

## Diabetes education in Mexico: patient and family

## Educación sobre diabetes en México: paciente y familia

Pelcastre-Neri, Aldo; de Carranza-Ayala, Vanessa C.

 Aldo Pelcastre-Neri

life\_9422@hotmail.com

Consultorio privado, México

Vanessa C. de Carranza-Ayala

vcaballerocarranza@gmail.com

Consultorio Privado, Pachuca, Hgo., México

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sitioweb@uaeh.edu.mx

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Corresponding author: life\_9422@hotmail.com



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**Abstract:** Introduction. Despite the efforts to provide care for people with type 2 diabetes by conducting multiple intervention studies to educate people with diabetes mellitus, work still needs to be done to include the family as a strategy to improve disease control. Objective. A systematical review was made with the objective of analyzing educational interventions, implemented in adult people with diabetes mellitus type 2 in Mexico, including their family. Materials and Methods. Bibliographic search was made in CrossRef, Medline (PubMed), EBSCO, SCIELO and UAEH digital library. Results. From the nine articles found, seven mention the importance of the family receiving diabetes education. However, none of them mention the family in educational sessions as part of comprehensive management. Three articles mention the economic impact to the family as an out-of-pocket expense. Conclusions. Educational interventions in diabetes significantly improve the metabolic control of people with diabetes mellitus type 2, however, in Mexico there is no evidence of the inclusion of the family in such interventions, whose importance lies as support within the family system.

**Keywords:** Education, diabetes type 2, Mexico, intervention, family.

**Resumen:** Introducción. A pesar de los esfuerzos que existen para brindar atención a las personas con diabetes tipo 2 realizando múltiples estudios de intervención para educar a personas con diabetes mellitus, aún se necesita trabajar para incluir la participación de la familia como estrategia para mejorar el control de la enfermedad. Objetivo. Mediante una revisión sistemática analizar intervenciones educativas aplicadas a personas adultas con diabetes mellitus tipo 2 realizadas en México y el grado de participación de los familiares. Material y métodos. La búsqueda bibliográfica se realizó en las bases CrossRef, Medline (PubMed), EBSCO, SCIELO y biblioteca digital UAEH. Resultados. De los nueve artículos encontrados, siete mencionan la importancia de que la familia reciba educación en diabetes. Sin embargo, ninguno menciona incluir a la familia en las sesiones educativas como parte del manejo integral. Tres artículos mencionan el impacto económico a la familia como gasto de bolsillo. Conclusiones. Las intervenciones educativas en diabetes mejoran significativamente el control metabólico de las personas que padecen diabetes mellitus tipo 2. En México no se ha encontrado evidencia de incluir a la familia en dichas intervenciones, cuya importancia radica como apoyo dentro del sistema familiar.

**Palabras clave:** Educación, diabetes tipo 2, México, intervención, familia.

## INTRODUCTION

Currently, low to high-income countries have focused their interest in public policies to improve public health's status on population, to face the consequences of diverse diseases, mainly, confronting daily incidences from many illnesses. Chronic degenerative diseases are the most, like diabetes mellitus, arterial hypertension and cardiovascular diseases, but they could be avoided; nevertheless, people with this kind of illness increases.<sup>1</sup> Mexico is not an exception. It has been tried to find a solution that contributes with a health improvement, especially for diabetes mellitus. Mexico is trying to decrease diabetes mellitus incidence, improving life styles promoting the healthy ones, besides, it includes the whole family for therapies, because education is an indispensable pillar for a successful glucose and metabolic control of people with diabetes mellitus.<sup>2,3</sup>

Both patients and family members share risk factors, which demand pertinent attention to prevent disease and condition derived from unhealthy life styles. Health and educational institutions have been developing strategies during at least 10 years, but practical implementation has not been possible. It is an opportunity area that contributes to metabolic control in people with diabetes mellitus.<sup>2</sup>

Efforts in public policies in Mexico are well sustained. Its continuity and position make possible their implementation and verification, contributing to health prevention and promotion in population.<sup>4</sup> Some policies, for example, sugary drinks taxes, mandatory frontal labelling, censoring publicity with high calorie content during kids viewing time, outstand from others because are in fact implemented and valued, so population may know them and support them. In contrast, main objectives are far away, because prevalence and score in diabetes mellitus, within its complications are not decreasing, causing mortality.<sup>5-9</sup>

According to the International Diabetes Federation (IDF), prevalence of persons with diabetes disease in 2017 were 425 million all around the world. Ages oscillate between 20 and 79 years old. From that, 79% are people living into low-middle income countries. If age category increases from 18 to 99 years old, the number of populations will be 451 million. If that rate remains, then 629 million people from 20 to 79 years old and 693 million people from 18 to 99 years old will have diabetes in 2045.<sup>9</sup> In concrete, economic dynamic in some countries from low to middle incomes will cause more population with diabetes.

Estimations have rated alarming increases during many decades. So, more than a third part of the population with diabetes are caused by growing and aging: 28 % increased by age prevalence, while 32% is due to an interaction between growing and aging.<sup>9</sup> In the same way, the cause of the expensive costs and economic burden on health is closely related to the degree of metabolic control. In Latin America, it is estimated that a 70% from population with diabetes have an improper control.<sup>10</sup>

In 2015, The World Health Organization (WHO) determined that diabetes mellitus caused 1.6 million death people around the world. Furthermore, hyperglycemic states provoked 2.2 million deaths. Even more, WHO projected that in 2030 diabetes will be the 7th cause of mortality around the world.<sup>11</sup>

According to the data of FID (2017), Mexico occupies the fifth place with diabetes mellitus population in the world, with 12 million.<sup>9</sup> In addition, people with diabetes rises from 9.2% in 2012 to 9.4% in 2016 in Mexico. Men between 60 to 69 years old and women older than 60. Also, there is a report of a 10.2%

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## AUTHOR NOTES

life\_9422@hotmail.com

prevalence of people with medical diagnosis in south region. Women had the highest prevalence in the center of the country with 11.7%, and men in the southern region with 11.2%.<sup>6</sup>

Two-year Health at a Glance report (2017) rates Mexico in first place of diabetes in the Organization for Economic Cooperation and Development (OECD). Its prevalence is 15.8% in population between 20 to 79 years old. As a consequence, Mexico has doubled the prevalence in diabetes mellitus compared to other OECD countries, when average is 7% for members. Due to this, there is a mortality alert in contrast with Estonia, Ireland, Luxemburg, Sweden and The United Kingdom, where only 5% of adult population have that disease.<sup>5,6</sup>

According to Official Mexican Standard NOM-15 for prevention, treatment and diabetes control, 8.2% of population between 20 and 90 years old have diabetes; in addition, 30% do not know they have a disease. So, it is estimated that Mexico have more than four million people with diabetes mellitus, but more than a million have not been diagnosticated yet.<sup>12</sup>

Many studies have demonstrated benefits about diabetes education to improve metabolic control in people. It improves knowledge, decision making and decreases healthcare costs caused by disease.<sup>3,13,14</sup> Thus, including family members, many researches have related family role and types of family with glycemic control. Family support impacts in diabetes control, also in knowledge about disease and contributes with making decisions.<sup>8, 14-23</sup>

Alulima Salazar<sup>18</sup> mentioned that deficient family support in most patients with diabetes causes regular adherence to treatment. Most of patients with diabetes mellitus disease do not get family support, because family do not know their influence on sick people's well-being, causing unhealthy conditions into integral health. Besides, family information determinates support in patient with diabetes mellitus, due to its influence into metabolic control.<sup>17</sup> As it can be seen above, it is important to educate first degree relatives in cohabitation with a person with diabetes mellitus, so they can intervene indirectly with their therapy and reach favorable results for all.<sup>12</sup>

Perez Rodríguez et al.<sup>17</sup> mentioned that both patient and family conform a risk group. That is to say that training of all is important to prevent disease, through health life styles. In addition, therapeutic education for both should be progressive and continuous, with the objective of actively involve both of them as part of the therapy.

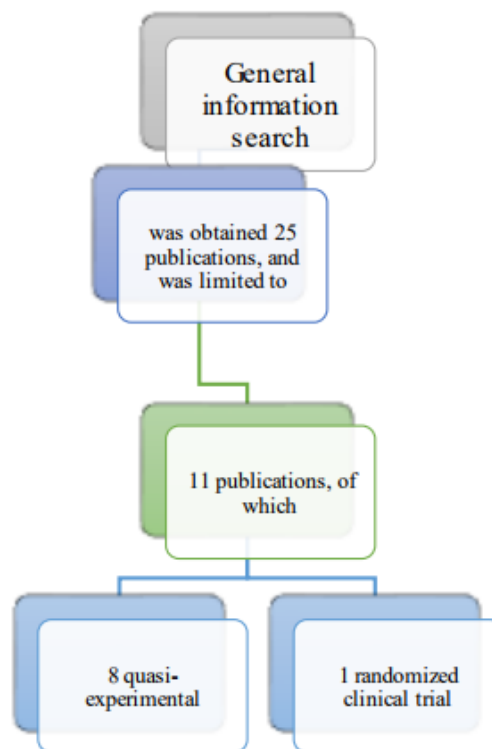
Due to this, this study has the objective of analysing educational interventions, implemented into adult people with diabetes mellitus type 2 in Mexico, including family.

## MATERIALS AND METHODS

Bibliographic search was made in CrossRef, Medline (PubMed), EBSCO, SCIELO and UAEH digital library and articles between 2010 and 2018 were considered. Using keywords as "education", "diabetes type 2", "Mexico", "intervention" and "family". At first, 25 papers were found. Population was used as a filter (studies with adults), language (English and Spanish), and country (Mexico), and 18 papers were obtained. Through reading and reviewing, only 9 researches were selected, excluding those without an intervention study in people with diabetes mellitus type 2.

## RESULTS

After a process of information search and selection, 9 papers were included (Figure 1). Main characters and results are resumed in Table 1.



*Figure 1. Strategy for publications selection (own elaboration).*

FIGURE 1.

*Strategy for publications selection (own elaboration). Intervention studies own elaboration*

Diabetes mellitus is a disease which requires many therapies. This is why it is a complex disease. Mexico has made some efforts facing problems about education of people with diabetes mellitus, however, a lack of publications about educational intervention was identified, as it was expected.

Diverse ways of leading with human behavior of people with diabetes mellitus have been proposed. They have as a goal to improve metabolic control, for a better life quality. In the Hernandez Lira<sup>24</sup> study, a randomized clinic trial made an assessment of the effectiveness on a medical therapy within diabetes education, through an educational multimedia tool, in comparison with a habitual medical care. Two hundred and forty six patients with diabetes mellitus type 2 were part of the research, but there were not statistically significant differences into BMI, diabetes knowledge, blood pressure, self-efficacy, self-informed medical care; on the other hand, perceived susceptibility of complications showed significant statistical differences.

All quasi experimental researches have had favorable results in different variables that were considered. Differences between them were related to population to which the project is directed, social demographic and cultural characteristics, members leading intervention (either multidisciplinary or not) and gender differences.

In the research by Ávila Domínguez<sup>25</sup>, 28 indigenous people with diabetes mellitus type 2 were educated during 8 weekly sessions, and no significative differences on weight were founded; on the other hand, waist circumference was statistically relevant ( $p=0.00$ ), systolic blood pressure ( $p=0.00$ ), and glycosylated hemoglobin ( $p=0.00$ ). In addition to it, Hernández Sánchez<sup>26</sup> studio evaluated results of a year training for 449 people with diabetes mellitus Type 2 inside a group called DiabetIMSS, showing an increase of controlled patients in variables as fasting glucose, glycosylated hemoglobin, total cholesterol, triglycerides and blood pressure.

Mexico gives specialized attention through Medical Specialties of Critical Diseases Units (UNEME-EC). UNEME are able to give integral attention to people with diabetes mellitus, as an example. Velasco Limón's<sup>27</sup> study included an educational program with 83 patients with diabetes mellitus type 2 inside a UNEME-EC. The educational program worked during 6 educational sessions and 8 weekly workshops or dynamics of learning. The results showed that people increased their knowledge level about diabetes mellitus, statistical significant with  $p < 0.0011$ , besides biochemical data with  $p < 0.05$  on blood pressure, waist circumference, capillary glycaemia, glycoside hemoglobin, total cholesterol in women, meanwhile for men only capillary glycaemia and glycoside hemoglobin.

Evidently, there is a clear result difference, because women had more statistically significant variables in comparison with men. It is an important data to be considered in subsequent studies and find strategies for an improvement of the same data in men.

Likewise, a study made by Hernández et al.<sup>28</sup> implemented 16 workshops with weekly sessions. In this study, diabetes education is part of a therapy and showed an improvement in the knowledge level, statistically significant  $p = 0.00$  of people with diabetes mellitus type 2, and glycosylated hemoglobin results report a lack of significant differences.

Conforming a multidisciplinary team for educational interventions demonstrate the importance of integral attention in health care services in Mexico. The study by Pichardo Hernández et al.<sup>29</sup> reinforces the aforementioned. They had 6 sessions of two hours per week, with a multidisciplinary team in charge (Family medicine, Nutrition, Stomatology, Social Work, etc.), where the number of participants with an adequate level of knowledge and glycemic indexes for a disease control, improved. At the end, authors concluded about the importance of increasing human and financial resources, so results could even get better, because main limitations were related to economic resources requirements for transportation and the lack of support from the family.

Guzmán Priego et al.<sup>30</sup> implemented monthly chats for 25 people with diabetes mellitus type 2. They provided the users with an information kit about diabetes mellitus type 2 for therapy and prevention. At the end, the people's average blood glucose were reduced, as well as glycosylated hemoglobin, creatinine, urea, BUN, cholesterol and triglycerides. Besides, results were statistically significant on glucose  $p = 0.0127$ , glycosylated hemoglobin  $p = 0.0045$ , cholesterol  $p = 0.0025$  and triglycerides  $p = 0.0114$ . Finally, they concluded that diabetes education influenced directly on changes in biochemical data that were part of their research.

The diversity of methods to manage the intervention are noticeable. For instance, the study from Velasco Casillas et al.<sup>31</sup> only had one two-hour session. Thirty adult patients diagnosticated with diabetes mellitus type 2 were part of it, inside a Health Center dependent of the Ministry of Health. During the only session an intervention occurred, and conversational maps were used; at the end, participants were equipped with didactic materials as a complement. Pre and post measurement were implemented with a rank of three months of difference between them. Implemented measurement were about diabetes knowledge, clinical measures, anthropometrics and biochemical ones. Results were statistically significant for glucose ( $p = 0.017$ ), diastolic blood pressure average ( $p = 0.009$ ) and knowledge level ( $p = 0.001$ ); in contrast, BMI, glycosylated hemoglobin, triglycerides and total cholesterol.

Vargas Ibáñez et al.<sup>14</sup> also made a study in patients diagnosed with diabetes mellitus type 2, at the end of a year for people with diabetes. The intervention consisted in 12 two-hour weekly sessions each for the experimental group. The main topic was about "diabetes education, decreasing ignorance costs". From Andalusia Regional Government Health Council, a control group was part of traditional education about self-care and disease therapy during their scheduled appointments. The intervention's duration was the same as the intervention for the experimental group. Three measurements were made: one before intervention, another one after 6 months, and the last one a year later. Results showed statistically significant differences in



the study group, in variables like serum glucose  $p=0.004$ , quality of life with  $p=0.01$  and knowledges  $p=0.00$ ; in contrast, the control group did not show relevant data. Total cholesterol and triglycerides did not show significant data, neither did the control and study groups. The quality of life got worse from the second to third measurement. According to the author, it was a consequence of a lack of follow-up on behalf of the health team. As a consequence, there was a lack of interest by sick people on their life quality.

#### *Family inclusion*

From a total of papers, only seven mentioned the importance of the family's education about diabetes. None of them mentioned the inclusion of the family in educational sessions of patients as part of an integral management. Three articles only mentioned economic impact for the family as an out of pocket spending caused by the disease.

The participation of family members in the patients' therapy is critical.<sup>32</sup> After a detailed review, all researches that included educational intervention were implemented only for patients with diabetes mellitus. Nevertheless, researches show a theoretical evidence about the importance of such implementation for family members. For example, Hernández Sánchez<sup>26</sup> mentioned that DiabetIMSS program had as a main objective to achieve positive behaviors and changes in the life style of patients along with their family. In the same way, the study of Guzmán Priego et al.<sup>30</sup> mentioned the importance of diabetes education. To them, the importance is focused on being informed, motivated and also in the strength of people with diabetes and their family members; in addition, they said that positive changes in quality of life depended on patients, health staff and their family members. However, the educational importance<sup>33</sup> was an essential part of health planning and must involve the patient's family, the diabetes care team, the community and all the decision makers during the educational process.<sup>14,34,36</sup> Besides, they add recommendations from the American Diabetes Association (ADA) focused on the objective of early education for the sick person and his/her family to self- manage the disease.<sup>35</sup>

## DISCUSSION

None of the papers that were reviewed included the educational intervention for the family of people with diabetes mellitus type 2. Nevertheless, seven of the nine researches considered the importance of family role in the disease control, even though they included a fundament inside a theoretical framework.

Each research favored the patients in some aspect. All of this contributes to a favorable state of health. Educational interventions in Mexico were favored by collaborative work between different health disciplines. Some of them made a diagnostic before the intervention and planned appropriate strategies for the study population. As a consequence, the probability of success increases.

#### **Table 1. Studies summary**

TABLE 1  
Studies summary

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Author and year	Paper's name	Aim	Type of design	Sample	Main results	Inclusion of family members in the intervention
Ávila R, 2018 <sup>25</sup>	Education on diabetes from an intercultural focus since Cognitive modifiability theory – Instrumental Enrichment Program [FIE].	To evaluate the effect of diabetes education with an intercultural approach based on the Theory of Cognitive Modifiability-Instrumental Enrichment Program [PEI] on the anthropometric measures, serum glucose and glycosylated haemoglobin levels of the participants.	Quasi-experimental	28 adult persons with diabetes mellitus	Differences in waist circumference (p=0.00), systolic blood pressure (p=0.00) and glycated hemoglobin (p=0.00).	Not included
Hernández N, 2018 <sup>26</sup>	Effectiveness of Diabetes education on Clinical and biochemical parameters in Diabetes Mellitus Patients that have concluded one year training as part of Diabetimss group in HGZ with UMF1, Pachuca, Hidalgo	To evaluate the efficacy of diabetes education on clinical and biochemical parameters in patients with diabetes mellitus who completed a year of training in the Diabetimss group at HGZ with UMF 1, Pachuca, Hidalgo.	Quasi-experimental Observational, comparative, longitudinal, retrospective.	499 patients with diabetes mellitus	Metabolic control as achievement, from 32.08% at the beginning and 77.95% at the end.	Not included
Velasco E, 2016 <sup>27</sup>	Effectiveness of an educational intervention in knowledge level of patients with diabetes mellitus type 2 of Medical specialties Units of Chronic Diseases in the Federal District.	To evaluate the effectiveness of an educational intervention in patients aged three Units of Medical Specialties for Chronic Diseases (UNEME-EC) of the Federal District.	Quasi-experimental, descriptive and analytic, intervention type before-after (pre-post)	83 patients with diabetes mellitus	Increase of knowledge level (p<0.0011) and biochemical parameters statistically significant in systolic and diastolic blood pressure, weight, BMI, waist circumference, capillary glycaemia and glycosylated hemoglobin in men.	Not included
Hernández P, Maldonado G, Trejo C, López B, Cano A, 2015 <sup>28</sup>	Effect of health education in people with type II diabetes from health center of Atotonilco de Tula, Hidalgo, Mexico.	To evaluate the effect of a health education program in patients with type 2 diabetes mellitus as part of non-pharmacological treatment.	Quasi-experimental pre-post type	13 patients with diabetes mellitus type 2	Knowledge level (p=0.008)	Not included
Pichardo J, Elizaldi N, 2015 <sup>29</sup>	Scope of an Educational Strategy in Diabetic Patients of a Family Medicine Unit	To carry out a strategy addressed to diabetic patients to improve control of their disease.	Quasi-experimental with Educational intervention, with measures before and after research.	20 patients with diabetes mellitus	Positive modification in knowledge level, besides glucose control improvement from 58% to 80% at the end of intervention.	Not included
Guzmán C, Baeza G, Atlano D, Torres J, León O, 2017 <sup>30</sup>	Effect of an Educational Intervention on Biochemical Parameters of Diabetic Patients in an Institutional Health Service	To know the effect of an educational intervention on biochemical parameters of diabetic patients, users of an institutional health service.	Quasi-experimental with pre-post evaluation of intervention.	25 persons with diabetes mellitus type 2.	To glucose p=0.0127, glycosylated hemoglobin p=0.0045, cholesterol p=0.0025, triglycerides p=0.0114	Not included
Velasco A, Ponce E, Madrigal H, Magos G, 2014 <sup>31</sup>	Impact of a Conversational Map as an Educational Strategy to Improve the Metabolic Control of Patients with Diabetes mellitus type 2	To evaluate the impact of a conversational map about Diabetes mellitus type 2 (dm2).	Quasi-experimental, assessment pre-post 3 month span.	30 adults with diabetes mellitus type 2	Significant impact on glucose levels (p=0.017), diastolic blood pressure average (p=0.009) and knowledge level (p=0.001)	Not included
Hernández I, 2018 <sup>24</sup>	Effectiveness of medical therapy and Diabetes education as a multimedia program on Patients with Diabetes Type 2 from First Level attention.	To evaluate the effectiveness of medical and nutritional therapy by adding a multimedia educational program, versus usual medical care in patients with type 2 diabetes mellitus.	Randomized clinical trial with two intervention groups and one control group.	90 patients with diabetes mellitus type 2	Systolic and diastolic blood pressure on therapy group and multimedia education p<0.05	Not included
Vargas A, González A, Aguilar M, Moreno &, 2010 <sup>14</sup>	Comparative study of the impact of an educational strategy about knowledge level and quality of life in patients with diabetes mellitus type 2	To determine the biochemical parameters, the level of knowledge and the quality of life in group of patients with diabetes mellitus 2 who attended CMD «Dr. Ignacio Chávez», ISSSTE, after a year of having taken the "course for diabetic people" «Course for diabetic patients» and to compare and compare them with those observed after six months of being studied.	Quasi-experimental and clinical	21 patients for one experimental group and 17 for one control group	In intervention group: Serum glucose p=0.004, quality of life with p=0.01 and knowledge p=0.00	Not included

Source: Own elaboration.

*Source: Own elaboration.*

Besides, studies considered several didactic methods to take information from people with diabetes. All of them focused on a constructivist pedagogical model and tested patient's creativity and participation. At the end, the target was a learning improvement and its implementation in daily life.

On the other hand, the information is addressed to the patient, because they are directly affected by their own lifestyle. Both health professional and the family of a patient with diabetes must accept their responsibility to support them. For this, it is necessary to include the patient's family.<sup>32</sup>

Accordingly, the family members should be actively involved, and attend all the interventions. As Pérez Rodríguez et al.<sup>17</sup> mentioned, family share as many risk factors as the patients who must be cared based on health promotion and prevention.

Educational interventions about diabetes have a positive impact on adopting healthy lifestyles,<sup>37</sup> on improving biochemical results and somatometric measures.<sup>34</sup>

An important part of educational interventions is to assist people. It has been proven that there is a clear gender difference. Women attend in greater number than men. The study of Ávila Domínguez<sup>25</sup> concluded that the interest of health care is not evident in males, since their participation was very low. Also, persuading people to attend educational sessions is another crucial finding of the studies; as Velasco refers, it was a challenge to motivate people to attend and engage in educational sessions.

In Mexico, the management of educational content improves the effectiveness of educational sessions. It is an opportunity to rethink strategies and adapt them to the sociocultural context, allowing the person to focus attention on friendly content and using technology that is possibly unknown. In this regard, it could be useful to consider the engaging of multimedia strategies to provide information to people who suffer from diabetes, because in the short term they can improve some biochemical parameters.<sup>24</sup> Also, the use of conversational maps as a teaching tool allows participants to interact and actively engage to improve their health conditions, since it is a tool easy to use, inexpensive and attractive.<sup>31</sup>

Most studies showed a problem about continuity of educational interventions. It is a problem because it works to carry out planning, diagnosis, pilot testing, perform the procedure, get the results, analyze them. Studies probably deliver results to the study population and also to health agencies or institutions where they manage their disease.

A consequence of that is a waste of research production. Only interventions that have continuity are carried out as part of the Mutual Aid Groups for Chronic Diseases (GAM-EC), however, it is not likely to innovate the way sessions are conducted, or the inclusion of different ideas from interventions made by other health professionals. All of this could cause results focused on these studies were the same or with minor factors. As it can be seen, when a lack of continuity occurs, it would be observed that people return to a state of bad control, so, at the end of educational sessions, participants improve in terms of disease control, but once they stop attendance, they return to their same unhealthy life styles, which conditioned them to a bad control.

Therefore, it is an opportunity for such future interventions and for people with diabetes mellitus type 2, to foster innovational medical equipment and a multidisciplinary<sup>35</sup> team responsible for providing continuity in health units. Important findings must be taken into account that benefit and enrich the planning, organization and participation in educational sessions since they are probably a start to improve this education<sup>33</sup> issue as part of the comprehensive treatment of a person who has a chronic illness such as diabetes mellitus type 2.<sup>14,25,36</sup>



## CONCLUSION

Education in people with diabetes mellitus (DM) in Mexico is an issue that needs to be strengthened, an issue that requires commitment and efforts of the health sector, health professionals and especially, the whole society. When interventions are made to educate people living with DM, then favorable results improve disease control, but also arise not favorable results like low attendance, lack of commitment and above all, the lack of continuity in health care. With this, the impact that several studies and efforts have had on the health sector in Mexico, is not reflected in the disease control for people with DM, as it was represented at the beginning of this work, with raw data about mortality, morbidity, complications and economic impact for the management of the condition.

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