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# DİABETES MELLİTUS VAKA KAYITLARI (2005-2014)

## DIABETES MELLITUS CASE RECORDS (2005-2014)

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**ÖZ**

**AMAÇ:** Diabetes mellitus, 21. yüzyılın en zorlu küresel sağlık sorunlarından biridir. Bu çalışmada, diabetes mellitus kayıtlarını analiz ederek bazı risk faktörlerini belirlemeyi amaçladık.

**GEREÇ VE YÖNTEM:** Tanımlayıcı ve retrospektif bir çalışmadır. Veriler hastane kayıtlarından elde edilmiştir. Çalışmanın evrenini 1 Ağustos 2005 - 9 Ocak 2014 tarihleri arasında, üç devlet hastanesine başvuran ve ICD10'a göre Diabetes Mellitus tanısı alan 34.649 vaka oluşturmuştur.

**BULGULAR:** Kayıtlarda yer alan 18.653 kadın (%53.8) ve 15.996 erkekten (%46.2) oluşan çalışma grubunun (n=34.649) yaş ortalaması 59.08±15.60 bulunmuştur. Diabetes mellitus tanı alma yaş ortalaması ise 54.76±15.54 olarak belirlenmiştir. Çalışmada vakaların %28.1'inin (n=9.743) 50-59 yaş arasında ve %24.9'unun (n=8.638) 60-69 yaş arasında diabetes mellitus tanısı aldığı görülmüştür. Tedavilerinin çoğunlukla (%81.35, n=28.188) ayaktan yapılmış olduğu, % 18.65'inin (n=6.461) ise hastanede yatarak tedavi edildiği belirlenmiştir. ICD10 göre diabetes mellitus tanısı alan bireyler incelendiğinde; yaklaşık olarak üçte birinin (%28.8, n=9.963) "E10-Tip 1 diabetes mellitus", üçte birinin (%29.8, n=10.334) "E11-İnsüline bağımlı olmayan diabetes mellitus" ve geri kalan üçte birinin (%27.9, n=9.663) ise "E13-Diğer tanımlanmış diabetes mellitus" olduğu saptanmıştır.

**SONUÇ:** Son yıllarda diabetes mellitus tanısının oldukça arttığı ve kadınlarda erkeklerden çok daha fazla olduğu görülmektedir. Diabetes mellituslu bireylerin çoğunun ayaktan tedavi görmesi nedeniyle birinci basamaktaki profesyonel sağlık hizmetine olan ihtiyacın da arttığı anlaşılmaktadır.

**ANAHTAR KELİMELER:** Diabetes mellitus, Ayaktan tedavi, Yatarak tedavi, Tanı kodları

**ABSTRACT**

**OBJECTIVE:** Diabetes mellitus is one of the most challenging global health problems in the 21st century. In this study, we aimed to identify some risk factors by analyzing diabetes mellitus records.

**MATERIAL AND METHODS:** This is a descriptive and retrospective study. Data were obtained from hospital records. The population of the study consisted of 34.649 cases who applied to three state hospitals between August 1, 2005, and January 9, 2014, and were diagnosed with Diabetes Mellitus according to ICD10.

**RESULTS:**The average age of the study group (n=34.649), which consisted of 18.653 women (53.8%) and 15.996 men (46.2%) in the records, was found to be 59.08 ± 15.60. The mean age for the diagnosis of diabetes mellitus was determined as 54.76 ± 15.54. In this study, 28.1% (n=9.743) of the cases were diagnosed with diabetes mellitus between the ages of 50-59 and 24.9% (n=8.638) between the ages of 60-69. Most of the treatments (81.35%, n=28.188) were determined to be outpatient and 18.65% (n=6.461) of them were hospitalized. When the individuals diagnosed with diabetes mellitus according to ICD10 were examined; approximately one third (28.8%, n=9.963) of them were found to be "E10-Type 1 diabetes mellitus", one third (29.8%, n=10.334) of them as "E11-non-insulin-dependent diabetes mellitus" and the remaining one third (27.9%, n=9.663) were "E13-Other defined diabetes mellitus".

**CONCLUSIONS:** The diagnosis of diabetes mellitus was concluded to have increased considerably in recent years and been much more common with women than men. It is also clear that the need for professional health services in primary care has increased since most of the individuals with diabetes mellitus receive outpatient treatment.

**KEYWORDS:** Diabetes mellitus, Outpatient care, Inpatient care, Diagnosis codes

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## INTRODUCTION

Diabetes mellitus (DM) is among the most formidable worldwide health problems of the 21st century (1). DM includes crucial morbidity of complications such as the ones that result in disability, an enormous health cost and poor quality of life, thus DM is associated with mortality (2). In addition to social class, increasing age, and death caused by cardiovascular underlying reason, insulin treatment and increased duration of diabetes have been more frequent; hence, they are also mentioned (3).

Also, according to Translating Research Into Action for Diabetes (TRIAD) Study, the reason for 39% of deaths of diabetic people in the United States (4) has been diabetes. A group of metabolic diseases, which have been identified with either insulin action or hyperglycemia which is caused by the defects in insulin secretion, or both of them, are defined as diabetes mellitus.

Dysfunction, the failure of different organs; especially, the eyes, blood vessels, heart, nerves and kidneys, and long-term damage are associated with the chronic hyperglycemia of diabetes (5). Prospective Diabetes Study indicates that in the United Kingdom 42% of death certificates of diabetic people include diabetes (3).

The American Diabetes Association classifies diabetes mellitus as follows: type 1 diabetes, type 2 diabetes, gestational diabetes mellitus (GDM) and specific types of diabetes due to other causes. There are also common forms of immune-mediated diabetes, drug- or chemical-induced diabetes, genetic defects in insulin action and endocrinopathies, and genetic defects of the b-cell as the other specific types of diabetes (5).

Turkey has the highest predominance of diabetes in Europe (6). The Prospective Urban Rural Epidemiology (PURE) of Turkey has 4056 participants (female: 60.7%, male: 39.3%; mean age: 50±9.1 years). Among them, 43.9% have metabolic syndrome and 52.8% are obese. The diabetes mellitus' predominance has expanded from 13.7% in 2008 to 21% in 2015 (7). Unfortunately, in Turkey, few Type 2 diabetes patients and even fewer diabetes patients with Type 1 have optimal metabolic control. Only 1.5% of patients fulfil the necessary standards of being non-smoker, non-obese and exercising (6).

The claims in standard care or the diagnoses of physicians' and/or population-based registries depending on drug prescriptions have been the groundwork for tracking the predominance of diabetes and increasing incidence in some countries. These registries are expected to include adequately qualified full data to be beneficial for clinical search (8). In this study, we aim to identify some risk factors by analyzing diabetes mellitus records.

## MATERIAL ANDS METHODS

This is an illustrative and retrospective study. Data have been obtained from hospital records. 34.649 cases between 1 August 2005 - 9 January 2014 with DM diagnosis according to the ICD 10 coding from three state hospital compose the universe of the study. To use medical records, the approval of the institutions was obtained from all three hospitals.

The dependent variable of the study is diabetes mellitus. Independent variables are gender, age, registration year to the hospital, the age of diagnosis, diagnosis codes in diabetes mellitus, medicational status.

Each hospital had used a different data collection system. Primarily, patient files have been standardized. Repetitive data have been extracted. Included information in these files is the gender, registration years to the hospital, the first and family name of the patients, their date of birth, the age of diagnosis in DM and diagnosis code which uses the International Classification of Diseases (ICD-10 codes). Data were analyzed using SPSS. The number and percentage distributions of the data were examined (9, 10).

### *ETHICAL COMMITTE*

Informed consent was obtained from the patients. Ethical approval for the study was granted by the Pamukkale University Ethics Committee (approval date and number 02.04.2019 - 07).

## RESULTS

When DM patients examined, 34 649 patients with DM were enrolled in hospitals between

2005 and 2014. The number of patients increased approximately twice in 2005 and 2014 **(Table 1)**.

**Table 1:** DM patients' registration years to the hospitals

| | 2005* | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014† | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n | 878 | 3196 | 2683 | 3005 | 2710 | 1979 | 3813 | 7946 | 7752 | 687 | 34 649 |
| % | 2.54 | 9.22 | 7.74 | 8.67 | 7.82 | 5.72 | 11.01 | 22.93 | 22.37 | 1.98 | 100.0 |

* 01-09.08.2005
† 01-09.01.2014

There were 18.653 females (53.83%) and 15.996 males (46.17%), with a mean age of 59.08±15.60 years. DM patients between the ages of 50-59 were 22.72% and DM patients aged 60-69 years were 28.72% **(Table 2)**.

**Table 2:** The ages of DM patients

| | 0-9 | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n | 66 | 558 | 1199 | 2215 | 3931 | 7873 | 9950 | 6320 | 2349 | 188 | 34 649 |
| % | .19 | 1.61 | 3.46 | 6.39 | 11.35 | 22.72 | 28.72 | 18.24 | 6.78 | .54 | 100.0 |

(X= 59.08±15.60)

The age of diagnosis in diabetes mellitus is 54.76±15.54 years. Also, 28.11% (n=9743) of cases have been diagnosed between the age of 50-59 and 24.93% (n=8638) of them have been diagnosed between the age of 60-69 **(Figure 1)**.

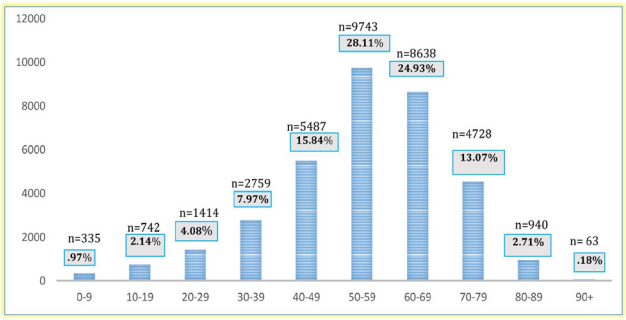


**Figure 1:** The age at diagnosis DM (X=54.76 ±15.54)

When it comes to the treatment of DM, Most of the treatments are outpatient (81.35%, n=28.188) and the rest of them (18.65%, n = 6.461) are hospitalized **(Table 3)**.

**Table 3:** Outpatient and inpatient care in patients with diabetes mellitus

| Hospital Care Unit | Outpatient care (%) | In-patient hospital care (%) | Total |
|---|---|---|---|
| Internal medicine | 23 710 ( 8.41) | 4 273 ( 6.61) | 27 983 |
| Surgery | 2 790 ( .99) | 1 908 ( 2.95) | 4 698 |
| Emergency | 1 050 ( .37) | 48 ( .08) | 1 098 |
| Pediatry | 560 ( .20) | 232 ( .36) | 792 |
| Pregnancy | 78 ( .03) | - | 78 |
| **Toplam** | 28 188 (1.00) † | 6 461 (1.00) † | 34 649 |

† Column percentage

Approximately, most of them (68.11%, n=23.596) are identified as "E10-Type 1 diabetes mellitus and E11-Non-insulin-dependent diabetes mellitus" and the rest-one third (30.55%, n=10.585) are identified as "E13-Other specified diabetes mellitus." Unfortunately in this study, E10-Type 1 diabetes mellitus and E11-Non-insulin-dependent diabetes mellitus have shown together **(Table 4)**.

**Table 4:** Distribution of Diabetes Mellitus Diagnostic Codes (n=34 649)

| Diabetes Mellitus Diagnosis Codes | n (%) |
|---|---|
| **E10-Type 1 diabetes mellitus + E11-Non-insulin-dependent diabetes mellitus** | 20297 (58.6) |
| Diabetes mellitus with coma *(E10.0-Type 1 + E11.1-Non-insulin-dependent type 2)* | 41 (.12) |
| Diabetes mellitus with hyperosmolarity *(E11.0-Non-insulin-dependent type 2)* | 16(.05) |
| Diabetes mellitus with ketoacidosis *(E10.1-Type 1)* | 84 (.24) |
| Diabetes mellitus with kidney complications *(E10.2-Type 1+ E11.2-Non-insulin-dependent type 2)* | 28 (.08) |
| Diabetes mellitus with ophthalmic complications *(E10.3-Type 1+E11.3-Non-insulin-dependent type 2)* | 10 (.02) |
| Diabetes mellitus with neurological complications *(E10.4-Type 1+E11.4-Non-insulin-dependent type 2)* | 19 (.05) |
| Diabetes mellitus with circulatory complications *(E10.5-Type 1+E11.5-Non-insulin-dependent type 2)* | 166 (.48) |
| Diabetes mellitus with other specified complications *(E10.6-Type 1+E11.6-Non-insulin-dependent type 2)* | 106 (.31) |
| Diabetes mellitus with **multiple complications** *(E10.7-Type 1+E11.7-Non-insulin-dependent type 2)* | 171 (.49) |
| Diabetes mellitus with unspecified complications *(E10.8-Type 1+E11.8-Non-insulin-dependent type 2)* | 64 (.18) |
| Diabetes mellitus without complications (E10.9-Type 1+E11.9 Non-insulin-dependent type 2) | 2594 (7.49) |
| **E12-Malnutrition-related diabetes mellitus** | 9 (.02) |
| E12.4-Malnutrition-related diabetes mellitus: With neurological complications | 1 (.00) |
| E12.7-Malnutrition-related diabetes mellitus: With multiple complications | 2 (.00) |
| **E13-Other specified diabetes mellitus** | 9 663 (27.9) |
| E13.0-Other specified diabetes mellitus with hyperosmolarity | 9 (.02) |
| E13.1-Other specified diabetes mellitus with ketoacidosis | 45 (.13) |
| E13.2-Other specified diabetes mellitus with kidney complications | 8 (.02) |
| E13.3-Other specified diabetes mellitus with ophthalmic complications | 40 (.12) |
| E13.4-Other specified diabetes mellitus with neurological complications | 4 (.01) |
| E13.5-Other specified diabetes mellitus with circulatory complications | 137 (.40) |
| E13.6-Other specified diabetes mellitus with other specified complications | 47 (.14) |
| E13.7-Other specified diabetes mellitus w**ith multiple complications** | 154 (.44) |
| E13.8-Other specified diabetes mellitus with unspecified complications | 71 (.20) |
| E13.9-Other specified diabetes mellitus without complications | 407 ( 1.17) |
| **O24-Diabetes mellitus in pregnancy, childbirth, and the puerperium** | 456 (1.32) |

Table 4 indicates that there is a rising trend for the predominance of diabetes-related complications which causes multiple complications and circulatory system complications. When the records examined, complications were observed in 1223 patients with DM.

## DISCUSSION

The rate of patients with diabetes increased from 2005 to 2014 in Denizli. In Singapore, the diabetes registry accreted from 129,183 patients to 170,513 patients between 2005-2008 years. Besides, the rate of diabetes in the National Health Group increased from 12% to 15% (1). Also, 467.6 million people are estimated to live in the South and Central America (SACA) Region. 64% of these people are between 20-79 years old; however, the distribution of their ages and the pyramid of the population are altering. The predominance of diabetes here is on average 8.0% and that is estimated to be 9.8%

by the year 2035 (11). The predominance of DM is expected to increase in the future. Since the effects of the crucial increase in this rate will cause much trouble for the systems of health care, emergent steps should be taken to stop the epidemic. Therefore, within the scope of the Horizon 2020 Program, the Turkish Ministry of Health is coordinating a project to follow up the patients with diabetes in 4 European countries (12).

Approximately, 24% of adult cases with diabetes has not been diagnosed; however, it is still as high as 50% in some countries (11). In the Pro-Empower project, it is aimed that patients with type 2 diabetes will be monitored remotely by health professionals. People with diabetes will be involved in their disease management processes more. The ultimate aim is to provide better quality and uninterrupted chronic disease management (12).

It has been concluded that DM is more prevalent among women than men. Similarly, in a Scotland study, 45.1% of diagnosed patients are women and 40.8% are men (13). Of the diabetes patients with type 2, a slightly higher percentage of females (51.1% to 52.9%) can be seen. Approximately, half of the ages of all patients are (46.6% to 50.2%) between 45 and 64 years.

While the age range of the males is from 59 to 61 years, females' ages are usually older with 63 to 64 years (1). In Turkey, meta-analysis of the low bias risk group has yielded a crude DM predominance of 13.5% (95% CI: 11.6-15.5%) in the whole group, 14.2% (95% CI: 12.3-16.2%) in females and 12.6% (95% CI: 10.5-14.9%) in males (14).

In this study, the numbers (to which) involved are 15.2%; however, the proportions of certificates that mention the ages of diabetes <40 years have been found as low. The rise in the incidence of type 2 diabetes should be monitored especially for young people with diabetes. Age, treatment and gender are the specific factors that affect the risks of Cerebrovascular accident and ischemic heart disease (15). 8.2% of the people ageing from 18 to 69 years are affected by diabetes mellitus in Singapore (16).

The diagnosis of diabetes is 42.0% in the 45-54 age range, 40.4% in the 55-64 age range, 45.9% in the 65-74 age group and 42.3% in the 74 age group (13).

According to The Singapore National Healthcare Group Diabetes Registry, the majority (86.2% to 89.2%) of primary care patients are on oral anti-hyperglycaemic agents (1). Similar results have been found in this study. Siddique et al. provided an integrated education, complete care and proper treatment through Diabetes Outreach Team; in this way, they could reduce the HbA1c of recently hospitalized patients at a significant rate (17).

In this study, diabetes-related complications have been found mainly cardiovascular and renal and also at least one diabetes-related comorbid condition has been found in over 1.3% of DM patients. The nonketotic hyperosmolar syndrome or hyperglycemia with ketoacidosis are uncontrolled diabetes' life-threatening, acute results. Nephropathy leading to renal failure; retinopathy with the potential loss of vision; amputations, peripheral neuropathy with risk of foot ulcers, and Charcot's joints; and genitourinary, autonomic neuropathy causing gastrointestinal, and sexual dysfunction and cardiovascular symptoms are the long-term complications of diabetes (5). Sak and colleagues found that the most frequent diabetic complication was neuropathy (50.8%, n=30) and the most common accompanying comorbidity was hypertension (HT) (64.5%, n=38) (18).

In Scotland, the latent cause of death of 120 people (6.4% of total deaths) was determined as a complication of diabetes or diabetes itself.

However, diabetes was not the latent cause of 682 people (36.4%). Hence, in total 42.8% of death certificates of all the deaths mentioned diabetes as the reason. The latent cause of death of 811 people was cardiovascular disease. On the death certificates of 416 (51.3%) diabetes was mentioned (13). Diabetes mellitus increases the length of hospital attendance. Mullins et al. have shown that the patient with diabetes had an anterior cervical discectomy for much in the hospital (19). An intensive care units for diabetes management is usually necessary during

acute hospital attendance because there might be glycemic changes in connection with the combined results of multiple factors. Thus, it is crucial for the various health-care professionals involved successively and simultaneously in inpatient care to work in coordination with one another (20).

An evidence-based, population-based and patient-centric approach is necessary for the diabetes patients' quality care. The evidence-based clinical practice guidelines aim to improve the quality of life, preventing complications, and to decreasing the number of deaths and disability (1). Patel and colleagues studied, vascular risk factor management was improved and decline in renal function slowed in patients with diabetic nephropathy within a short period at diabetes renal clinic in a district general hospital (21).

The quality of diabetes care has been improved and useful insights have been proven through the registry data (22). Further data might be needed in the research to guess the disease burden stemming from ageing and the rising rate of obesity. For this, improved care that ends up with survival in a better way, the presently lacking information and the rates of diabetes-related complications will be necessary for Singapore (1).

Iran's global and local citations and scientific production (21.7% of diabetes research in the Middle East) raise the country to a significant place in diabetes research. The highest-ranking countries in diabetic research are Turkey, Iran, and Israel, respectively. To reach the best multidisciplinary approach to deal with diabetes and its complications, health care providers can make use of the consequences of this study (23).

A basic standard for the assessment of the care and burden of diabetes patients in the health care system, which will enable essential "evidence" for arranging future programs, has been achieved through the registry. Also, the likelihood of DM appears to have increased considerably in recent years. Since patients receive mostly outpatient care, there is a need to organize a professional primary health care service.

**LIMITATIONS**

The patients who went to the private hospital because of the examination of the records of the state hospitals were not included in the study. It is assumed that the records are reliable and accurate.

In this study, the total number and type of patients from the direct system is available. However, ICD encodings are already troubled. This has been communicated by the associations to the Turkish Ministry of Health. Type 2 Mellitus diabetes using insulin is coded as I10 in patients with DM, which makes them appear to be Type 1 diabetes mellitus.

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