

Anthropometry in Elderly Mexican Patients with Diabetes Treated with Insulin or Hypoglycemic Agents

Marcos Ramírez Lourdes^{1*}, Mendoza Romo Miguel Angel², Coronado Juárez Cinthya Giselle³, Francisco Javier López Esqueda⁴, Héctor Gerardo Hernández Rodríguez⁴, Gonzalo Ramón González González⁵, Marco Vinicio González Rubio⁵ and Saucedo Zambrano Ricardo⁶

¹Medical Intern of Social Service in Medicine, Research and Teaching Center, Mexico

^{2,3}Mexican Social Security Institute, San Luis Potosí, Mexico

⁴Central Hospital Dr. Ignacio Morones Prieto, Mexico

⁵Autonomous University of San Luis Potosí, México

⁶University of Toulouse I Capitole, France

ARTICLE INFO

Article history:

Received: 12 April 2018

Accepted: 23 April 2018

Published: 26 April 2018

Keywords:

Anthropometry;

Elderly;

Diabetes

Copyright: © 2018 Lourdes MR et al.,

Ann Diabetes Metab Disord Contr

This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation this article: Lourdes MR, Mendoza-Romo MA, Coronado-Juárez C G, Francisco-Javier L E, Héctor-Gerardo H R et al., Anthropometry in Elderly Mexican Patients with Diabetes Treated with Insulin or Hypoglycemic Agents. Ann Diabetes Metab Disord Contr. 2018; 2(1):116.

ABSTRACT

Objectives: To evaluate Anthropometry in elderly Mexican patients with diabetes treated with insulin or hypoglycemic agents.

Material and Methods: Cross-sectional study. Secondary analysis of the multicenter SABE study who had the following measures: height, weight, waist and hip size, treatment with insulin or hypoglycemic agents. It was analyzed the frequency distribution, percentages, ranges, standard deviation, and Student's t-test for the mean difference for the corresponding variables.

Results: A total of 179 women and 138 men with diabetes were included. Of which 57 used insulin and 260 hypoglycemic agents. In a total of 57 patients with insulin treatment, a diastolic blood pressure of 79 mmHg, body mass index of 22.2 kg/m² and waist-hip ratio was obtained 0.96 cm. While a total of 260 patients without insulin treatment were obtained an average systolic blood pressure of 134, blood pressure 81.1, body mass index 22.8 kg/m² and waist hip ratio 0.94.

Conclusion: There is a majority of diabetic patients that use hypoglycemic oral agents rather than treatment with insulin. There is a significant difference between the body mass index in patients with insulin treatment and oral hypoglycemic agents. Being higher in patients treated with insulin.

Introduction

In Mexico, the process of demographic aging is not reversible nevertheless there is an epidemiological transition, characterized by the persistence of infectious diseases, as well as chronic diseases, such as diabetes mellitus, hypertension, dementia, joint diseases and arteriosclerosis [1]. Many of these pathologies begin in the early stages of life and reach old age, with a range of comorbidities, complications and disabilities, which generate a significant increase in health care expenditures [2].

Aging is a multifactorial process characterized by several changes. There are observed variations in body mass, fat, muscles and bones, all of which are strongly influenced by gender, race or ethnicity, and physical activity.

Correspondence:

Dr. Lourdes Marcos Ramírez,
Medical Intern of Social Service in
Medicine, Research and Teaching
Center, Mexican Social Security
Institute, San Luis Potosí, Industries
105, San Luis Potosí 78399,
Mexico, Tel: 00521518691;
Email: lululu898@hotmail.com

The variation of body mass throughout life has been studied by several authors due to the ability to mask several pathologies [3].

The most affected system being the musculoskeletal system. In striated muscle, progressive loss of fiber and a fat-free mass are observed [4,5]. The muscle is about 40% of the total body mass and 75% of the cell mass. The sum of the visceral and muscular cell mass predicts the energy needs. The hormonal growth axis / insulin-like growth factor-1 (IGF-1) is the main regulator of tissue mass in the early stages of life. In the elderly, a decrease in IGF-1,2,4,8 has been reported, probably due to a decrease in growth hormone [6].

Nutrition plays a very important role in the aging process, through the modulation of changes in the various organs and functions of the body. The nutritional status of the elderly is determined by many factors, such as socio-economic, functional, mental, psychological and physiological factors. Therefore, the complete assessment of nutritional status should include information on these dimensions with the objective of helping to understand the etiology of possible deficiencies, and to create more efficient interventions [7].

The greatest attraction of anthropometry is its simplicity, however, isolated measures have limited value. Although these measures are obtained with relative ease, they are difficult to assess in the elderly. The most commonly used anthropometric measures for the assessment of nutritional status are weight and height, body mass index (BMI), perimeters and skin folds [8,9].

The BMI is an attempt to quantify the amount of tissue mass (muscle, fat, and bone) in an individual, and then categorize that person as underweight, normal weight, overweight, or obese based on that value. However, there is some debate about where on the BMI scale the dividing lines between categories should be placed [10]. Commonly accepted BMI ranges are underweight: under 18.5 kg/m², normal weight: 18.5 to 25 kg/m², overweight: 25 to 30 kg/m², obese: over 30 kg/m². People of Asian descent have different associations between BMI, percentage of body fat, and health risks than those of European descent, with a higher risk of type 2 diabetes and cardiovascular disease at BMIs

lower than the World Health Organization cut-off point for overweight, 25 kg/m² [11].

It is important to emphasize that a direct relationship has been found in the literature between leptin, insulin and growth hormone, since they influence fat mass, body composition and fat distribution [12]. As with oral hypoglycemic agents, including the following groups: sulfonylurea, meglitinide, and D-phenylalanine derivatives weight gain was also found [13].

To evaluate Anthropometry in elderly Mexican patients with diabetes treated with insulin or hypoglycemic agents

Materials and Methods

Transversal study, an analysis was carried out on the data of people aged 60 years or older in the state of San Luis Potosí participating in the multicenter health and wellness and aging study. The SABE study methodology was used to calculate the size of the sample of questionnaires to be applied, for each zone, 95% confidence interval parameters, a maximum allowed error of + 5% and a success rate to 50%, as well as the population size corresponding to inhabitants of 60 years and over, according to the II Count of Population and Housing 2005 of the National Institute of Statistics and Geography.

The data were processed with the following formula to calculate the size of the finite population sample, based on proportions, considering a binomial distribution of the questionnaire, where the probability of success is in function of locating a person 60 years or older.

Field personnel selected and trained by the Universidad Autonoma of San Luis Potosí. After 8 weeks of field work, 2,320 questionnaires were applied in a total of 260 localities, including the 58 municipal headwaters of the state. The survey was carried out across the state, both in urban and rural areas, including areas where the indigenous population is located. Obtaining a total of 2320 records of the survey SABE corresponding to the year 2011-2012 with the authorization of the committee of bioethics with the following registration R-2015-2402- 11.

The SABE San Luis Potosí Survey is a questionnaire composed of 11 sections, with a total of 486 items, plus a section of identification data, as well as a section of questions and final comments. There were included only in this study of diabetic patients, being a total sample of 317 that included the following data: height, weight size, hip size, systolic blood pressure, diastolic blood pressure, insulin treatment or hypoglycemic agents. To obtain the parameters, it was requested the data base of the 2320 questionnaires for the selection of the variables of interest.

With the information was obtained, a database with a total of 317 patients was created in the Excel program, (Table 1) all personal data of the participants were kept confidential. Subsequently, it was analyzed the frequency distribution, percentages, ranges, standard deviation, and Student's t-test for the mean difference for the corresponding variables.

Quetelet index is a value derived from the mass (weight) and height of an individual. The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m^2 , resulting from mass in kilograms and height in meters.

Matched paired samples were found according to whether there was insulin treatment or hypoglycemic agents. It was evaluated SBP, DBP, BMI and WHR, the differences between both groups is shown in table 2.

The correlation found with SBP, DBP, BMI and WHR in both groups as mentioned is found in table no.4. It was found that diabetic patients with insulin have a higher BMI than people who have not used it (Table 3).

Discussion

In two studies in the united states it was found that Increased BMI was associated with increased prevalence of diabetes mellitus, hypertension and dyslipidemia ($p < 0.001$).

Table 1: It shows the characteristics of the population studied.

General Population	Minimum	Maximum	Average	Standar Deviation
Systolicbloodpressure (mmHg)	90	198	134.57	19.20
DiastolicBloodPressure (mmHg)	60	129	80.76	11.67
Weight (kg)	50.00	68.61	68.61	10.14
Height (cm)	137	181	156.03	9.24
Waistsize (cm)	79	128	100.43	9.155
Hip Size (cm)	80	136	106.09	9.197
Waist/Hip Ratio(cm)(WHR)	0.75	1.17	0.94	0.07
Body Mass Index(kg/m^2)(BMI)	17.11	30.18	21.96	2.79
n=317				

Results

A total of 317 diabetic patients 43.5% were women and 56.5% men with a mean age of 71 ± 8.2 years. Divided into two groups, there were 18% of diabetic patients that had a treatment with insulin and the second group diabetic patients 82% had a treatment with hypoglycemic agents (Table 1).

The Waist-hip ratio or waist-to-hip ratio (WHR) used is a ratio of the circumference of the waist to that of the hips. This is calculated with waist measurement divided by hip measurement. The Body Mass Index (BMI) or

For each condition, more than 75% of patients had BMI $\geq 25 \text{ kg}/\text{m}^2$. Which is found similarities within our study having a higher BMI in diabetic patients with insulin treatment. However differing in the Mean BMI of our study being $21.96 \text{ kg}/\text{m}^2$. Obtaining $27.8 \text{ kg}/\text{m}^2$ for SHIELD(Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes) and $27.9 \text{ kg}/\text{m}^2$ for NHANES(National Health and Nutrition Examination Surveys) [14].

Table 2: Differences of paired samples.

	Differences of paired samples					Student t	Significance p< 0.05
	Average	Standard Deviation	Standard error average	95% of difference interval of confidence			
				Inferior	Superior		
SBP	1.9649 1	30.04756	3.9799	-6.00778	9.9376	0.494	0.623
DBP	0.3684 2	17.07089	2.2611	-4.1611	4.89794	0.163	0.871
BMI	3.9509 3	2.08638	0.27635	3.39734	4.50452	14.297	0
WHR	0.0308 3	0.09212	0.0122	0.00639	0.05528	2.527	0.014
n=317							

Table 3: Correlation of paired samples.

n=317	Correlation	Significance p<0.05
SBP	-0.196	0.144
DBP	-0.133	1.326
BMI	0.974	0.000
WHR	0.091	0.500

In Mexico, the prevalence of type 2 diabetes had a remarkable growth in recent years. The percentage of the population that has been already diagnosed. The prevalence is even greater if asymptomatic cases are considered [15]. A study realized in Mexico in 2012 it was found the factors significantly associated with the onset of diabetes were: education, hypertension and BMI. Presenting similarities with the present study.

There is a clear relationship between the increases in body mass index with the increase in the prevalence of diabetes mellitus type 2. Presenting a peak of prevalence at 60 to 65 years of age. However, a decrease is subsequently found due to premature mortality presented in diabetic patients. Which is the reason the population studied in the present study, we found a lower BMI than that reported in the literature [16].

The majority of diabetic patients treated with oral hypoglycemic agents in Mexico receive secretagogues (glibenclamide) and biguanide (metformin). Weight gain in the secretagogues is well known while a reduction in weight is found in the biguanide group. Making us think that their weight remains neutral while in insulin there is an increase on the body mass index observed due to its pure anabolic effect [17].

Conclusion

There is a majority of diabetic patients that use hypoglycemic oral agents rather than treatment with insulin.

The majority of diabetic patients treated with oral hypoglycemic agents in Mexico receive secretagogues (glibenclamide) and biguanide (metformin). The rest of hypoglycemic oral agents being used is a minority.

There is a significant difference between the body mass index in patients with insulin treatment and oral hypoglycemic agents. Being higher in patients treated with insulin.

References:

1. Welfare and Aging Health Survey SABE, San Luis Potosí. National Center for Preventive Programs and Disease Control (2012).
2. Survey of Health, Well-being and Aging SABE, San Luis Potosí. National Center for Preventive Programs and Disease Control.
3. Gómez-Cabello A, Vicente Rodríguez G. (2012). Aging and Body Composition: Sarcopenic Obesity in Spain. *Hospital nutrition*. 27: 22-30.
4. Leville SG. 2004. Musculoskeletal aging. *Curr Opin Rheumatol*. 16: 114-118.
5. Payette H, Roubenoff R, Jacques PF, Dinarello CA, Wilson P, et al. (2003). Illulin-likw-1 growth factor and interleukin 6 predict sacopenia in very old men in the community and at women: the study of the heart of Framingham. *J Am Geriatr Soc*. 51: 1237-1243.
6. Ansdersen J, Schierling P, Saltin B. (2000). Muscle, genes and atlic performance *Sci Am*. 283: 48-55.
7. Nutrition assessment. Food and Agriculture Organization of the United Nations. 2017.
8. Ravasco P, Anderson H, Mardones F. (2010). Methods of assessing nutritional status. *Nutr. Hosp*. 25: 57-66.
9. Menéndez A, Báez R, Rodríguez L. (2017). Receiving anthropometry in the elderly. *Cuban Journal of Comprehensive General Medicine*. 24: 1-9.
10. Kvamme JM, Holmen J, Wilsgaard T, Florholmen J, Midthjell K, et al. (2012). Body mass index and mortality in elderly men and women: the Tromsø and HUNT studies. *Journal of Epidemiology and Community Health*. 66: 611-617.
11. Padilla J. (2014). Relationship of the body mass index and body fat percentage in Venezuelan youth. *Rev.Ib.CC. Act. Fis*. 3: 27-33.
12. Molero-Conejo E, Morales LM, Fernández V, Raleigh X, Casanova A, et al (2006). Insulin, leptin and growth hormone and its relationship with body mass index and obesity index in adolescents. *Latin American Nutrition Files*. 56: 29-35.
13. Chong H. Diabetes mellitus type 2: oral hypoglycemic agents. *Medical-Scientific Magazine*. 38-42.
14. Bays HE, Chapman RH, Grandy S. (2007). The relationship of body mass index to diabetes mellitus, hypertension and dyslipidaemia: comparison of data from two national surveys. *International Journal of Clinical Practice*. 2007; 61: 737-747.
15. Peña JDL, Buitrón-Granados LV, RamírezMartínez JC, Chavira Mejía R, Schargrotsky H, et al. 2011. Diabetes in Mexico. CARMELA study. *Cir Cir*. 79: 424-431.
16. Ruíz Arregui L, Pérez Lizaur AB. (2010). Nutrition and diabetes in the elderly. *Clinical Investigation Journal*. 62: 350-356.
17. 2018. Evidencias y Recomendaciones.