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Title: The Association Between Great-Grand Multiparity and the Development of Type 2 Diabetes Mellitus

Running Head: Parity and Type 2 Diabetes Mellitus

Turkish Title: Great-Grand Multiparite ile Tip 2 Diabetes Mellitus Gelişimi Arasındaki İlişki

Turkish Running Head: Parite ve Tip 2 Diabetes Mellitus

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Abstract

Objective: We planned to reveal the relationship between great-grand multiparity and type 2 diabetes mellitus development.

Methods: Between April 1, 2011, and April 1, 2012, the information of the patients who applied to the polyclinics of obstetrics and gynecology with various complaints were detected retrospectively. Patients' age, height, weight, body mass index, number of births and presence of diabetes mellitus were noted.

Results: 179 patients were included in the study. The study was conducted in Turkey's regions inhabited by ethnic Arabs on the southern border. The patients participating in the study are women who have a low socioeconomic level, illiterate, married under 18 and most of them under 18 years of age. The mean age of the patients was 64.8 ± 6.3 years and 67.7 ± 6.2 years in nulliparous and great-grand multiparous patients, respectively. The median body mass index values of the patients were 30.95 ± 7.0 and 30.11 ± 6.1 , respectively. There was no statistically significant difference between the two groups in terms of mean age and body mass index. Twenty-eight (18.5%) patients were diagnosed with type 2 diabetes mellitus, while 3 (10.7%) patients were diagnosed as having type 2 diabetes mellitus in the non-delivery group. There was a statistically significant relationship between the two groups in terms of the development of type 2 diabetes mellitus ($p < 0.05$).

Conclusion: A statistically significant relationship was found between great-grand multiparity and type 2 diabetes mellitus development.

Keywords: Great-grand multiparity, postmenopause, type 2 diabetes mellitus

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Öz

Amaç: Great grand multiparite ile tip 2 diabetes mellitus gelişimi arasındaki ilişkiyi ortaya koymayı planladık.

Yöntemler: 1 Nisan 2011- 1 Nisan 2012 yılları arasında kadın hastalıkları ve doğum polikliniğine çeşitli şikayetler ile başvuran hastaların bilgilerine dosyaları geriye doğru taranarak ulaşıldı. Hastaların yaş, boy, kilo, vücut kitle indeksi, doğum sayısı ve diabetes mellitus varlığı not edildi.

Bulgular: Çalışmaya 179 hasta dahil edildi. Çalışma Türkiye'nin Güney sınırında etnik köken olarak arapların yaşadığı bölgede yapılmıştır. Çalışmaya katılan hastalar, sosyo ekonomik düzeyi düşük, okuma yazma bilmeyen, büyük bir kısmı 18 yaş altı evlenen ve ilk doğumunu 18 yaş altı dönemde yapan kadınlardır.

Nullipar ve great-grand multipar hastalarda yaş ortalaması sırasıyla $64,8\pm 6,3$ yıl, $67,7\pm 6,2$ yıl olarak saptandı. Hastaların ortalama vücut kitle indeksi değerleri sırasıyla $30,95\pm 7,0$ ve $30,11\pm 6,1$ olarak saptandı. İki grup arasında ortalama yaş ve vücut kitle indeksi açısından istatistiksel olarak anlamlı fark saptanmadı. On ve üzere doğum yapan grupta 28 (18,5%) hasta da tip 2 diabetes mellitus, saptanırken, doğum yapmayan grupta tip 2 diabetes mellitus saptanan hasta sayısı 3 (10,7%) olarak bulundu. Her iki grup arasında tip 2 diabetes mellitus gelişimi açısından istatistiksel olarak anlamlı ilişki saptanmıştır ($p<0,05$).

Sonuç: Great grand multipartite ile tip 2 diabetes mellitus gelişimi arasında istatistiksel olarak anlamlı ilişki saptanmıştır.

Anahtar kelimeler: Great grand multiparite, postmenapoz, tip 2 diabetes mellitus

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INTRODUCTION

Grand multiparity is defined as five or more live births and/or stillbirth after twenty weeks of gestation, great-grand multiparity is defined as ten or more live births and/or stillbirth after twenty weeks of gestation (1). However, it can be used in different definitions. The prevalence was reported as 2.8% for 5 births, 1.7% for 6 births, 7% for overweight and 0.7% for overweight in the United States (2). The frequency of multiparity is increasing in the Africa and mid-east, and further in south Asia. There is a relationship between birth number and development of antenatal and postnatal complications. In particular, placenta previa, placental abruption, postpartum hemorrhage, macrosomia and umbilical cord prolapse and grand multiparity have been reported in many publications (3-6). Among long-term complications, the incidence of pelvic organ prolapse development is increased however in some studies it has been shown that the increase in parity inversely proportions of breast cancer and some gynecologic cancers decrease such as endometrium and over cancer(7-11). On the other hand, the relationship between the number of parity and development of type 2 diabetes mellitus is controversial.

In our retrospective cohort study, we planned to reveal the relationship between great-grand multiparity and type 2 diabetes mellitus development.

METHODS

Between April 1, 2011, and April 1, 2012, A Hospital Women's diseases and obstetric polyclinic, the data of patients who were applied with various complaints were scanned. Patient approval was not obtained because of the retrospective study. Ethics

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committee approval was not obtained because the study was retrospective. The study was carried out in accordance with the criteria of Helsinki.

Patients' age, height, weight, body mass index, number of births, the presence of diabetes mellitus were noted. Demographic information about the marital status (married, widowed, divorced, not married) and education (eg primary or secondary, secondary school, high school, college or above) was collected. Patients who did not give birth and those who had given birth to ten or more were included in the study. Patients were divided into two groups according to the number of births: those who had never given birth and those who had given birth to ten or more.

Patients who have diabetes according to the American Diabetes Association criteria; those with antidiabetic treatment; and fasting plasma glucose (≥ 7.0 mmol / L) were diagnosed with type 2 diabetes mellitus and were included in the study.

Statistical Analysis

When evaluating the findings obtained in this study, IBM SPSS Statistics 22 for statistical analysis (SPSS IBM, Turkey) programs were used. When the study data were evaluated, the normal distribution of parameters was evaluated by the Shapiro Wilks test. Oneway ANOVA test was used to compare the normal distribution of the parameters with the descriptive statistical methods (mean, standard deviation, frequency) as well as the quantitative data. Tukey HSD test was used to determine the difference group. The Kruskal Wallis test was used to compare the groups with no normal distribution, and the Mann Whitney U test was used to determine the group

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that caused the difference. Chi-square test was used for comparison of qualitative data. Significance was assessed at $p < 0.05$ level.

RESULTS

The study was conducted between April 1, 2011, and April 1, 2012, with a total of 179 women. The study was conducted in Turkey's regions inhabited by ethnic Arabs on the southern border. The patients participating in the study are women who have a low socioeconomic level, illiterate, married under 18 and most of them gave birth under 18 years of age. When the study group was questioned in detail, alcohol, and cigarette addictive substance use were not detected. When feeding habits are questioned, the daily consumption of meat, milk and dairy products is widely determined in the region where agriculture and livestock are the main sources of income for the people.

Table 1 shows the demographic characteristics of the three groups. The mean age of the women was found to be 64.8 ± 6.3 and 67.7 ± 6.2 in nulliparous and great-grand multiparous patients, respectively, and no statistically significant age difference was found between the two groups. The body mass index of the patients participating in the study was evaluated and nulliparous and great-grand multiparous genders were 30.95 ± 7.0 and 30.11 ± 6.1 , respectively, and no statistically significant difference was found.

Twenty-eight (18.5%) patients were diagnosed with type 2 diabetes mellitus in the first group, and 3 (10.7%) patients were found to have type 2 diabetes mellitus in the non-parturition group. There was a statistically significant relationship between type 2

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diabetes mellitus development and great-grandmultiparity between the two groups ($p < 0.05$).

DISCUSSION

The mechanism underlying the link between birth rate and diabetes development is unclear. There are many published publications in the literature on the contrary opinion. The possible mechanism explaining the relationship between the number of parity and type 2 diabetes mellitus development is described below. There are dramatic changes in physiology, metabolism, and lifestyle during pregnancy. Insulin resistance, especially in peripheral tissues, an increase in some diabetogenic hormones and changes in cortisol levels. It is particularly induced in placental growth hormone, including placental lactogen, circulating insulin-like growth factor I, gestational hormones, and tumor necrosis factor-alpha. The B-cell mass expands to accommodate progressive insulin resistance and increases insulin secretion to maintain normal blood sugar levels during pregnancy and the postpartum period. This metabolic stress has been suggested to lead to the consumption of b cells, leading to insulin secretion dysfunction and subsequent development of diabetes mellitus in later life (12-14).

In our study, we found that the relationship between great grand multiparity and type 2 diabetes development was statistically significant, and that the development of type 2 diabetes was significantly higher in patients with a birth number of 10 and above.

Results of large number of studies which have been published in the literature were similar with our study and a significant part of these studies have shown a statistically

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significant relationship between the development of multiparity and type 2 diabetes (15-17). Pelyun Li et al. found that there is a positive correlation between multiparity and type 2 diabetes development in a meta-analysis of 296923 individuals, including 7 cohort studies, 1 case-control study, and 9 cross-sectional studies (18). In another study Rosario et al. (19) revealed that 6 and over-delivered patients had a significantly higher risk of developing type 2 diabetes independent of family history, level of adiponectin and adipose tissue and other risk factors.

On the other hand, studies suggest that there is no significant association between multiparity and type 2 diabetes mellitus (20, 21). Gunderson EP and colleagues have suggested that gestational diabetes is the most important risk factor for the development of type 2 diabetes in the elderly, although the risk of type 2 diabetes is not increasing in the age range of patients with normal glucose levels during pregnancy (20). In a similar study, Fowler-Brown et al. conducted that by the elderly women, they argued that grandmultiparity and diabetes development were related to one another factor and described that body weight and sociodemographic factors were influential on this relationship (21).

The retrospective nature of our work and the low number of participants are the limitations of the study. It is important, however, to be the first study to reveal the relationship between parity and diabetes development in patients with ten and or more births.

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CONCLUSION

The relationship between multiparity and type 2 diabetes mellitus is controversial in the literature, but the development of type 2 diabetes was found to be significantly higher in patients with ten and over maternal birth in our study.

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Table 1. Comparison of those who did not give birth and those who gave birth to ten or more

Features	Birth		p
	Ten and/or more (n=151)	Nullipar (n=28)	
Age, mean±sd	67.7±6.2	64.8±6.3	0.024
BMI, mean±sd	30.11±6.1	30.95±7.0	0.558
Menapouse age, mean±sd	17.9±7.5	10.6±8.2	0.000
Diabetes mellitus	28 (% 18.5)	3 (% 10.7)	p <0.05

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