__Original Research Article__

Relationship of the Self-perception of Lifestyle with Level of Physical Activity in People with <mark>Type 2 Diabetes and their offspring, without it.</mark>

.
ABSTRACT

Objective: To determine the relationship of the perception of lifestyle with level of physical activity in people with type 2 diabetes and without type 2 diabetes.

Study design: Analytical cross-sectional observational study.

Study location: Celaya, Guanajuato, <mark>Mexico</mark>; Mutual Aid Group.

Methodology: Sample composed of 100 people with type 2 diabetes and 100 people without type 2 diabetes, the lifestyle questionnaire and IPAQ questionnaire was used. Descriptive statistics were used for sociodemographic variables, frequencies and percentages for categorical, mean and standard deviation for quantitative variables. To demonstrate statistical significance of results, the value of P was set at .05. Statistical analysis was performed in STATA 13.0 ®

Results: No relationship was found between lifestyle perception and level of physical activity in adults with type 2 diabetes (X^2 = 0.0022 gl 1 *P* = .96) and a significant relationship between lifestyle perception and level of physical activity in adults without type 2 diabetes (X^2 = 5.23 gl 1 *P* = .02 RM = 2.85 95% CI = 0.80 to 10.4)

Conclusion: There is no relationship between the self-perception of lifestyle and the level of physical activity in people with type 2 diabetes, but it was shown that there is a significant relationship between the self-perception of lifestyle and the level of physical activity in people without type 2 diabetes.

Keywords: Physical activity; Diabetes; Self-perception of lifestyle.

1. INTRODUCTION

17 Type 2 diabetes mellitus (T2D) is a chronic degenerative disease with a prolonged latency
18 period that represents a burden for health services, for the patient, the family, the community
19 and the country [1].

20 T2D is a metabolic alteration of carbohydrates, with deficit in the production or release of
21 insulin, increasing blood sugar levels [2].

22 This chronic disease and its complications are one of the main causes of death in Mexico,
23 only surpassed by cardiovascular diseases for 2017, with a total of 75,637 deaths [3] and
24 with more than 331.13 new cases per 100 thousand population at year [4].

25 According to the Official Mexican Standard for the prevention, treatment and control of
26 diabetes, people at risk of developing diabetes are considered to be those who are
27 overweight / obese, sedentary, first-degree relatives with diabetes, age equal to or greater
28 than 65 years, women with a history of macrosomic products or with gestational diabetes [5].

29 The lifestyle is defined as the perception that an individual has of his place in existence, in
30 the context of the culture and the value system in which he lives and in relation to his
31 objectives, his expectations, his norms, his concerns [6].

32 Despite the benefits of a healthy lifestyle for both the control of T2D or to delay its
33 occurrence in those with risk factors such as family history OF T2D, many of them do not
34 maintain a healthy lifestyle [7].

35 Health can be affected by lifestyle and living conditions. The lifestyle includes attitudes and
36 values, which are expressed in the behaviour of the individual in different areas of life,
37 including physical activity, food, the use of alcoholic beverages, the use of cigarettes, the
38 excessive alcohol intake and the management of sexuality, as well as the social, physical,
39 cultural, and economic aspects that impact people's lives [8].

40 Currently, physical activity is any body movement produced by skeletal muscles that
41 requires energy expenditure [9].

42 The limited physical activity that exists in the lifestyles of society has manifested the
43 importance of performing some sport, becoming a social necessity to reduce risks of
44 presenting degenerative chronic diseases such as diabetes, thus having the opportunity to
45 maintain a healthy lifestyle. in people with T2D [8].

46 The main objective of the research was to determine the relationship of the perception of
47 lifestyle with level of physical activity in people with T2D and their offspring without T2D.
48
49 2. METHODOLOGY
50
51 2.1 Study design
52
53 Cross-sectional, observational, analytic.
54
55 2.2 Place and Universe of the study
56
57 Mutual Assistance Group (MAG) of Celaya, Guanajuato, Mexico, with registered people with
58 T2D, and one of their offspring.
59

2.3 Sampling

<mark>Patients with T2D registered in MAG in Celaya were 186 and of them 12 did not attended to the session of the group; from 174 patients were selected using a random number from Epidat 4.2, 2016 (Xunta de Galicia, OPS, OMS, Universidad CES), as simple random sampling. From each patient, we ask number of offspring, and by draw, it was selected one of their offspring.</mark>

2.4 Selection of participants

2.3.1 Inclusion criteria of subjects with T2D

All persons with T2D registered in the MAG of Celaya, Mexico, adults who voluntarily agree to participate in the study, signing the informed consent, whether male or female.

2.3.2 Exclusion criteria of subjects with T2D

Subjects with T2D, hospitalized or who do not agree to participate in the study.

2.3.3 Inclusion criteria of subjects without T2D

Offspring of subjects with T2D registered in the MAG of Celaya, Mexico, with 18 years of age or older, who voluntarily agree to participate in the study, signing the informed consent, whether male or female.

2.3.4 Exclusion criteria of subjects without T2D

Offspring of people with T2D who have not agreed to participate.

2.4 Variables

2.4.1 Sociodemographic

Age. Discrete quantitative variable; number of years from the date of birth; Its measurement scale is in years and is summarized with frequencies and percentages.

Gender. Dichotomous categorical variable; they are the phenotypic characteristics that differentiate men from women; Its measurement scale is male or female and is summarized with frequencies and percentages.

Civil status. Nominal categorical variable; it is the state of natural persons determined by their family relationships, originating from marriage, that establishes certain duties and rights; its measurement scale is single, married, divorced, widowed, separated, free union; It is summarized with frequencies and percentages.

Weight. Continuous quantitative variable; it is the body mass expressed in kilograms; It is measured on an altimeter scale, digital Medidata Series ®, without shoes with as little clothing as possible; Its measurement scale is in kilograms and is summarized with mean and standard deviation.

110 Height. Continuous quantitative variable; it is the measurement from the feet to the parietal
111 region of the scalp, expressed in meters; it is measured on an altimeter scale, digital
112 Medidata®, without shoes, in an upright position and facing forward; Its measurement scale
113 is in meters and is summarized with mean and standard deviation.
114
115 Body Mass Index. Continuous quantitative variable; is the body mass expressed in Kg / m2;
116 Its measurement scale is in Kg / m^2; and is summarized with mean and standard deviation.
117

2.4.2 Independent

120 Self-perception of lifestyle. Dichotomous categorical variable, which can be called habits in
121 terms of physical activity, food, smoking, alcohol consumption; its unhealthy measurement
122 scale is 0-39 points and healthy 40-78 points measured with the lifestyle perception
123 questionnaire [10]; It is summarized with frequencies and percentages.
124

2.4.3 Dependent

127 Physical activity level. Ordinal categorical variable; It is defined as any body movement
128 produced by skeletal muscles that requires energy expenditure; it is measured with the
129 International Physical Activity Questionnaire (IPAQ) [11], with mild categories with 0 to 599
130 METS / min / week, moderate / vigorous with 600 or more METS / min / week; It is
131 summarized with frequencies and percentages.
132

2.5 Questionnaires

135 The lifestyle perception questionnaire was used, which consists of 78 items with a
136 dichotomous answer of YES or No; it is dichotomized in unhealthy from 0 to 39 points and
137 healthy from 40 to 78 points; It has a reliability of 0.9 intraobserver and 0.89 interobserver.
138 For the physical activity the IPAQ short version in Spanish was used with questions of
139 vigorous, moderate activities and walking as well as sitting in the last seven days; the result
140 is transformed to METS / minute week; It has a Kappa reliability of 0.89 [12].
141

2.6 Procedures

144 Participants were explained the objectives of the study, as well as the advantages and
145 disadvantages of participating. They were asked to sign the informed consent. After doing
146 so, we proceeded to apply the lifestyle perception and the IPAQ questionnaires, and
147 anthropometry.
148

2.7 Sample size

151 Assuming that there is a ratio of 9 among those with an unhealthy and healthy lifestyle,
152 expecting 75% to be perceived with an unhealthy lifestyle and 50% with a healthy lifestyle,
153 the minimum sample size is 37 with a perception of Unhealthy lifestyle and 331 with
154 perception of healthy lifestyle, with 95% accuracy and 80% power (Epi Info, 7.1.3.0, 2013,
155 CDC, Atlanta, GA, USA).
156

2.8 Statistical análisis

158 Descriptive statistics were used for the sociodemographic variables frequencies and
159 percentages for the categorical, mean and standard deviation for the quantitative ones.
160

In order to show a relationship between perception of lifestyle and level of physical activity, a Chi-square test and P value, Odds Ratio (**O**R) and 95% confidence intervals (95% CI) were calculated. To demonstrate statistical significance of the results, the value of *P* was set at .05. Statistical analysis was performed in STATA 13.0® (Stata Corp., College Station, TX, USA).

3. RESULTS AND DISCUSSION

The sample consisted of 100 individuals with type 2 diabetes (T2D) and 100 people without T2D, where they named female persons with T2D (70%) and men without T2D (74%), individuals with marital status married to T2D (67%) and single without T2D (45%), people with no schooling with T2D (28%) and high school-university without T2D (25%), adults with a body mass index (BMI) greater than 25 kg/m^2 with T2D (81 %) and greater than 25 kg/m2 without T2D (75%) (Table 1).

Table 1.   Distribution of categorical sociodemographic variables by group

Variables		Subjects with T2D		Subjects without T2D	
		F	%	f	%
Gender					
	Female	70	70.00	26	26.00
	Male	30	30.00	74	74.00
Civil Status					
	Single	13	13.00	45	45.00
	Married	67	67.00	38	38.00
	Divorced	3	3.00	3	3.00
	Separate	4	4.00	1	1.00
	Widowed	9	9.00	12	12.00
	Free Union	4	4.00	1	1.00
Schooling					
	Nothing	28	28.00	16	16.00
	Elementary	27	27.00	13	13.00
	Secondary	19	19.00	18	18.00
	High School	12	12.00	25	25.00
	University	12	12.00	25	25.00
	Postgrade	2	2.00	3	3.00
Body mass index	>25 kg/m^2	81	81.00	75	75.00
	<25 kg/m^2	19	19.00	25	25.00

T2D Type 2 Diabetes

It was found that people with T2D have a higher BMI with a range of 19.39-58.59 kg / m^2 and although the BMI range in people without T2D is lower, BMI is still high with a range of 17.44-47.63 kg / m^2 (Table 2).

Table 2.   Distribution of quantitative sociodemographic variables by group

Variables	With T2D	Without T2D

Age (years)			
	Range	34-78	18-65
	Mean ± SD	56.12±10.26	34.94±12.60
Weight (kg)			
	Range	38-150	42-125
	Mean ± SD	74.70±16.60	71.87±16.10
High (m)			
	Range	140-1.86	1.34-1.90
	Mean ± SD	1.60±0.10	1.60±1.00
Body mass index (kg/m^2)	Range	19.39-58.59	17.44-47.63
	Mean ± SD	29.13±5.48	27.96±4.93

186 T2D Type 2 Diabetes

187

188 In the MAG the mild level of physical activity predominates in people with T2D (74.00%) and
189 mild in people without T2D (60.00%) and the perception of healthy lifestyle in people with
190 T2D is 96.00% and healthy in people without T2D is 85.00% (Table 3)

191
192 **Table 3. Distribution of study variables**
193

Variables		**With T2D**		**Without T2D**	
		f	%	f	%
Physical activity	Mild	74	74.00	60	60.00
	Moderate/ Vigorous	26	26.00	40	40.00
Lifestyle perception	Non-healthy	4	4.00	15	15.00
	Healthy	96	96.00	85	85.00

194 T2D Type 2 Diabetes

195

196 In adults with T2D of MAG Celaya, there was no relationship between lifestyle perception
197 and physical activity, $P = 0.96$ (Table 4).

198
199 **Table 4. Distribution of lifestyle perception and level of physical activity in people with**
200 **type 2 diabetes**
201

Variables	**Physical activity level**			
	Mild		Moderate/Vigorous	
Lifestyle perception	*f*	*%*	*f*	*%*
Non-healthy	3	75.00	1	25.00
Healthy	71	73.96	25	26.04
X²= 0.0022 df 1 P=.96				

202

203 In the MAG there is a significant relationship between the perception of lifestyle and level of
204 physical activity in adults without T2D throwing a value of *P* less than 0.05, marking that

people who have a level of mild physical activity, have 2.85 times more likely to have non-healthy lifestyle (OR = 2.85) (Table 5).

Table 5. Distribution of lifestyle perception and level of physical activity in people without type 2 diabetes

| Variables | Physical activity level | | | |
| | Mild | | Moderate/Vigorous | |
Lifestyle perception	*f*	*%*	*f*	*%*
Non-healthy	13	86.67	5	13.33
Healthy	47	55.29	38	44.71

X^2= 5.23 df 1 P=.02 OR= 2.85 95%IC = 0.80 a 10.4

In the investigation, by Cantú Martínez, the population with T2D had a prevalence of female gender (72.3%), marital status, married (69.2%), with primary schooling completed (49.2); being similar to the sample data in the MAG Celaya [13]. Piñón et al., in their research with people without T2D obtained a prevalence of the female gender (71.9%), with a finished high school education (64.5%); being similar to the results obtained in the MAG Celaya [14].

Cantú Martínez mentions that in his research, overweight and obesity stand out, having a high BMI agreeing that in the data obtained in the MAG Celaya they have a lot of equality between the two population of people with T2D [13].

Piñón et al., agree with the data obtained in the MAG since in their study a low level of physical activity predominates with 48.8% in people without T2D [14].

According to Cantú Martínez, in his study conducted in 2015 in various Urban Health Centers of the Metropolitan Area of Monterrey, México, with a sample of 65 people with T2D, he tells us that 29.23% considered having a "good lifestyle", percentage which corresponded to a "healthy" classification, while the highest concentration has an inadequate lifestyle (70.77%), with two classifications of the participants; then, 56.92% is characterized by "moderately healthy" behaviour and only 13.85% of these were classified as "unhealthy". A significant correlation was detected between the evaluated lifestyle and the dimensions considered, except with the emotional state [13].

Regarding the physical activity carried out by the patients in the study, the inquiries showed that 20% have a "good lifestyle" and a "healthy" classification, however, 80% show an "inappropriate lifestyle" ", Which is reflected in 47.6%," moderately healthy "; 20% is "unhealthy" and 12.3% "unhealthy". There is an average of 53 and a variation of 25, in the average lifestyle considered "moderately healthy" for this population [13]. Considering different results with the research in Celaya, Mexico, since there is no relationship between perception of lifestyle and level of physical activity in adults with T2D.

Piñón et al., in their study conducted in 2015 with participants of a program of healthy habits and lifestyles in the municipality of Popayán Colombia, with a sample of 217 participants

without T2D, with respect to the level of physical activity measured with IPAQ , the study reports a general prevalence of 3.22% around the performance of vigorous physical activity; with an average of 181 minutes / week, in terms of moderate physical activity the prevalence was 15.1%, 223 minutes / week; the general prevalence of low physical activity was 70.3% in which subjects who performed less than three days of moderate activity were classified, having a significant relationship between the perception of lifestyle and level of physical activity [14]

Therefore, this study yielded the same results to this research, marking a relationship between lifestyle perception and level of physical activity in adults without T2D.

In a study with 150 people with T2D, in India, 60% had BMI greater than 25 kg / m2 and reported that only 8% did some type of exercise or walked at least 4 days a week; 58% ate more than 3 times a day but only once a week [15], which is considered a healthy measure, eat five times a day but in smaller quantities. The population of Celaya with T2D, reported 74% of the participants doing mild physical activity.

Yuing et al., In a meta-analysis show that physical activity, with monitoring and surveillance of patients with T2D, improves glycosylated hemoglobin levels [16]. It would be desirable that our patients with T2D perform more exercise with monitoring to improve their biochemical parameters and that their children who do not yet develop the disease, the exercise will probably cause their appearance to be delayed.

A strength of the study is that there were no defections and all the members of the samples complied with all the procedures. A weakness is that people with T2D are not comparable with the group of their descendent without T2D. What was intended was to check if the children of people with T2D had a better self-perception of their lifestyle than their parents with T2D.

4. CONCLUSION

In the study carried out it was found that there is no relationship between the self-perception of lifestyle and the level of physical activity in people with T2D, but it was demonstrated, however, that there is a significant relationship between the self-perception of lifestyle and level of physical activity in people without T2D, this is because people without T2D (offspring of people with T2D).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

CONSENT

All authors declare that 'written informed consent was obtained from of the study participants for publication of this investigation. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

288
289 The protocol was reviewed and approved by the Bioethics Committee of the Division of
290 Health Sciences and Engineering of the Celaya-Salvatierra Campus of the University of
291 Guanajuato, with registration number CIBCSIC-1381310
292

REFERENCES

294
295 1. Velázquez O, Lara A, Martínez MY, Márquez F. Integrated detection as an instrument to
296 link primary prevention, early treatment and epidemiological surveillance in diabetes and
297 high blood pressure.Rev Endocrino y Nutr 2000; 8(4):129-135.
298
299 2. Mexican Diabetes Federation. The numbers of diabetes in Mexico, (2008). Available in:
300 http://www.fmdiabetes.org/v2/paginas/d_numeros.php
301
302 3. Instituto Nacional de Geografía, Estadística, Informática. Causes of death. Total general
303 deaths by main causes of mortality, 2008. Available in: http://www.inegi.org.mx
304
305 4. Instituto Nacional de Geografía, Estadística, Informática. Number of diabetes cases per
306 100 thousand inhabitants, 2017. Available in: http://www.inegi.org.mx
307
308 5. World Health Organization. Quality of life. 2005. Available in:
309 http://vidacalida.blogspot.com/2010/12/oms-calidad-de-vida-2005.html
310
311 6. Ministry of Health. Modification to the Official Mexican Standard NOM-015-SSA2-1994, for
312 the prevention, treatment, control of diabetes mellitus in primary care to become the Official
313 Mexican Standard NOM-015-SSA2-1994, for prevention, treatment and control of diabetes.
314 Available in: http://salud.gob.mx/unidades/cdi/nom/m015ssa24.htm
315
316 7. World Health Organization. Global Strategy on Diet, Physical Activity and Health. 2005.
317 Available in: https://www.who.int/dietphysicalactivity/pa/es/
318
319 8. Guerrero Montoya LR, León Salazar AR. Lifestyle and health. Educere. 2010; 14 (48): 13-
320 19. Available in: http://www.redalyc.org/articulo.oa?id=35616720002
321
322 9. Muñoz Diaz JC. Habits and lifestyles in relation to physical activity in primary education.
323 Revista Digital. 2004; 10(79):1/1. Available in:
324 https://www.efdeportes.com/efd79/habitos.htm
325
326 10. Baños Benitez A, Gallart-Magaña G. Application of style questionnaires healthy lives for
327 students and teachers of the Latin American school of Medicine. Memories of the First
328 Congress of Health, Quality of Life and Environment. 2005;SCV004.
329
330 11. Ruiz JR, Ortega FB. Physical activity and cardiovascular disease risk factors in children
331 and adolescents. Curr Cardiov Risk Rep. 2009; 3(1): 281-7. Doi:
332 https://doi.org/10.1007/s12170-009-0043-6
333

334 12. Booth ML. Assessment of physical activity: An international perspective.Research
335 Quarterly for Exercise and Sport. 2000; 71(2):114-20.

336

337 13. Cantú Martínez PC. Lifestyle in adult patients with type 2 diabetes mellitus. Enfermería
338 Actual en Costa Rica. 2014; (27):1-14. Doi: http://dx.doi.org/10.15517/revenf.v0i27.15996

339

340 14. Vernaza-Pinzón P, Villaquiran-Hurtado A, Paz-Peña CI, Ledezma BM. Risk and level of
341 physical activity in adults, in a program of healthy lifestyles in Popayán. Revista de Salud
342 Pública. 2017; 19(5):624-30. Doi: https://doi.org/10.15446/rsap.V19n5.53042

343

344 15. Shukla A, Baghel AS, Vyas M. Diet and lifestyle-related factors associated with
345 Apathyanimittaja Prameha (type 2 diabetes): A cross-sectional survey study. Ayu.
346 2018;39(4):199–207. Doi: http://doi.org/10.4103/ayu.AYU_108_16

347

348 16. Yuing T, Lizana PA, Berral FJ. Hemoglobina glicada y ejercicio: una revisión sistemática.
349 Rev Med Chile. 2019;147(4): 480-9. Doi: http://doi.org/10.4067/S0034-98872019000400480

350
351

352
353
354
355