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Physical activity and foot hygiene in patients with type 2 diabetes

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Abstract: Type 2 diabetes mellitus (DM type 2) accounts for about 90% of all cases of diabetes. Diabetic foot includes any pathology that results directly from diabetes mellitus or its long-term complications. Loss of sensation caused by peripheral neuropathy, ischemia due to peripheral arterial disease or a combination thereof can lead to foot ulcers.

The purpose of this paper is to expand the knowledge about Type 2 Diabetes Mellitus, respectively the impact of physical activity and hygiene on the foot of patients with Type 2 Diabetes, which entered the group of chronic complications of Diabetes.

The method of retrospective study was used for the realization of this work. This paper is based on the data of the registers that have been provided in the Regional Hospital "Isa Grezda" Gjakova, in the Internal department and the specialist ambulance of Surgery. This paper analyzes the histories of patients diagnosed with type 2 diabetes and diabetic foot, during the period January 2020-June 2021.

There were a total of 155 patients, 41 of them with Diabetic Foot. The most affected gender with Diabetes and diabetic toe in this period, was the female gender with 86 patients while the male gender with 79 patients. The most affected age group was over 65 years old.

Of the 155 patients, 102 use insulin therapy, while 53 of them use oral therapy. The prevalence of patients with diabetic foot for the period January 2020- June 2021 results in 0.43.

Type 2 diabetes mellitus and diabetic foot as its chronic complication are serious health conditions that require maximum health care from health personnel, therefore it is necessary to cooperate continuously with the person suffering from such a condition and his family. Curing and managing type 2 diabetes mellitus and diabetic foot has high financial costs and requires constant and multidisciplinary care.

Keywords: Type 2 diabetes, diabetic foot, ulcers, peripheral arterial disease, neuropathy.

1. Introduction

Diabetes mellitus is a metabolic disease characterized by hyperglycemia that results from defects in insulin secretion, insulin action, or both. Chronic Diabetes Hyperglycemia is associated with long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels. Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of pancreatic beta cells resulting in insulin deficiency to abnormalities resulting in insulin resistance (**Association, January 2014**). Type 2 diabetes mellitus (DM type 2) accounts for about 90% of all cases of diabetes. In DM type 2., the insulin response is reduced, and this is defined as insulin resistance. During this condition, insulin is ineffective and is initially counteracted by an increase in insulin production to maintain glucose homeostasis, but over time, insulin production decreases, resulting in DM type 2. DM type 2. most often occurs in persons older than 45 years. Still, it is increasing in children, adolescents and adults due to increased levels of overweight, physical inactivity and high-carbohydrate and high-fat diets. (**Rajeev Goyal, 2020**). Diabetic foot is a life-changing complication for the diabetic patient and is associated with increased morbidity and mortality. It accounts for more hospital bed days than all the other complications of diabetes. Foot ulcer is defined as a localized injury to the skin and underlying tissues below the ankle. In a person with diabetes, ulcers are associated with peripheral

arterial disease and peripheral neuropathy, often in combination with each other. It is estimated that at least 10% of diabetic patients will suffer a foot ulcer during their lifetime. **(Rhea O'Regan, 2018)**

The incidence of open wounds in patients with diabetes is very high and affects 1 in every 6 patients. Ulcers do not occur on their own, but are always preceded by a gradual or sudden damage to the skin by some external factor. Preventing these types of injuries, and recognizing early when they occur, can reduce the risk of the wound progressing to amputation. Health care providers play an important role in recognizing the early signs of foot changes. Early patient education has been proven to be helpful in identifying these changes that come as a result of diabetes and, thus, reducing the risk of complications. **(Heitzman, 2020)**

It has been shown that up to 50% of amputations and leg ulcers in diabetes can be prevented by effective identification and education. Plantar problems occur in both type 1 and type 2 diabetes and it is estimated that the lifetime risk of a patient developing a foot ulcer is 25%. Ulcers are more common in men and in patients over 60 years of age. A large population-based study of more than 10,000 patients in the north-west of England reported that 5% had past or current foot ulcers and almost 67% had one or more risk factors: the annual incidence of ulceration in these diabetic patients was 2.2% Foot ulcers are more common in Caucasians than in Asian or African patients. Foot ulcer also seems to be associated with social deprivation. Leg lesions can be the hallmark of type 2 diabetes and any patient with unexplained foot ulcer should be screened for diabetes. **(Boulton, 2014)**

2. The role of physical activity in patients with diabetic foot

In diabetic patients regular physical activity reduces body weight, improves blood glucose control and insulin sensitivity, which completely lead to a reduced risk of developing neuropathy. **(Piergiorgio Francia, 2014)**

Physical activity also helps control blood sugar levels and lowers the risk of heart disease and nerve damage. Some additional benefits include: maintaining a healthy weight, losing weight, if

necessary, feeling happier, better sleep, improving your memory, controlling blood pressure, and lowering LDL ("bad" cholesterol) ") and raising HDL cholesterol (" good "). The goal is to perform at least 150 minutes a week of moderate-intensity physical activity. **(Prevention, 2018)**

Walking can be one of the most basic forms of exercise, but it is also a very effective form of activity to help lower blood glucose levels. It has therefore been suggested by many experts that physical activity in these patients can be an important weapon in preventing foot ulcer. **(<https://www.diabetes.co.uk/walking-and-diabetes.html>, n.d.)**

2.1 Current situation in Kosovo

Based on the publication made in 2017, by IDF approximately 425 million adults (20-79 years) live with DMT2; by 2045 where the number will increase to 629 million. 79% of adults with diabetes live in middle- and low-income countries, where the majority of those affected are between 40 and 59 years old. 1 in 2 people (212 million) with DMT2 are undiagnosed.

The lack of a National Registry for Diabetes in Kosovo and the lack of official data according to ICD 10, cannot be concluded about the prevalence of the disease in Kosovo.

2. Literature Review

Diabetes is one of the major public health problems in the world, responsible for several health problems including blindness, heart attack, kidney failure and lower limb amputation. In 2017, diabetes mellitus resulted in the death of 4 million adults globally. In 2019, about 463 million individuals were living with diabetes, with a prevalence rate of 9.3% in adults.

The prevalence of diabetes has increased by 62% over the last ten years (2009–2019), and the prevalence is projected to increase to 10.2% and 10.9% by 2030 and 2045. A complication of uncontrolled diabetes is diabetic foot ulcer, which negatively affects the quality of life of individuals with diabetes and causes a great economic burden on the family and health care services. **(Taiwo Maxwell Adeyemi)**

The standard of care for diabetes is education on proper diet, physical activity and glucose monitoring. Using medications and managing them alone (without exercise and diet) does not lower HbA1C. However, the combination of nutrition counseling and exercise results in a 1% reduction in hemoglobin A1C in middle-aged Hispanics with type 2 diabetes. **(Edgar Ramos Vieira, 2021)**

Regular physical activity is a preventative measure and a cure for non-communicable diseases. Furthermore, physical activity improves mental health, quality of life, and well-being. Physical activity has proven to be a low-cost alternative for treating and preventing disease, therefore, interventions to prevent disease by increasing the percentage of physically active people are essential. Physical activity interventions are needed to reduce the costs of treating chronic morbidity that may result from a lower prevalence and better control of diseases and their risk factors. **(Emanuela Gualdi-Russo, 2021)**

3. Methodology and Findings

The method of retrospective study was used for the realization of this work.

This paper is based on the data of the registers that have been provided in the Regional Hospital "Isa Grezda" Gjakova, in the department of Interno and the specialist ambulance of Surgery.

This paper analyzes the histories of patients diagnosed with type 2 diabetes and diabetic foot, during the period January 2020-June 2021.

Gender, age, place of residence, occupation, and therapy used to manage blood sugar, number of patients with diabetic foot, and prevalence of diabetic foot were also analyzed.

4.1 Profile characteristics of patient's

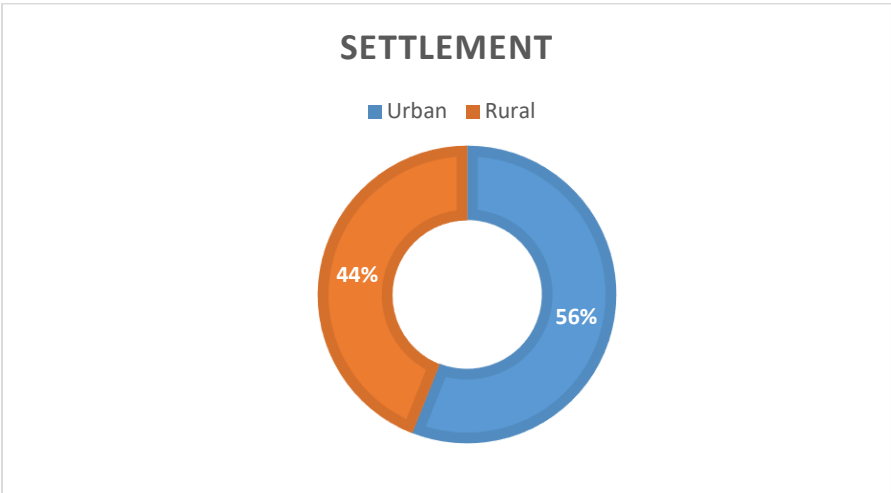
The results are taken from the registers of patients with type 2 diabetes and diabetic foot in the Department of Internal Medicine and Surgery at the Regional Hospital of Gjakova. The total number of cases of Diabetes Mellitus in the Municipality of Gjakova for the period January 2020

- June 2021 was one hundred and fifty-five (155) patients. Sixty-nine (69) or forty-four points five percent (44.5%) belong to the male gender, while eighty-six (86) or fifty-five points five percent (55.5%) belong to the female gender. Of the total one hundred and fifty-five (155) patients with Diabetes Mellitus in the period January 2020 - June 2021, eighty-seven (87) or fifty-six percent (56%) were of urban residence, while sixty-eight (68), or forty-four percent (44%) were of rural residence. From the extracted data are presented the cases according to the age of those affected by Diabetes Mellitus in the period January 2020- June 2021, where the ages from fifty to sixty-five (55-65) years, as well as over sixty-five (65) years are attacked with most. From that data we see that seventy-one (71) or forty six percent (46%) of the patients with Diabetes Mellitus are retired, while fifty four percent (54%) of the patients are labor force but only thirty of them (30) or nineteen percent (19%) are employed.

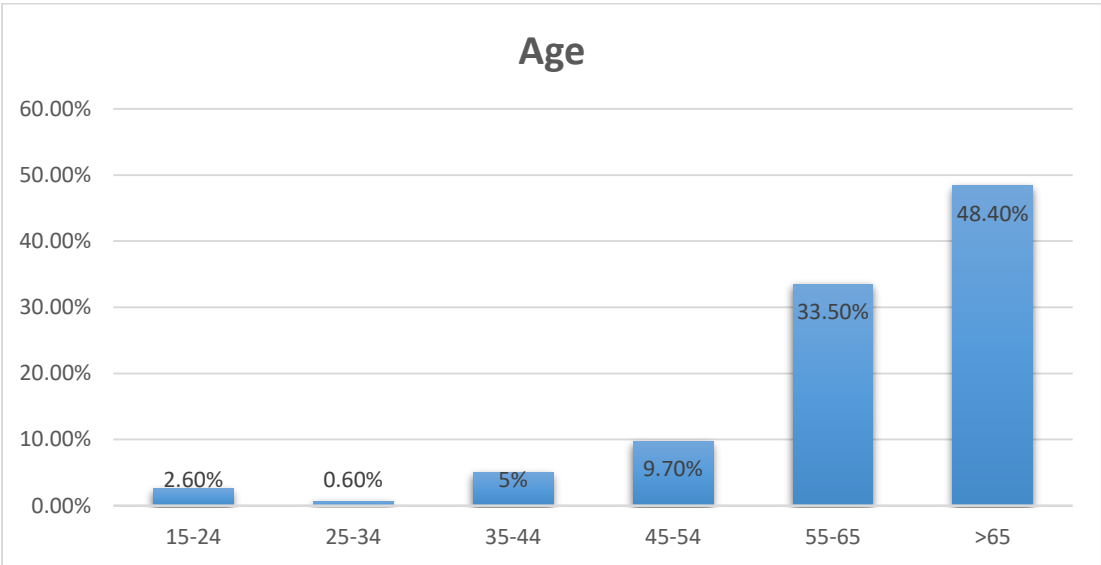
Table 1. Number of patients with DMT2

Gender	Number	Percentage (%)
<i>Male</i>	<i>69</i>	<i>44.5%</i>
<i>Female</i>	<i>86</i>	<i>55.5%</i>
<i>Total</i>	<i>155</i>	<i>100%</i>

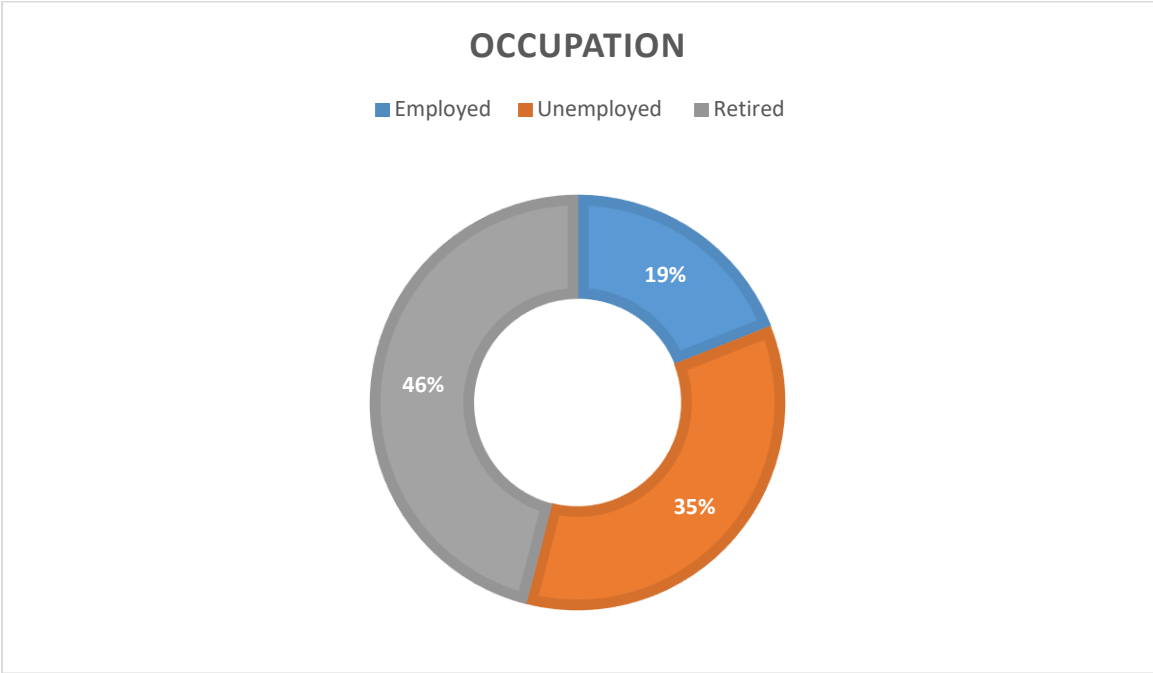
Graf.1. Structure of patients with Diabetes Mellitus by place of residence



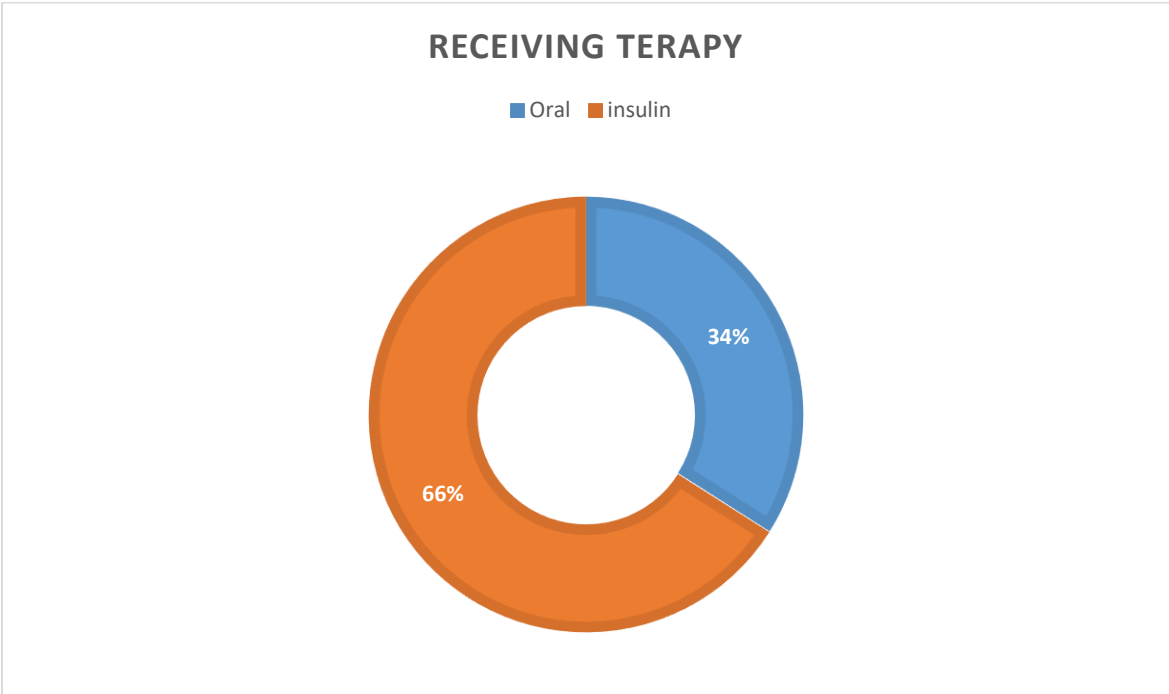
Graphic 2. Presentation by age of patients with Diabetes Mellitus in the period January 2020- June 2021



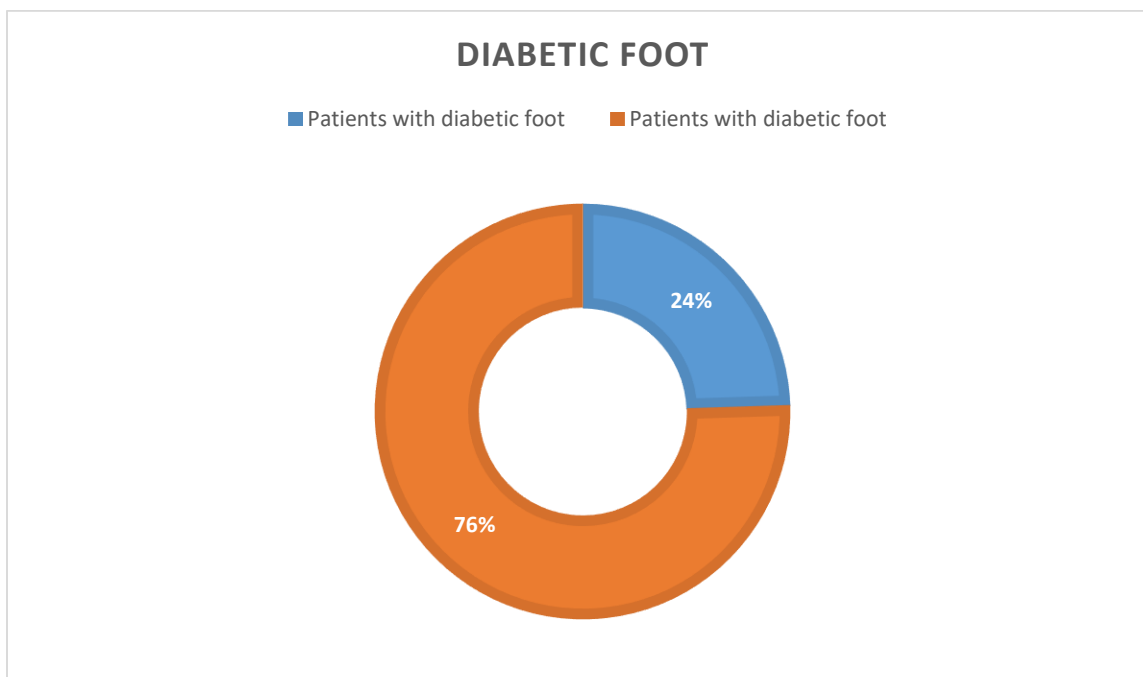
Graphic 3. Dividing patients into groups by profession



Graphic 4. Classification of patients according to the therapy they use



Graphic 5. Total number of patients with Diabetic Foot in SR "Isa Grezda", in the period January 2020- June 2021



According to data obtained from statistics in the intern ward of SR "Isa Grezda" in Gjakova, it turns out that one hundred and two (102) or sixty-six (66%) of patients use insulin therapy to manage glycemic levels, while fifty-three (53) or thirty-four percent (34%) of them use oral therapy. The most commonly used oral therapies are: Metformin tab 850 mg / 1000mg, Diabos 5 mg, Amyrill 3mg, while most insulins use Insulin Mix X2 (2 times a day). Of the one hundred and fifty-five (155) patients with Type 2 Diabetes Mellitus, forty-one (41) or twenty-four percent (24%) of the patients have diabetic foot, while the rest have no foot complications. The total number of cases of diabetic foot patients in the Municipality of Gjakova for the period January 2020- June 2021 was forty-one (41) patients, with a prevalence of zero points forty-three (0.43)

5. Conclusions

This paper aimed to show about physical activity and foot hygiene in patients with type 2 diabetes. Also, the results were obtained regarding patients with type 2 diabetes and diabetic foot for the period January 2020- June 2021 at the Regional Hospital of Gjakova.

During the analysis of the collected data we came to the conclusion that:

Diabetes and diabetic foot occupy an important range among chronic diseases. Diabetes mellitus is a metabolic disease characterized by hyperglycemia that results from defects in insulin secretion, insulin action, or both. Type 2 diabetes mellitus (DM type 2) accounts for about 90% of all cases of diabetes. In DM type 2., the insulin response is reduced, and this is defined as insulin resistance. Diabetic foot includes any pathology that results directly from diabetes mellitus or its long-term complications. There are various risk factors for developing leg ulcers in diabetic patients. The most important factors are peripheral neuropathy, foot deformity, minor trauma, and peripheral artery disease.

Regarding the results for patients during the period January 2020- June 2021, it results that: patients with type 2 diabetes and diabetic foot in the Regional Hospital "Isa Grezda" in Gjakova, in the ward of the Interno and Specialist Ambulance Surgery, there were a total of 155 patients , of which 41 with Diabetic Foot. The most affected gender with Diabetes and diabetic toe in this period, was the female gender with 86 patients. Less affected by this disease at this time was the male gender with 69 patients. The age group most affected by Diabetes and diabetic foot was over the age of 65 years. It should also be noted that the population living in urban settlements is more vulnerable than the population living in rural settlements. The largest number or (46%) of patients with Diabetes and diabetic toe are retired. Of the 155 patients, 102 use insulin therapy, while 53 of them use oral therapy. The prevalence of patients with diabetic foot for the period January 2020- June 2021 results in 0.43.

Author contributions

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