

Validity and Reliability of the Diabetes Eating Problem Survey-Revised (DEPS-R) in Mexican Population: An Instrumental Study

Validez y confiabilidad del Diabetes Eating Problem Survey-Revised (DEPS-R) en población mexicana: un estudio instrumental

Ometéotl Hernández-González,* José E. Andrade-Pineda,* Mónica C. Osorio-Granjeno.*

Summary

Objective: To evaluate the validity and reliability of the Diabetes Eating Problem Survey-Revised (DEPS-R) instrument to identify the risk of eating disorders (ED) in a Mexican population diagnosed with Diabetes Mellitus (DM). **Methods:** A three-stages instrument validation study. Stage 1. Translation: three translators, whose native language was Spanish, translated the English version of the DEPS-R instrument; Stage 2. Using the Delphi method, the validity of the content was estimated through an evaluation of five experts; subsequently the wording was evaluated applying the instrument to a pilot group of ten people; finally, the instrument was applied to a calculated sample (95% confidence interval; 5% error rate) of 130 patients. Stage 3: A psychometric evaluation was carried out, calculating Cronbach's alpha, and Spearman's correlation coefficients. **Results:** Cronbach's alpha was 0.72. Spearman's correlation coefficient was calculated, highlighting the weight/score ratio obtained in the second version of the DEPS-R with 0.3645 ($p < 0.0001$). **Conclusion:** there is good reliability in the translated and validated version of the instrument, making it an adequate screening measure for the identification of ED in the Mexican population.

Keywords: Feeding and Eating Disorders; Diabetes Mellitus, Diabulimia.

Suggestion of quotation: Hernández-González O, Andrade-Pineda JE, Osorio-Granjeno MC. Validity and Reliability of the Diabetes Eating Problem Survey-Revised (DEPS-R) in Mexican Population: An Instrumental Study. *Aten Fam.* 2023;30(1):15-20. <http://dx.doi.org/10.22201/fm.14058871p.2023.1.83856>

This is an open access article under the CC-BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

*Unidad de Medicina Familiar No. 33, Instituto Mexicano del Seguro Social. Ciudad de México, México.

Received: 04/19/2022
Accepted: 08/08/2022

Correspondence:
Ometéotl Hernández-González
omehernandezg@gmail.com

Resumen

Objetivo: evaluar la validez y confiabilidad del instrumento *Diabetes Eating Problem Survey-Revised* (DEPS-R) para identificar el riesgo de trastornos de la conducta alimentaria (TCA) en población mexicana con diabetes mellitus (DM). **Métodos:** estudio de validación de un instrumento en tres etapas. Etapa 1. Traducción: tres traductores, cuya lengua materna era el español realizaron traducciones de la versión en inglés del instrumento DEPS-R; Etapa 2. Se estimó la validez de contenido, a través de una evaluación por cinco expertos mediante el método Delphi, se evaluó subsecuentemente la claridad de la redacción con la aplicación del instrumento a un grupo piloto de diez personas; finalmente se aplicó el instrumento a una muestra calculada (intervalo de confianza 95%; porcentaje de error 5%) de 130 pacientes. Etapa 3. Se realizó una evaluación psicométrica, calculando el coeficiente alfa de Cronbach y el de correlación de Spearman. **Resultados:** se obtuvo alfa de Cronbach de 0.72. Se calculó el coeficiente de correlación de Spearman, destacando la relación peso/puntaje obtenido en la segunda versión del DEPS-R con 0.3645 ($p < 0.0001$). **Conclusión:** la versión traducida y validada del instrumento demostró buena confiabilidad, por lo que es una medida de escrutinio adecuada para la identificación de TCA en población mexicana.

Palabras clave: trastornos de la conducta alimentaria; diabetes mellitus, diabulimia

Introduction

The prevalence of Diabetes Mellitus (DM) in adult patients has increased worldwide in recent years; according to the Inter-

national Diabetes Federation (IDF),¹ in 2000 there were 151 million cases, by 2015, there were 415 million and it is expected to increase 54% by 2040.

An adequate diet, physical exercise, and pharmacological approach are the mainstays of treatment. It has been identified and described that psychiatric disorders are common in patients with DM, including eating disorders (ED), anxiety, depression, and suicide.²⁻⁷

EDs have been related to the approach to the disease in patients with DM, which is mainly based on the control of carbohydrate intake, exercise, and insulin use. In addition, patients with diabetes often have a history of overweight or obesity, conditions that predispose to the development of impulsive and anxious behaviors that are risk factors for bulimia nervosa and binge eating disorder, as compared to individual with normal weight.⁸

A condition called “Diabulimia” has been described in patients with DM1, in which insulin-dependent patients restrict or decrease insulin doses in order to lose or maintain body weight. The most frequent age at which this condition occurs is between 15 and 30, with a higher frequency in women.⁹⁻¹²

Other screening tools for ED have yielded inconclusive results, the likely explanation being that they have been applied in the general population, which does not consider insulin use, diet, or practices such as avoiding hyperglycemic foods, among others.¹³

Markowitz et al.¹⁴ developed and validated the Diabetes Eating Problem Survey-Revised (DEPS-R), an ED screening instrument for patients with DM, in which a Cronbach’s alpha of 0.86 was obtained; this is a Likert-type instrument that evaluates the following

dimensions: eating attitudes, bulimic behaviors, weight control, avoidance and restriction; each dimension has five, four, three, three and one item, respectively, with a total of 16 items and six types of response: never, rarely, sometimes, often, usually, and always, giving a score from 0 to 5 respectively; with a final score ranging from zero to eighty points. The instrument has a cut-off number ≥ 20 points to be classified as ED high risk, it is closed-ended and self-administered.

The importance of diagnosing ED in early stages lies in its impact on the reduction of complications in patients with DM, besides, international guidelines state that all patients with DM should be screened for ED; despite these recommendations, there are currently only two instruments developed for this group of patients, the Diagnostic Survey for Eating Disorders (DSED) and the Diabetes Eating Problems Survey/Diabetes Eating Problems Survey-Revised (DEPS/DEPS-R),¹⁵⁻¹⁷ neither of which has been validated in the Mexican population with the characteristics analyzed in this study. Given the above, our objective was to evaluate the validity and reliability of the DEPS-R to identify the eating disorders (ED) risk in a Mexican population with Diabetes Mellitus (DM).

Methods

Validation study of the instrument. Diabetes Eating Problem Survey-Revised (DEPS-R) in the identification for eating disorders (ED) risk.

Stage 1. Instrument Translation and Adaptation

In 2009, the DEPS-R instrument, developed by Markowitz et al.¹⁴ was translated three times from its original language (English) into Spanish by three different

translators whose native language was Spanish.

Stage 2. Content Validation and Clarity Assessment

After translating and adapting, the instrument was evaluated by five experts in health science whose expertise is the care of patients with DM and psychiatric disorders, to determine the content validity by the Delphi method.¹⁸ Comments were made and the instrument's capacity to assess all the established dimensions was judged. During four rounds, comments on clarity, consistency, contribution to the construct, wording, and final considerations were asked until consensus was reached.

The instrument was applied to a pilot group of ten people who met the following inclusion criteria: patients diagnosed with DM2, according to the American Diabetes Association (ADA) criteria, on insulin treatment, patients over eighteen years, who did not present complications secondary to their disease, who could read, and who were assigned to a Family Medicine Unit in Mexico City.

Previous diagnosis of ED was considered an exclusion criterion in order to evaluate the wording and comprehension of the items by the target group.

Finally, a sample of 130 patients was calculated with a formula for a finite population and with knowledge of the prevalence of DM, with a confidence interval of 95% and an error percentage of 5%. Inclusion and exclusion criteria were those applied to the pilot group.

Stage 3. Psychometric Validation

Cronbach's alpha coefficient was calculated, for the evaluation of reliability, in addition, the adjusted linear regression

model was applied together with the Kolmogorov-Smirnov test and, finally, Spearman's correlation coefficient for the variables age, time of suffering DM, weight and central glycaemia. Data analysis was performed using the version 2021.09.0 R-Studio (R) statistical program.

Ethical considerations: this study was approved by the 3511 local health research committee, the Federal Commission for the Protection of Health Risks (COFEPRIS) registration 19CI09017032, institutional registration number R-2020-3511-054. All participants authorized their contribution with prior informed consent.

Results

Stage 1. Instrument Translation and Adaptation

A first version of the instrument was elaborated after the translations, see Table 1.

Stage 2. Content Validation and Clarity Assessment

The group of experts consisted of one woman and four men with an average age of 43 ± 6.41 years, with a maximum degree of specialty 40% (n=2) and 60% with a subspecialty (n=3); their professional experience areas included

Table 1. DEPS-R version I

Losing weight is an important goal for me
I skip meals and/or snacks
Other people have told me that my eating is out of control
When I overeat, I do not take enough insulin to cover my food
I eat more when I am alone than when I am with others
I feel it is difficult to lose weight and control my diabetes at the same time
I avoid checking my blood sugar when I feel like it is out of range
I make myself vomit
I try to keep my blood sugar high so that I will lose weight
I eat in a way to get ketones in my urine
I feel fat when I take all of my insulin
Other people tell me that I should take better care of my diabetes
After overeating, I skip my next insulin dose
I feel that my eating is out of control
I alternate between eating very little and eating huge amounts
I would rather be thin than to have good control of my diabetes

Table 2. DEPS-R version II

Losing weight is an important goal for me
I skip meals and/or snacks
Other people have told me that my eating is out of control
When I overeat, I do not take enough insulin to cover my food
I eat more when I am alone than when I am with others
I feel it is difficult to lose weight and control my diabetes at the same time
I avoid checking my blood sugar when I feel like it is out of range
I make myself vomit
I try to keep my blood sugar high so that I will lose weight
I eat in a way to get ketones in my urine
I feel fat when I take all of my insulin
Other people tell me that I should take better care of my diabetes
After overeating, I skip my next insulin dose
I feel that my eating is out of control
I alternate between eating very little and eating huge amounts
I would rather be thin than to have good control of my diabetes

Answers are indicated on a Likert scale of six different options:
 0-Never, 1-Rarely, 2-Sometimes, 3- Often, 4-Usually, 5-Always

Table 3

Cronbach's Alfa total	0.72
Confidence Interval	95
Lowest Cronbach's Alfa	0.65
Highest Cronbach's Alfa	0.78
Per Item	
Item	Cronbach's Alfa
1	0.73
2	0.71
3	0.67
4	0.71
5	0.7
6	0.67
7	0.7
8	0.72
9	0.71
10	0.71
11	0.72
12	0.67
13	0.71
14	0.68
15	0.69
16	0.73

endocrinology, psychiatry and internal medicine. Based on their suggestions, a second version was made, see Table 2.

The ten-people pilot group, 50% women (n=5) and 50% men (n=5) with average age 60.1±9.31 years; time of being diagnosed with DM2 9±5.79 years; mean weight 82.15±20.04 kilograms; all participants had DM2 and a BMI average of 31.54±5.

The total sample group was 54.61% women (n=71) and 45.38% men (n=59), with average age 59.46±11.72 years, time with DM 13.05±8.76 years, average weight 75.34±16.88 kilograms, 100% with DM2 (n=130), the BMI average was 29.67±5.27.

Stage 3. Psychometric Validation

Cronbach's alpha coefficient of the DEPS-R version II instrument was obtained with 0.72, as well as for each of the items, see Table 3.

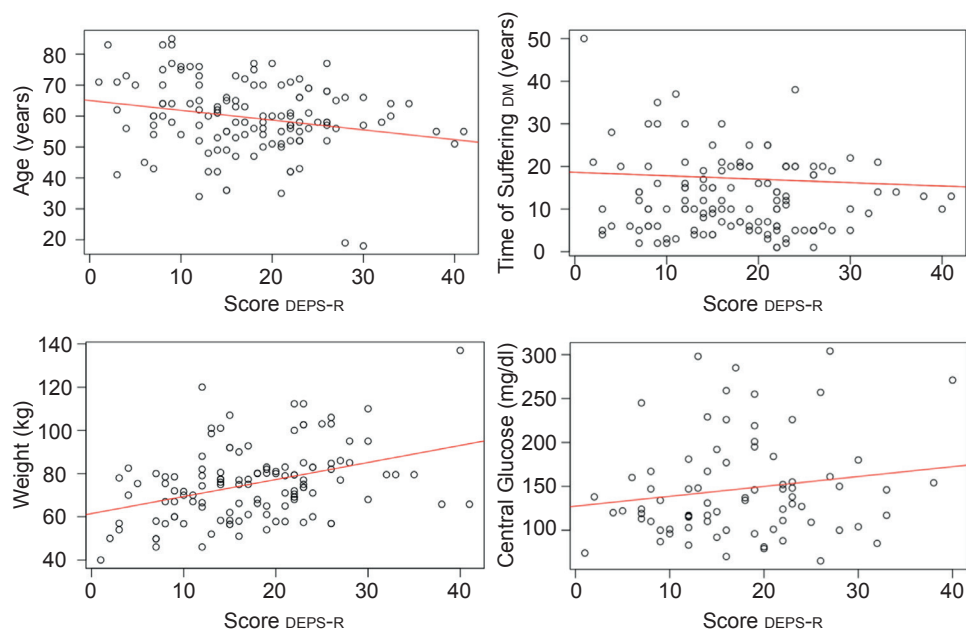
The adjusted linear regression model was used to analyze the main variables with respect to the obtained score in the ADEPS-R version II, see Figure 1.

On the other hand, the Kolmogorov-Smirnov normality test estimated that the score obtained in the ADEPS-R version II instrument presented characteristics of a normal distribution (p=0.444).

Spearman's correlation coefficient was obtained, see Table 4, corroborating what was observed in the graphical representation of the linear regression models, in which the highest coefficient was in the weight/score ratio, obtaining 0.3645 (p<0.0001).

Discussion

In the present study, in order to identify the risk of eating disorders in Mexican population with DM2, the Diabetes Ea-

Figure 1**Table 4**

Variables	Spearman's Correlation Coefficient	P Value
Age/DEPS-R Score	-0.1874	0.0328
Time of Suffering Diabetes Mellitus/DEPS-R Score	-0.0129	0.8845
Weight/DEPS-R Score	0.3645	<0.0001
Central Glucose/DEPS-R Score	0.1413	0.2202

ting Problem Survey-Revised (ADEPS-R) was translated and validated; during its application, it has reported reliability identifying eating disorders in patients with DM2, with good internal consistency based on Cronbach's alpha. To date, the existing questionnaires have been developed for the general population, limiting their use in patients with DM, since changes in lifestyle, diet, and insulin application are factors that impacts on weight, body image, and associated disorders. In Italy, Pinna et al,¹⁵ obtained a relationship and validated the ADEPS-R instrument in insulin-dependent diabetics, with a sample of 211 patients; 192 with DM1 and 19 with DM2; obtaining a Cronbach's alpha of 0.83. On the other hand, in Turkey, Altinok et al.¹⁹ tested the reliability and validity, applying it in children and adolescents with DM1, with a sample of 200 patients, obtaining Cronbach's alpha of 0.847, 0.857 and 0.830 for the general population, women and men, respectively. In France, Gagnon et al.¹⁶ validated it with a sample of 624 patients with DM, 137 DM1, and 487 DM2. Patients were evaluated on two occasions and obtained a Cronbach's alpha of 0.80 and 0.83, in the first and second application, respectively.

On the other hand, Saßmann et al.¹⁷ reported a high reliability (Cronbach's alpha of 0.84) when adapting and validating this instrument in 246 patients in Germany. Finally, in Spain, Sancanuto et al.²⁰ translated and validated it in 112 adults with DM1, achieving a Cronbach's alpha of 0.821; the latter was carried out in Spanish; however, due to the geographical difference in language or diatopical, the instrument was taken in the original language (English) and adapted to the target population (in Mexico). The use of this instrument

makes it possible to evaluate possible comorbidities such as eating disorders in persons with a higher risk of presenting them, such as patients with DM2. The degree of reliability of this instrument makes it useful and viable in a Mexican population, and it can also be applied in Family Medicine clinics due to the response time, and the fact that the two variables of greatest interest here analyzed (ED and DM2) report a high prevalence in Primary Care Level.

The limitations of this study are the sample size, in addition to not having included patients with DM1, and not having explored cultural barriers in the study population in relation to their information on eating disorders, as well as on specific elements of the disease.

Conclusion

The validated version of the ADEPS-R instrument showed good reliability, making it useful for the identification of ED in a Mexican population. The application of this instrument facilitates the comprehensive evaluation of patients over eighteen years of age with DM2, and its use is important at the Primary Care Level for the identification and timely care of risk factors in order to avoid future complications.

Authors' contributions

OH-G: conceptualization, development, survey application, data analysis, and writing; JEA-P: conceptualization and development. MCO-G: development and writing.

Funding

The present research did not receive external funding.

Conflicts of Interest

The authors declare not having conflicts of interest.

References

- Rojas-Martínez R, Basto-Abreu A, Aguilar-Salinas C, Zárate-Rojas E, Villalpando S, Barrientos-Gutiérrez T. Prevalencia de diabetes por diagnóstico médico previo en México. *Salud Pública de México*. 2018;60(3):224-232.
- García-Mayor RV, García-Soidán FJ. Eating disorders in type 2 diabetic people: Brief review. *Experimental and clinical endocrinology & diabetes reports*. 2016;(627):1-4.
- Mariusz J, Mariusz P, Andrzej MS, Melania B, Katarzyna J, Piotr M, et al. A Ten-Year Longitudinal Study of Prevalence of Eating Disorders in the General Polish Type 2 Diabetes Population. *Med Sci Monit*. 2018;(24):9204-9212.
- Robinson ME, Simard M, Larocque I, Shah J, Nakhla M, Rahme E. Risk of Psychiatric Disorders and Suicide Attempts in Emerging Adults with Diabetes. *BMJ Open Diabetes Res Care*. 2019;43(2):484-486.
- Perna B, Gunjan A, Deepak K, Deep D, Sanjay K, Pankaj T, et al. Occurrence and Predictors of Depression and Poor Quality of Life among Patients with Type-2 Diabetes: A Northern India Perspective. *Indian J Endocrinol Metab*. 2017;21:564-569.
- Rajput R, Gehlawat P, Gehlan D, Gupta R, Rajput M. Prevalence and predictors of depression and anxiety in patients of diabetes mellitus in a tertiary care center. *Indian J Endocr Metab*. 2016;20:746-751.
- Bădescu SV, Tătaru C, Kobylińska L, Georgescu EL, Zahiu DM, Zăgrean AM, Zăgrean L. The association between Diabetes mellitus and Depression. *Journal of Medicine and Life*. 2016;9(2):120-125.
- Giel KE, Teufel M, Junne F, Zipfel S, Schag K. Food-Related Impulsivity in Obesity and Binge Eating Disorder-A Systematic Update of the Evidence. *Nutrients*. 2017;9(1170):1-15.
- Torjesen I. Diabulimia: the world's most dangerous eating disorder. *BMJ*. 2019;364(982):1-2.
- Chelvanayagam S, James J. What is diabulimia and what are the implications for practice? *British Journal of Nursing*. 2018;27(17):980-986.

- Falcao MA, Francisco R. Diabetes, eating disorders and body image in young adults: an exploratory study about "diabulimia". *Eat Weight Disord*. 2017;22(4):675-682.
- Kınık MF, Gönüllü FV, Vatansver Z, Karakaya I. Diabulimia, a Type I diabetes mellitus-specific eating disorder. *Türk Pediatri Ars*. 2017;(56):46-49.
- Racicka E, Bryńska A. Eating Disorders in children and adolescents with type 1 and type 2 diabetes-prevalence, risk factors, warning signs. *Psychiatr Pol*. 2015;49(5):1017-1024.
- Markowitz JT, Butler DA, Volkening LK, Antisdell JE, Anderson BJ, Laffel LMB. Brief Screening Tool for Disordered Eating in Diabetes. Internal consistency and external validity in a contemporary sample of pediatric patients with type 1 diabetes. *Diabetes Care*. 2009;33(3):495-500.
- Pinna F, Enrica D, Sanna L, Deiana V, Manchia M, Nicotra E et al. Assessment of eating disorders with the diabetes eating problems survey-revised (DEPS-R) in a representative sample of insulin-treated diabetic patients: a validation study in Italy. *BMC Psychiatry*. 2017;17(262):1-11.
- Gagnon C, Aimé A, Bélanger C. French Validation of the Diabetes Eating Problem Survey- Revised (DEPS-R). *Can J Diabetes*. 2013;(37):58.
- Saßmann H, Albrecht C, Busse-Widmann P, Hevelke L, Kranz J, Markowitz J et al. Psychometric properties of the German version of the Diabetes Eating Problem Survey—Revised: additional benefit of disease-specific screening in adolescents with Type 1 diabetes. *Diabet Med*. 2015;32(12):1641-1647.
- McPherson S, Reese C, Wendler MC. Methodology Update. *Delphi Studies*. *Nursing Research*. 2018;67(5):404-410.
- Altınok Y, Özgür S, Meseri R, Özen S, Darcan S, Gökşen D. Reliability and Validity of the Diabetes Eating Problem Survey in Turkish Children and Adolescents with Type 1 Diabetes Mellitus. *J Clin Res Pediatr Endocrinol*. 2017;9(4):323-328.
- Sancanuto C, Jiménez-Rodríguez D, Tébar F, Hernández-Morante J. Traducción y validación de un cuestionario para la detección de trastornos del comportamiento alimentario en pacientes con diabetes mellitus. *Med Clin (Engl Ed)*. 2016;147(2):548-554.