© **2011** ILEX PUBLISHING HOUSE, Bucharest, Roumania

*RJDNMD*, **18**(4):333-340 *http://www.jrdiabet.ro*

# FEEDING BEHAVIOR EVALUATION IN PERSONS WITH NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS IN SALAJ COUNTY

***Daniela Gabriela Zaharie*** ✉

University of Medicine and Pharmacy "Iuliu Haţieganu" Cluj-Napoca

*received*: September 09, 2011 *accepted*: November 11, 2011

*available online*: December 15, 2011

## Abstract

*The paper analyzes the behavior and eating habits of people newly diagnosed with type 2 diabetes in Sălaj county. As a working method a questionnaire was used to assess the nutrition and eating habits; the sample chosen for the study consisted of 126 subjects. Statistical analysis of this observational study will enable the conclusion of the specific characteristics of lifestyle zone. In the studied group of 126 people, with a distribution approximately equal by sexes, over 40% were overweight and 40% were also diagnosed with abdominal obesity in various degrees. This was not a surprise after the evaluation of questionnaires and the study of the eating habits. The analysis of these questionnaires indicated that over 50% of respondents had only 3 meals a day, but over 80% did not have breakfast, though still over 50% confirmed having the daily snacks. The worrying fact was that about 80% of respondents said that the most important meal of the day for them is dinner, and about 70% said that more than half of the quantity of food consumed daily is at dinner. Also, it was noted the late hour at which dinner, 55% recognizing meal after at 22$^{oo}$. From all of the eating behavior disorders, over 40% of respondents did not dine in the kitchen and over 50% frequently take their meals in front of the TV. Also, this study demonstrated an increased consumption of saturated and unsaturated fat, eggs, sweets, bread and gaskets, with the unfortunate combination of the latter two at the same meal. It was alarming lower consumption of vegetables and fruits, milk and dairy products, and meat. It should be noted here that cooking with fried flour was reported in over 60% of the cases. Following nutritional imbalances such as those demonstrated in this study, we have to worry about the growing risk of developing obesity, diabetes mellitus and cardiovascular diseases.*

***key words:*** *eating behavior disorders, macronutrients, micronutrients, type 2 diabetes*

## Introduction

Lifestyle, representing all individual decisions and behaviors, is found in correlation with health condition by its components that define human behavior: diet and eating behavior, body weight, physical

✉ ZALĂU, A. Iancu Street, No. 2, SĂLAJ county, ROMANIA,
*corresponding author e-mail: d.zaharie @ yahoo.com*

activity, alcohol consumption, smoking, sleep [1-4].

A healthy nutrition must keep a balance in intake of essential nutrients to maintain health status and to prevent nutritional imbalances [1,6]. A caloric and nutritionally balanced diet is necessary to ensure growth and development in normal children and adolescents, physical and intellectual support, giving a good state of nutrition and health, all leading to increased life quality [7.8].

Growing concern of diabetes in the last decade requires to pay more attention to healthy lifestyle components, as an early measure of primary and secondary prevention. One of the risk factors in the development of diabetes mellitus is the unhealthy lifestyle [5,6].

Unhealthy lifestyle is recognized as the key to the emergence of type 2 diabetes in correlation with abdominal obesity, metabolic syndrome and insulin resistance syndrome [9] and healthy lifestyle that therapeutic method to treat chronic diseases. Special importance is given to identifying and evaluating obesity. The relationship between birth weight and obesity has long been controversial. It seems that infants weighting less than normal are at greatest risk of becoming obese after 40 years [8,10].

Nutritional status of a person shows the extent to which food needs are covered by physiological contribution. There are many factors that influence food intake and thus nutritional status. Among these may be mentioned pathological conditions, stress (psychological stress, infections, acute and chronic trauma), metabolic physiological states (pregnancy, growth, convalescence), economic and cultural status, emotional climate, feeding behavior, ability to eat and absorb food [11,12].

Poor nutrition or excessive state occurs when the intake does not meet the physiological needs, namely insufficient or excessive intake of nutrients, leading to malnutrition or over nutrition. In most cases, impaired nutritional status is a result of eating behavior disorders [11,12].

Malnutrition occurs frequently by insufficient intake, but there are other factors that lead to this condition such as digestive disorders, increased excretion of nutrients or metabolic disorders. The most exposed are children, pregnant women, elderly persons hospitalized for a long time, people with low incomes. The consequences of malnutrition are multiple, such as delayed growth and development, decreased resistance to infection, consequently increasing the morbidity and mortality [11,12].

Overeating leads rapidly to the appearance of overweight and obesity. Of the diseases associated with those states there are metabolic syndrome, diabetes mellitus, hypertension, cardiovascular disease, dyslipidemia, atherosclerosis, which involve increasing cardiovascular risk and cardiovascular mortality [11,12].

Cardiovascular diseases associated with unhealthy lifestyle have a multifactorial pathogenicity, involving numerous and varied mechanisms: oxidative stress, endothelial dysfunction, increased sympathetic tone, pro-inflammatory status, procoagulants state, insulin resistance [9] and altered lipid metabolism [13,14]. Applying a long unhealthy lifestyle involves obesity [15,19], hypertension [20-22], dyslipidemia [28], insulin resistance and disglycemia.

Cardiovascular risk in people with diabetes is 2-4 times higher than in persons without diabetes and the risk of developing a major cardiac event in people with diabetes with no history of coronary heart disease is equal to that of persons without diabetes, but with a history of myocardial infarction, as demonstrated by some population studies [23-27].

Nutritional screening is the identification of behavior problems associated with nutrition and eating habits. This requires a careful history and an accurate assessment of anthropometric data [11,12].

Nutritional assessment is an essential step nutrition care process, aimed at identifying people who require aggressive treatment and monitoring dietary results [11,12].

**Aim**

This paper's purpose was to review, in Sălaj county, the food behavior in people newly diagnosed with type 2 diabetes in Ambulatory County Center of Diabetes, Nutrition and Metabolic Diseases Zalău.

There were evaluated the intake of macronutrients, micronutrients, fluid intake, the daily caloric ratio, frequency of meals and eating behavior.

In order to assess the eating habits of these people, the study included 126 patients who were asked about their lifestyle before being diagnosed with type 2 diabetes.

Nutrition assessment questionnaire and eating behavior included a series of questions that have appreciated weekly consumption of meat and meat derived, solid fats, vegetable fats, eggs, milk and dairy products, bread, side dishes (potatoes, rice, semolina, flour), vegetables, fruits and sweets. The subjects were also questioned about the number of meals, the number of snacks taken daily, cookery techniques (if you cook with fried flour), if they serve breakfast, which is the most consistent meal of the day, what time dinner is served and what is the amount of food eaten for dinner daily.

Other questions concerned the consumption of bread at every meal and the frequency of desserts over a week. Also, we aimed to place dining and customs associated with this time.

Statistical analysis of this observational study will enable the conclusion of lifestyle characteristics of the area.

**Material and methods**

The method used in the investigation was based on an evaluation form interviewing about the lifestyle that people have adopted previously.

Eating is designed to meet the caloric needs and nutrients needed to maintain life. Daily caloric needs will be assessed taking into account various factors: age, sex, type of physical activity, initial body weight, ambient temperature, pregnancy and lactation.

Nutritional screening, which included social history, medical history, food history and evaluation of anthropometric data of each person investigated, was performed.

The intake of macronutrients (carbo-hydrates, lipids and proteins), micronutrients (vitamins and minerals), fluid intake, daily caloric intake, meal frequency and eating behavior were appreciated. It should be remembered that the eating behavior involves all five senses: sight, hearing, smell, taste and touch sensitivity.

It was designed a lifestyle evaluation form, in addition to personal data and associated diseases, which included six

surveys: evaluation of food and eating habits, physical activity, alcohol consumption, smoking, compliance and adherence to lifestyle changes, psychosocial stress.

Questionnaire for assessing food and eating habits included a series of questions followed by weekly consumption of meat and meat preparations, solid fats, vegetable fats, eggs, milk and dairy products, bread, side dishes (potatoes, rice, semolina, pasta flour), vegetables, fruits and sweets. Also questioned were the number of meals taken daily, number of snacks, cooking techniques (if you cook with fried flour), if breakfast is served, which is the most consistent meal of the day, what time dinner is served and what is the amount of food eaten for dinner daily.

Other questions concerned the consumption of bread at every meal and the frequency of desserts over a week.

Also in the questionnaire for the assessment of food and eating habits surveyed the place where the meal takes place and whether it often happens in front of the TV.

Chosen group for the survey sample consisted of 126 subjects.

Questionnaires were distributed to people who asked for medical advice in Ambulatory County Center of Diabetes, Nutrition and Metabolic Diseases Zalău. Dissemination of the questionnaires was made between 1 January 2011 - March 1, 2011. The results obtained, though referring to Sălaj county, can be extrapolated nationally. The questiones were open (the answer of your choice), closed (with answers required) or mixed (with answers required and optional).

Statistical analysis of this observational study will enable the conclusion of lifestyle characteristics of the area.

**Results and discussions**

Questionnaires were received from each person newly diagnosed with type 2 diabetes County Center of Diabetes, Nutrition and Metabolic Diseases Zalău between 01.01.2011 - 01.03.2011.

Of the 126 subjects analyzed, 62 were men (49.2%) and 64 women (50.8%), 53 from urban areas (42%), and 73 rural (58%). As the average age, 71 people were within 40-60 years (56.3%), 49 subjects between 60-80 years (38.9%), outside this range were located only 4 people in 40 years (3.2%) and 2 people over 80 years (1.6%). As the level of training, 49 people attended 1-8 grades (38.9%), 29 attended vocational school (23%), 40 were undergraduates from high school (31.7%) and 8 subjects had higher education (6.4%). Professional status proved pensioners share in the studied group - 87 people (69%), 20 subjects were employees (15.9%), 4 unemployed (3.2%), 13 persons unemployed (10.3%) and 2 freelancers (1.6%).

Anthropometric measurements were performed separately and for each subject the body mass index (BMI) was determined to assess the nutritional status of the studied group. Thus, nine subjects had a BMI 18,5 - 25 kg / m² (7.1%) having a normal weight, 62 persons who had a BMI ranged from 25 to 29.9 kg / m² (49.2%) were diagnosed as overweight, 39 people had a BMI located between 30 and 34.9 kg / m² (30.9%) which fits them into first degree obesity; 13 individuals had a BMI located between 35 - 39.9 kg / m² (10.3%) placing them into second degree obesity. 3 persons who had a BMI above 40 kg / m² (2.4%) were diagnosed with morbid obesity.

The question of the number of daily meals a subject has, was answered from 2 to 5 meals

/ day. Thus, 10 persons admitted consumption of 2 meals / day (7.9%), 72 people said 3 meals / day (57.1%), 38 subjects took 4 meals / day (30.2%) and 6 subjects served 5 meals / day (4.8%).

Knowing the local customs, I was curious if they cooked with fried flour. 71 persons (66.4%) said yes and only 55 denied (43.6%).

When asked "do you have breakfast?" a positive response was given by 34 subjects (27%), while 82 people answered “no” (83%).

In terms of snacks, 69 people confirmed taking snacks (54.8%), and 57 people related their absence (45.2%). Expanding interest in the presence or absence of and snacks in the daily diet, we found that: 20 people took breakfast and snacks (15.9%), 14 people took breakfast, but did not take snacks (11.1 %), 49 subjects served only snacks, without breakfast (38.9%) and 43 subjects serve no breakfast and no snacks (34.1%).

Regarding the most important meal of the day, we obtained the following answers: 6 people said that the most important meal of the day is breakfast (3.8%), 20 people named it as lunch (15.8%) and 100 subjects said that dinner is the most important meal (79.4%). When asked "what is the amount of food consumed daily for dinner?" 89 people answered "more than half" (70.6%), 6 answered "all" (2.4%) and 37 subjects responded "less than half".

Given the high percentage of those for whom dinner is the most important moment of the day in terms of food, I had the curiosity to investigate the time dinner is served. I took as a landmark $19^{oo}$ and found that only 15 people took dinner before this time (11.9%) and 111 subjects took dinner after this time (88.1%). Of these, 50 people ate dinner at $22^{oo}$ (45%), and 61 people were dine after $22^{oo}$ (55%).

In terms of macronutrients and micronutrients daily intake, I have analyzed the intake of meat, saturated and unsaturated fats (solids and vegetable), bread, eggs, milk and dairy products, gaskets (rice, semolina, potatoes and pasta ), vegetables, fruits and sweets. These responses were obtained for daily intake of various food groups, as shown in table 1:

**Table 1.** Daily food intake.

| Food groups | yes | no |
|---|---|---|
| meat and meat products | 32 (25,4%) | 94 (74,6%) |
| solid fat | 72 (57,1%) | 54 (42,9%) |
| vegetable fats | 53 (42,1%) | 73 (57,9%) |
| eggs | 10 (7,9%) | 116 (92,1%) |
| milk and dairy products | 33 (26,2%) | 93 (73,8%) |
| bread | 117 (92,9%) | 9 (7,1%) |
| side dishes (rice, semolina, castofi, pasta) | 98 (77,8%) | 28 (32,2%) |
| vegetables | 23 (18,3%) | 103 (81,7%) |
| fruit | 44 (34,9%) | 82 (65,1%) |
| sweet | 80 (63,5%) | 46 (36,5%) |

It can be noted that only 25.4% of subjects consumed meat and meat derivatives daily, but the consumption of fat (57.1% saturated fat and 42.1% unsaturated fat) is greatly increased. It is also disturbing that 7.9% consume eggs daily, given that 98.1% have an average of 6 eggs / week, only 4% (5 persons) saying they do not eat eggs at all.

Consumption of milk and dairy products is also low among the population surveyed, being found only in 26.2% of respondents.

In terms of bread consumption, 92.9% of those surveyed recognize the daily consumption, moreover, the question "Do you eat bread at every meal?" was answered “yes” by 87 people (69%) and only 39 subjects said “no” (31%).

To assess vitamin intake, was followed the daily consumption of vegetables and fruits. Analysis of questionnaires showed that only 23 people (18.3%) consumed vegetables daily and only 44 subjects (34.9%) related daily intake of fruit. Only 13 (10.3%) reported the daily consumption of vegetables and fruits were found, too little the recommended nutritional needs of a healthy diet.

In the daily consumption of sweets we have also found a disturbing percentage of those giving recognition to this fact (63.5%) than those who do not eat sweets (36.5%).

Also for an overview assessment of eating behavior and eating habits, the questionnaire aimed usual place of eating and if eat is often in front of the TV. Thus, 71 persons (56.3%) said they dine in the kitchen, and 55 of the subjects (43.7%) stated elsewhere. An unpleasant surprise was that 72 of the interviewed people (57.1%) admitted that it often happens to dine in front of the television, only 54 subjects (42.9%) actually serving meals in place for this in particular.

## Conclusions

The studied group included 126 people with an approximately equal gender distribution, 40% were overweight and 40% were diagnosed with in various degrees. This was not a surprise after studying nutrition assessment questionnaires and food behavior. From the analysis of these questionnaires over 50% of respondents took only 3 meals a day, but over 80% do not have breakfast, though still over 50% have confirmed the presence of snacks in the daily diet. Worrying was the fact that approximately 80% of those polled said the most important meal of the day for them is dinner, and about 70% said that more than half the food consumed daily is for dinner. I also noted the late hour at which dinner is served, 55% responding at 22. From all of the food behavior disorders was noted that over 40% of respondents do not have meals in the kitchen and over 50% frequently take their meals in front of the TV.

Also, this study demonstrated an increased consumption of saturated and unsaturated fats, eggs, sweets, bread and garnish with the unfortunate combination of the two latter at the same meal. Alarming was the low consumption of vegetables and fruit, milk and dairy products, meat and meat derivatives. Here it should be noted that over 60% of the respondents cook with fried flour.

The percentage of overweight and obesity increased in the population studied is mainly explained by food intake in the afternoon, especially at night, and by the intake of foods rich in calories, carbohydrates and fats, and foods with high glycemic index.

Following nutritional imbalances such as those demonstrated in this study, we have to worry about increased risk of obesity, diabetes and cardiovasculare diseases.

## REFERENCES

**1. Ford ES, Bergmann MM, Kröger J, Schienkiewitz A, Weikert C, Boeing H.** Healthy living is the best revenge: findings from the European Prospective Investigation Into Cancer and Nutrition-

Potsdam study. *Arch Intern Med.* Aug 10;169(15):1355-62. 2009

**2. Nettleton JA, Polak JF, Tracy R, Burke GL, Jacobs DR Jr.** Dietary patterns and incident cardiovascular disease in the Multi-Ethnic Study of Atherosclerosis. *Am J Clin Nutr.* Sep;90(3):647-54. Epub 2009 Jul 22. 2009

**3. Balluz LS, Okoro CA, Mokdad A.** Association between selected unhealthy lifestyle factors, body mass index, and chronic health conditions among individuals 50 years of age or older, by race/ethnicity. *Ethn Dis.* Autumn;18(4):450-7. 2008

**4. Lakerveld J, Bot SD, Chinapaw MJ, van Tulder MW, van Oppen P, Dekker JM, Nijpels G.** Primary prevention of diabetes mellitus type 2 and cardiovascular diseases using a cognitive behavior program aimed at lifestyle changes in people at risk: Design of a randomized controlled trial. *BMC Endocr Disord.* Jun 24;8:6. 2008

**5. Esposito K, Ciotola M, Maiorino MI, Giugliano D.** Lifestyle approach for type 2 diabetes and metabolic syndrome. *Curr Atheroscler Rep.* Dec;10(6):523-8. 2008

**6. Nishiyama M, Muto T, Minakawa T, Shibata T.** The combined unhealthy behaviors of breakfast skipping and smoking are associated with the prevalence of diabetes mellitus. *Tohoku J Exp Med.* Aug;218(4):259-64. 2009

**7. Rossener S.** Childhood Obesity and Adult Consecuences.*Acta Pediatrica.* 87(1), 1-5. 1998

**8. August GP, Caprio S, Fennoy I, Freemark M, Kaufman FR, Lustig RH, Silverstein JH, Speiser PW, Styne DM, Montori VM; Endocrine Society.** Prevention and treatment of pediatric obesity: an endocrine society clinical practice guideline based on expert opinion. *J Clin Endocrinol Metab.* Dec;93(12):4576-99. Epub 2008 Sep 9. 2008

**9. Szoke E, Gerich JE.** Role of impaired insulin secretion and insulin resistance in the pathogenesis of type 2 diabetes mellitus. *Compr Ther.* Summer;31(2):106-12. 2005

**10. Stoneham L.** Unhealthy children. *Tex Med.* Jan;97(1):54-8. 2001

**11. Negrişanu G.** Tratat de Nutriţie, *ed. Brumar*, pp 359-377. 2005

**12. Geissler C., Powers H.** Human Nutrition, eleventh edition, *ed. Elsevier Livingstone*, pp 501-516, 573-596. 2005

**13. Caples SM; Garcia-Touchard A; Somers VK.** Sleep-disordered breathing and cardiovascular risk. *SLEEP*; 30(3):291-304. 2007

**14. Hancu N., Cerghizan A.** A global approach to cardiovascular risk in type 2 diabetic persons, in Cardiovascular risk in type 2 diabetes mellitus. Asseasment and control. Hancu N. *(ed.) Springer-Verlag*, pp 240-276. 2003

**15. Khan LK, Sobush K, Keener D, Goodman K, Lowry A, Kakietek J, Zaro S; Centers for Disease Control and Prevention.** Recommended community strategies and measurements to prevent obesity in the United States. *MMWR Recomm Rep.* Jul 24;58(RR-7):1-26. 2009

**16. Harrington M, Gibson S, Cottrell RC.-** A review and meta-analysis of the effect of weight loss on all-cause mortality risk. *Nutr Res Rev.* Jun;22(1):93-108. 2009

**17. Tse MM, Yuen DT.** Effects of providing a nutrition education program for teenagers: dietary and physical activity patterns. *Nurs Health Sci.* Jun;11(2):160-5. 2009

**18. Kim DH, Sagar UN, Adams S, Whellan DJ**. Lifestyle risk factors and utilization of preventive services in disabled elderly adults in the community. *J Community Health.* Oct;34(5):440-8. 2009

**19. Egger G, Dixon J.** Obesity and chronic disease: always offender or often just accomplice? *Br J Nutr.* May 18:1-5. 2009

**20. Rafique G, Khuwaja AK.** Diabetes and hypertension: public awareness and lifestyle - findings of a health mela. *J Coll Physicians Surg Pak.* Dec;13(12):679-83. 2003

**21. Campbell NR, Leiter LA, Larochelle P, Tobe S, Chockalingam A, Ward R, Morris D, Tsuyuki R.** Hypertension in diabetes: a call to action. *Can J Cardiol.* May;25(5):299-302. 2009

**22. Manrique CM, Lastra G, Palmer J, Stump CS, Sowers JR.** Hypertension--a treatable component of the cardiometabolic syndrome: challenges for the primary care physician. *Clin Hypertens (Greenwich).* Jan;8(Suppl 1):12-20. 2006

**23. Ryden L.** Diabetes and the Heart, Diabetes and the Heart Survey. *Press releases* 2004.

**24. Mazzone T.** Reducing cardiovascular disease in patients with diabetes mellitus. *Curr. Opin. Cardiol*; 20:245-249. 2005

**25. Haffner S.M. et al.** Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with or without prior myocardial infarction. *N. Engl. J. Med*;339:229-234. 1998

**26. Klein L. et al.** Management of the patient with diabetes mellitus and myocardial infarction: clinical trials update. *Am. J. Med*; 116:47S-63S. 2004

**27. Lee C.D et al.** Cardiovascular events in diabetic and nondiabetic adults with or without hystory of myocardial infarction, ARIC Study., *Circulation*; 109:855-860. 2004

**28. Campbell NR, Leiter LA, Larochelle P, Tobe S, Chockalingam A, Ward R, Morris D, Tsuyuki R.** Hypertension in diabetes: a call to action. *Can J Cardiol.* May;25(5):299-302. 2009