respondents claimed that they prefer to learn in a group compared to one-to-one session because they can discuss with others especially on sharing unfamiliar topics and gain new information from others by giving opinion, sharing experiences and ideas. Moreover, this map also can help them to provide familiar situations through which people can easily understand different aspects of the disease and relate them to their personal experiences. These were among the statements identified from the conversations:

"I think it is good to be in a group because when it comes to ideas or when others asked some questions, which I don't really understand; I can also learn something from them. Similarly, when we discuss an unfamiliar topic on diabetes, we can share

(the information) together. I think learning in a group is better." (Miss M, 32 years old)
"I think it is better to learn in a team. Each of us can give an opinion and suggestions or something that I am unfamiliar with, can be discussed." (Miss D, 46 years old)

(iii) Openness in giving opinions: Most of them confessed that they feel uncomfortable to give opinions and sharing problems with others at the beginning of the group discussion process as they all do not know each other and feel like strangers. But after ice-breaking session, they started to feel more relax and comfortable to do so. Here are some confessions given by the respondents:

"At first, I felt uncomfortable. Only after a while I got used to it and am now at ease to communicate with others." (Mr. R, 24 years old)

"At first, I felt uncomfortable, because I was unfamiliar with them. But after knowing each other, we realised that we are facing similar problems and could learn from each other." (Mr. K, 47 years old)

"Really comfortable where we can exchange ideas about diabetes and share information about the map." (Miss S, 44 years old)

b. Patient's understanding of healthy eating habits

(i) Benefits of good diabetes management: Most of the respondents show that healthy eating practices could help them to control blood sugar level and body weight. They understood that healthy eating habits can help them to have a healthy body and avoid complications from diabetes. This understanding can be demonstrated through the evidence from the respondents:

"Healthy eating habits can keep the sugar intake at normal level. This means that you will not feel hyper or hypo, because if you are hyper, you feel uncomfortable, you can easily get a fever or infection. If you are hypo, you feel dizzy and sweaty. So if you choose a balanced diet like this, you can keep a healthy lifestyle. You can live

normally without having any serious health problems." (Mr. R, 24 years old)

"To me, there is only one benefit to healthy eating habits which is, we can control our weight. Then, we can control the blood sugar level, avoid complications, and eat the right amount of food groups to balance all the nutrients in our body." (Mr. A, 38 years old)

(ii) Ability to choose healthy foods: The respondents were also assessed on their understanding of free selection of food "free-to-eat" or on controlled food items after learning group of food from food pyramid. They know the key to eating well is to enjoy a variety of nutritious food from each of the groups. All the responses were almost the same and they knew the right choices of food. Their understanding can be clearly seen through the information provided:

"You can eat whatever you want; but you have to control the portions. You should eat fruits and vegetables; but you have to take less fats and sweets."

(Mr. H, 43 years old)

What food is free to eat will of course include leafy vegetables, spices, mineral water; no harm right? Then, what food should be controlled include sugar, fats and the carbohydrate group." (Mr. A, 38 years old)

(iii) Recommended dietary intake: Most of the respondents showing that they understand how to measure food portion by using their hands, but some of them faced difficulties in remembering the application. These were among the statements identified from the conversations;

"Depending on the food pattern we learned from the conversation map, I like what was shown on the map (by using hands). As for carbohydrates, you can take as big as your fist; for vegetables, the portions are both hands; as big as our fist for fruits; and meat for protein. You can take as big as your palm for any kind of meat but only a thumb-size of oil." (Mr. H, 43 years old)

"You can eat vegetables as much as you want by using two hands (palm) for the portions. Vegetables are good for our health right? As a protection (from diseases), it slows down the rise of the sugar levels, but you can also eat fruits such as four rambutans, two chunks of durians and the small-sized bananas." (Mr. Z, 36 years old)

c. Patient understanding of active living lifestyle

Benefits of practicing active living lifestyles: Most respondents claimed that among the benefits of adopting an active lifestyle was to control weight and BMI, having a healthy and energetic body with a smart brain and able to control blood sugar levels.

"As for me, firstly we get a healthy body. That is the main reason for staying active to maintain a healthy body. People say, even if you have a disease, you will have a better life if you exercise."

(Mr. Z, 36 years old)

"The benefit that we get is usually a fit and healthy body and a smart brain with controlled body weight, which means a controlled BMI." (Mr. A, 38 years old)

"If you keep active, you can gain many benefits. For example, our body is healthier and stronger when weight management is under control which means that indirectly the sugar level in the blood is also controlled. There is a change in it (positive effect). So, our diabetes is more manageable." (Mr. H, 44 years old)

(ii) Stay active and practice regular exercise: DCM suggested that patients must stay active by engaging in daily activities which include housekeeping, cooking, gardening, walking and washing cars. Meanwhile, exercising include muscular and sports activities such as running, swimming, playing badminton, aerobic exercises and playing football. In general, these two activities are actually similar in their objectives which are encouraging an individual to move actively

and keep sweating. Each of these activities requires effort and diligence as a healthy lifestyle comes from an active individual. Through the respondents' experience, they showed that they understood the difference between staying active and exercising. Among the respondents' answers were:

"The difference in staying active means doing daily activities (always moving). But exercise is doing sports activities. For example, sports activities can also include playing badminton and exercise with friends whereas daily activities include activities that we can do at home like cooking, mopping and sweeping the floors." (Mr. K, 47 years old)

"Exercise is like when we plan for it and we must follow the time. For example, when we are doing sports activities, we must go to the right place. By staying active means doing our daily activities where we are moving around doing household chores which include walking, sweeping the floor and tidying the home." (Mr. H, 43 years old)

"Exercise means we do sports activities like running, going to the gym and aerobics, but for staying active we do physical activities that can produce sweat such as cooking, sweeping, and mopping." (Mr. A, 47 years old)

(iii) Activities that help to stay active:

This question aims to encourage respondents to think what appropriate activities that could help them to stay active and change their lifestyle to become more active. Majority of the respondents stated that the easiest way was to practice active lifestyle is climbing up the stairs and walk to the workplace. These ideas have been proved in their statement:

"Firstly, I need to control the diet. As for the activity to do at home, I will do exercise and practice at the office too. At the workplace (the most fun activity) is climbing up the stairs, which is hard and high for me as I work at level 8. It is easy to go down the stairs but it is so hard to climb up. Currently I am trying to climb up the stairs up to level

2 and then take the elevator." (Mr. K, 47 years old)

"Maybe at the workplace we can practice by using the stairs and not using the elevator. But at home, we can do household chores such as cleaning the house, doing the laundry and others." (Mr. Z, 36 years old)

"It is alright to park the car further from the office and walk. I am trying to do more activities at home and at the workplace (hospital) where I can use the staircase instead of taking the elevators." (Miss P, 32 years old)

(iv) Starting and staying active daily:

Majority of respondents think that they want to walk more at the workplace by using stairs and not elevator. Some of them also were thinking to park their car a bit far. If at home, they prefer to do house chores or gardening to keep them active. Respondents have given the following answers:

"I will keep myself active since morning. For example, I walk up to level 5 at my workplace but if I am unable to climb the stairs, I just go up one level and then take the elevator. This also includes walking activities by parking further from my workplace even it takes my time." (Mr. H, 43 years old)

"If I am at home, I clean up the house and mop the floors. I do it once a week but now I do it more frequently, like two or three times per week. Sometimes I do gardening, but if I am working, I prefer to park my car a bit further and walk more. To me that is exercise." (Mr. A, 38 years old)

"I will do physical activities at home like washing and cleaning, but at the workplace, I park my car further away and walk to my office." (Mr. A, 47 years old)

DISCUSSION AND CONCLUSION

Perceptions

People with diabetes need ongoing self-management to achieve a better quality of life. Overseas studies have found that education programmes such as the Diabetes Conversation Map (DCM) can have a

positive impact especially in the way of life and self-management in the dietary intake. [7] Kolb states that learning theory through experience emphasised that the actual experience of an individual played an important role in his/her learning process. The four main stages in the learning cycle started from Concrete Experience which means how we accept something that will affect a person's feelings or emotions based on their first experience. [11]

This was supported by explanations in the KnudIlleris model where the learning process begins with the first stimuli of perceptions that referred to the world environment that comes to the individual thoroughly without intermediaries. [15] Respondents' perceptions resulted in further actions, which were making a decision to change or vice versa. This study revealed that the acceptance perception of all respondents was positive because they felt that their participation in the learning process as a patient-centred intervention strategy was more interactive other than passive existing educational methods.

Moreover, the respondents' feelings of acceptance indicated that emotions played an important role in the learning process as shown in the KnudIlleris model which explained clearly that the three main dimensions were closely interrelated in terms of thinking, emotion and society (environment). In this context, thoughts and emotions were an "internal process" that interacted when respondents gained knowledge from the learning sessions by using this map. Emotion is a psychological force that comes from feelings, attitudes and motivations which may be influenced and developed through learning. [15] Researchers found that the respondents' emotions such as the likes of these conversational maps helped them to understand diabetes more easily and quickly.

In addition, perceptions of acceptance in terms of learning styles were also discussed in this study. According to Honey and Mumford, they defined a learning style as an explanation of the

attitudes and behaviours that determined the tendency of individual's learning. [12] Learning style is a stable indicator of how respondents see, interact and react to the learning environment. Therefore, it is undeniable that structured diabetes education is important for good self-management.

Education is not a one-time process, but rather should be reassessed repeatedly by health care professionals. In this study, majority of respondents gave the same view that group learning was more effective than individuals. Most of them preferred to be in a group because they have a chance to learn from others' experiences, is easy to remember, share and exchange opinions. This is in line with the results of the overseas findings as reported by Ghafoor et al where the majority of participants found that learning the map to be more effective and much better than one-on-one sessions. [13]

Moreover, the results of this study found that group learning gave them ideas of unlikely issues and they were not shy to share their problems. This showed that their interaction is in parallel with Kolb's theoretical reality where personal involvement with the people around the group played an important role. Another study conducted by Mensing & Norris stated that a group-based approach usually allowed for greater interaction and more dynamic interpersonal communication. [14] This proved that finally patients realised that they are not alone in this world when they get a chance to interact and discuss their experiences with others in similar situations.

Furthermore, this study also takes into account the comfort of the respondents to express their opinions because group learning requires each respondent to communicate so that other members of the group can learn something. Openness in giving opinion means that the respondents feel free to speak, share ideas and problems and listen to others even though they met each other for the first time. However, there were also respondents who claimed they felt

uncomfortable at the beginning but they had no problem communicating and participating in the discussions soon after an ice-breaking session.

According to Illeris, the learning process involved not only engaging one's thoughts and emotions but also involved the environment or "socialism" as external interactions. ^[15] This included the participation of individuals in the group, the means of communication and co-operation among the health care workers and the diabetics. Diverging learning style indicated that the learning process is better when they have the opportunity to observe and collect information from various sources. ^[16] As a result, feeling comfortable in giving opinions while in the group can help to facilitate the process of delivering information.

Patient's understanding of healthy eating habits

In accordance with the definitions of Malaysia's Dietary Guidelines (2010), a healthy diet is a diet that provides the right combination of energy and nutrients. ^[17] The guidelines suggested that the four main features of a healthy diet are adequate, balanced, moderate and varied diets. Sufficient dieting is a diet that can provide enough energy, nutrients and fibre to maintain an individual's health. While a balanced diet is a diet that meets the need for proper nutrition by eating all healthy food including fruits, vegetables and meat.

However, simplicity is the key to healthy eating habits and it is the basis of treatment for type 2 diabetics. It helps to stabilize blood glucose levels, increase body metabolism and reduce the risk of complications due to diabetes. ^[18] In this study, a total of twelve respondents stated that healthy eating habits prevented weight gain and regulated blood sugar content. This result showed that they also knew that healthy eating habits could prevent complications from chronic diabetic diseases.

Additionally, this map also teaches respondents about how to control their food intake by using "hands" as an indicator. The food is divided into two categories, which are "free-to-eat" and "need to be controlled". "Free-to-eat" food is rich in vitamins and minerals such as green leafy vegetables and fruits. This is because fibre-rich food will act as "filters" that slow down the process of absorption of glucose into the blood. Result showed that all respondents understand how to make the right choice of food after learning from the map.

Besides, patients were also exposed to food groups according to the food pyramid. Some of the respondents were aware of the five groups but had difficulty to recall because they were confused. Even though it was hard to remember, but through this learning session, they know how to choose what types of food in each different group to get enough nutrients for their meal so that they could maintain the blood glucose within the normal range and minimise the complications of the disease.

Patient's understanding of active living lifestyle

According to the study by Polikandrioti & Dokoutsidou, the benefits of exercise for diabetics were to control the blood glucose level, increased insulin and metabolism level of protein and fat, prevented diabetes complications, increased flexibility and muscle strength, had a beneficial effect on cardiovascular system and could extend the lifespan of a patient. ^[18] Similarly, this study also showed that most of the respondents agreed that the benefits of adopting an active living lifestyle include the ability to control weight, blood sugar levels as well as BMI, to obtain a healthy and energetic body with a smart brain.

In addition, the World Health Organisation (2018) also suggested people to be active by doing physical activity at least for 30 minutes of regular, moderate-intensity in a day could reduce the risk of developing diabetes type 2 and its

complications. [19] In most European countries, training activities have been recommended by medical doctors as a precautionary measure. [19] Nevertheless, the majority of diabetics still do not exercise because of lack of counselling and time constraints. Due to their ignorance, they tend to take this matter lightly.

Respondents were also taught about the differences in staying active and exercising through this map. Staying active means an individual is actively engaged in daily activities while exercising is the movement of muscles of the body, such as participating in sports activities. The main purpose about these differences was to keep them active even though they have time constraints. Staying active does not necessarily mean solely working out at the gym but doing daily activities throughout the day is also a part of it. Hence, diabetic patients should not use excuses of time constraints for not doing physical activities because active movements are also considered to be active lifestyle.

Limitations of the study and future suggestions

This study just focuses on one topic only which is entitled "Healthy eating habits and Active living lifestyle". In fact, there are other four maps that actually could be discussed that cover a variety of topics such as good diabetes management, glucose monitoring in the blood, diabetes complications and medicines / insulin for diabetes. Therefore, findings from this study are not an overall answer to the acceptance of the Diabetic Conversation Map among patients.

Furthermore, time constraint is another limitation for this study. Some of the topics are not really relevant and appropriate within our culture and lifestyle. Some discussions could be dragged because patients need more time to understand and clarify on certain things which is not really clear. Because of this, some topics have not been discussed appropriately and patients could not get to know more.

Based on the above limitations, future study should consider improving this study by reviewing the question structure, language usage, learning duration, discussion topics and syllabuses that have been used in the kit of Diabetic Conversations Map. Besides, an intervention study should be conducted to see the effectiveness through the differences before and after using the map as part of an educational tool for Diabetes Self-Management Education so that findings can be strengthened and expanded across Malaysia to replace the old learning method.

CONCLUSION

In conclusion, all respondents showed a positive perception of using the Diabetes Conversation Map as a new educational tool and self-management to achieve a better quality of life. Moreover, their understanding towards healthy eating habits and active living lifestyles also became better through these small group discussion activities which were intended to provide opportunities for patients to interact with others who have the same disease. They found that this experience will help them to modify their lifestyle and give full commitment to a more meaningful life-change. As such, this map should be fully utilised to empower individuals to make positive behavioural change and make a difference in their overall health.

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REFERENCES

1. Reaney M, Zorzo EG, Golay A, Hermanns N, Cleall S et al. Impact of Conversation Map™ Education Tools Versus Regular Care on Diabetes-Related Knowledge of People With Type 2 Diabetes: A Randomized, Controlled Study. *Diabetes Spectrum* 26. 2013; 4(236-245)

2. GhafoorErum, RiazMusarrat, Eichorst Barbara, FawwadAsher, and Basit Abdul. Evaluation of Diabetes Conversation Map™ Education Tools for Diabetes Self-Management Education. *Diabetes Journals*. 2015; 28:4(230-235)
3. Norris, S.L., Lau, J., Smith, S.S., Schmid, C.H., & Englelau, M. Self-Management Education for Adults with type 2 Diabetes. *Diabetes Care*. 2002; 25 (7): 1159-1171.
4. Hung Jui-Yu, Chen Pin-Fan, LivnehHanoach, Chen Yi-Yu, Guo How-Ran, Tsai Tzung-Yi. Long-term effectiveness of the Diabetes Conversation Map Program: A prepost education intervention study among type 2 diabetic patients in Taiwan. *Medicine*. 2017; 96:36
5. Grenzi, A. Applying new diabetes teaching tools in health-related extension programming. *Journal of extention*. 2010; 48(1). <http://www.joe.org/joe/2010february/iw5.php> [15Julai 2014].
6. Figueira ALG, Gomes-Villas Boas LC, Coelho ACM et al. Educational interventions for knowledge on the disease, treatment adherence and control of diabetes mellitus. *Rev. Latino-Am. Enfermagem*. 2017; 25:e2863.
7. Hassan MB. Applying Conversation Map program as a nutrition education program for type II diabetic patients at Al-Noor Hospital Makkah Saudi Arabia. *International Journal of Pure and Applied Sciences and Technology*. 2014; 20(2):8-18.
8. Haus R. Effectiveness of U.S Diabetes Conversation Map Patient Education Program in Improving Glycemic Control. 2017
9. Carvalho SL, Ferreira MA, Medeiros JMP, et al. Conversation map: an educational strategy in the care of elderly people with diabetes mellitus. *Rev Bras Enferm*. 2018; 71(suppl 2):925-9.
10. Shih Yin-Ting, Hsu Hui-Chun, Chen Shi-Yu, et al. The effect of the Conversation Map™ program in patients with poor glycemic control with type 2 diabetes mellitus-when usual care is not enough. *Int J ClinExp Med* 9(2). 2016; 3473-3480.
11. McLeod, S. A. 2017. Kolb - learning styles. Retrieved, Malaysia: August 28, 2018 from <https://www.simplypsychology.org/learning-kolb.html>
12. Honey, P. and Mumford, A. (1992). *The manual of learning styles*. Maidenhead: P.Honey.
13. GhafoorErum, RiazMusarrat, Eichorst Barbara et al. Evaluation of Diabetes Conversation Map™ Education Tools for Diabetes Self-Management Education. *Spectrum. Diabetes Journals. Org*. 2015; 28:4(230-235)
14. Mensing, C. R. & Norris, S.L. 2003. Group Education in Diabetes: Effectiveness & Implementation. *Diabetes Spectrum*. 2003; 16: 96-103.
15. Illeris, K. (2002). *The Three Dimensions of Learning: Contemporary Learning Theory in the Tension Field between the Cognitive, the Emotional and the Social*. Copenhagen: Roskilde University Press, and Leicester: NIACE (American edition: Krieger Publishing, Malabar, FL, 2004).
16. Kolb, DA. (1984): *Experiential Learning: Experience as the Source of learning and Development*. Englewood Cliffs, NJ: Prentice-Hall.
17. Malaysian Dietary Guidelines 2010. (MDG). Eat variety of foods within your recommended intake. Retrieved, Malaysia: October 11, 2018 from <http://www2.moh.my/images/gallery/Garispanduan/diet/KM1.pdf>.
18. Polikandrioti, M. & Dokoutsidou H. The Role of Exercise and Nutrition in Type II Diabetes Mellitus Management. *Health Science Journal*. 2009; 3(4): 216-221.
19. World Health Organization (WHO). Fact Sheets Diabetes. Retrieved, Malaysia: October 10, 2018 from <http://www.who.int/news-room/fact-sheets/detail/diabetes>

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