Electromagnetic Exposure May Interfere with the Prevalence of Diabetes Mellitus in Turkey

Türkiye'de Elektromanyetik Maruziyet Diyabetes Mellitus Prevalansını Etkileyebilir

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Abstract

Exposure to electromagnetic fields may cause or worsen diabetes mellitus. Cancer has been studied many times but diabetes has not been discussed in terms of electromagnetic exposure. We combined the data of two large studies that were recently conducted in Turkey. We found that electromagnetic pollution may negatively affect health. *Turk Jem 2012; 16: 41-2*

Key words: Electromagnetic exposure, prevalence, diabetes mellitus, TURDEP 2

Özet

Elektromanyetik etki altında kalma diyabeti kötüleştirebilir veya diyabete sebep olabilir. Kanserin elektromanyetik maruziyet ile ilişkisi birçok çalışmada araştırılmıştır ancak diyabetle ilgili bu konuda bir tartışma yapılmamıştır. Türkiye'de bu konularda yapılmış iki büyük araştırmayı birleştirdik ve elektromanyetik kirliliğin sağlığı olumsuz etkileyebileceği sonucuna vardık. *Türk Jem 2012; 16: 41-2*

Anahtar kelimeler: Electromanyetik maruziyet, prevalans, diabetes mellitus, TURDEP 2

Introduction

Many studies show that watching television is associated with obesity. Spending relatively more amounts of time in front of a television may cause a disruption in glucose metabolism, thus leading to insulin resistance. In addition, it has been shown that these negative effects are independent of the physical activities performed by affected individuals (1,2).

Recently, findings of TURDEP 2, a study of 26.499 individuals in Turkey, have been announced. This study identified that the prevalence of diabetes mellitus (hereafter diabetes) in Turkey was 13.7% in 2010 (3). However, the projected prevalence of diabetes in the year 2025 in Turkey is only 10%. This lower projected prevalence over the next 10–15 years is a surprising finding. Diabetes has reached epidemic proportions in the 21st century, and the rapid rise in the number of cases in Turkey poses a serious threat to the national welfare. According to TURDEP 1, the prevalence of diabetes was only 7.2% in 1999. The more recent TURDEP 2 identified that the highest prevalence of diabetes was observed in the cities of Bursa and Malatya. The high prevalence in Bursa is partially explained by European immigration to Bursa over the last few decades, but this explanation does not account for the high prevalence in Malatya. Evaluating the relatively sharp increase in the prevalence of diabetes in Turkey could enable us to determine why these are the leading cities.

Another increasing trend towards use of technological devices has been noticed in Turkey (4). Their penetration rate is estimated to be 87.97%, and there were 64.8 million mobile phone subscribers in Turkey by 2011. These devices and televisions may affect health via the electromagnetic fields they emit. Apart from these devices, unintended electromagnetic exposure also results from base stations and visual transmitters. In this study, we aimed to examine a possible effect of electromagnetic exposure in general on the prevalence of diabetes using data of two large studies conducted in 2010.

TURDEP 2 study results were made public in 2010. Professor Satman announced the results at the National Diabetes Congress of Turkey in 2011, and confirmed the prevalence of diabetes in each of the 15

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investigated cities. The obtained results were compared with those of TURDEP 1 to determine how rapidly the prevalence of diabetes was increasing.

The Turkish science technologies and communication service (BTK) reported general electromagnetic exposure rates for each city of Turkey in 2010. There were a number of measurements for each city and the results were classified into 5 groups: (0-1) V/m, (1-3) V/m, (3-5) V/m, (5-6) V/m, (6-9) V/m. For the purpose of our study, we accepted (0-1) V/m as 'safe' and measurements exceeding this limit as 'unsafe'. The main aim of our study was to compare the prevalence of diabetes in safe versus unsafe cities.

In TURDEP 2, the prevalence of diabetes was determined in 15 cities from 5 regions of Turkey. There were 6 cities determined as 'unsafe' in more than 50% of measurements and the remaining 9 cities were 'safe.' The prevalence of diabetes in unsafe cities was 18.0% (SD +/-2.3), and in safe cities it was 14.9% (SD +/-2.5). The difference in the prevalence of diabetes between these two categories of cities was statistically significant (p=0.032). We used the t-test for the comparison of mean values between the two groups (safe and unsafe) and p values of less than 0.05 were considered to indicate statistical significance.

According to data reported by BTK, the exposure measurements were only made around the base stations in each city. Measurements of electric field strength were repeated 76 times in Denizli and 8991 times in Ankara. The former had the least, and the latter had the most frequently repeated measurements. The cities included in the study were Denizli, Bursa, Konya, Ankara, Istanbul, Eskisehir, Diyarbakir, Malatya, Erzurum, Adana, Antalya, Trabzon, Samsun, Izmir, and Gaziantep. The prevalence of diabetes was 13.7% among the 26,499 persons examined (16,696 women and 9,327 men). The number of persons living in urban areas was 15,743 and the number in rural areas was 10,441. The prevalence of diabetes in each city was approximately 9% in Trabzon, 14% in Samsun and Erzurum, 15% in Denizli, Izmir and Gaziantep; 16% in Konya, Adana and Ankara; 17% in Eskisehir, Antalya and Istanbul, 20% in Diyarbakir, Bursa and Malatya. Percentage of electric field strength measured exceeding 0-1 V/m range was 48,16% in Trabzon (safe), 41,08% in Samsun (safe), 32,43% in Erzurum (safe), 89,47% in Denizli (unsafe), 64,98% in Izmir (unsafe), 43,47% in Gaziantep (safe), 38,85% in Konya (safe), 45,65% in Ankara (safe), 29,52% in Eskisehir (safe), 30,3% in Adana (safe), 36,64% in Antalya (safe), 77,92% in Istanbul (unsafe), 61,67% in Diyarbakir (unsafe), 61,17% in Bursa (unsafe), and 57,19% in Malatya (unsafe).

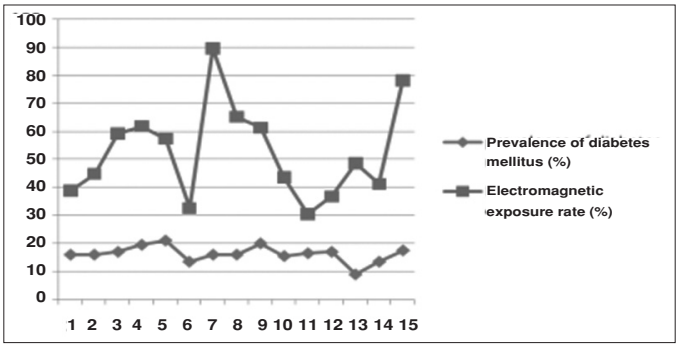

Figure 1. Electromagnetic exposure rate and the prevalence of diabetes mellitus

Studies such as TURDEP 2 certainly generate new ideas about diabetes. Similarly, reports such as those announced by BTK are useful for health evaluations. Following our simple evaluation, we determined that electromagnetic exposure may result in a higher prevalence of diabetes.

The immobility that accompanies watching television may lead to obesity and insulin resistance. Furthermore, discussions of the cancer-causing potential of mobile phones will probably continue in the future. However, we concluded that these devices may negatively affect health, probably by reducing glucose metabolism.

It is known that patients with diabetes have higher iron stores compared with patients without diabetes (5-7). The iron excess in patients with diabetes may be affected by electromagnetic stimulation via enzymes taking a role in glucose metabolism. It should also be remembered that iron has a role in carcinogenesis because of its catalytic effects, and has prognostic value in cancer patients (8).

We proposed a synthesis of two large studies conducted at the same time in Turkey. Following our analysis, we found that electromagnetic fields may affect the prevalence of diabetes in the surrounding areas. This relationship is shown in Figure 1 where abscissa illustrates 15 different cities and ordinate demonstrates changes in the rates. Prospective studies measuring the direct effect of electromagnetic waves on individuals should be planned in the future.

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