Prevalence of Epilepsy in Adults of Kırıkkale Province Population, a Rural Area of Turkey

Türkiye Kırsalında, Kırıkkale İlinde Erişkinlerde Epilepsi Prevalansı

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Geliş Tarihi/*Received:* 16.12.2009
Kabul Tarihi/*Accepted:* 20.02.2010

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ABSTRACT Objective: Epilepsy has a great socio-economic effect on the population as well as psychogenic and health effects. The prevalence of epilepsy in adults has yet to be determined in Turkey. **Material and Methods:** We screened 1080 of the adult population of Kirikkale province, Turkey, for the prevalence of active epilepsy with using a standardized screening questionnaire. Epilepsy patients were further investigated with a detailed history, neurological and physical examinations were performed. Neuroimaging and EEG were performed on all persons who had seizures. **Results:** Forty-four patients were reported to have had a spell. Thirty-six had spells of hypertension, migraine attacks and syncope. Five of the 1080 (4.6 per 1000) patients were found to have epilepsy. Ages ranged from 26-64 (mean 40.8± 11.4), three were female. The socio-economic status and the education level of epilepsy patients were low. Epilepsy type was generalized tonic-clonic in two patients, complex partial in two patients, atonic in one patient. All were using monotherapeutic agents. Tuberculosis and Behçet's disease was found in two epilepsy patients as a coincidental disease. Family history was not positive. Paramedical methods including religious treats are in highly demand for treating epilepsy patients in rural areas. **Conclusion:** Our data shows that the low rate of reporting epilepsy was strongly correlated with the socio-cultural and economic state of the screened population. Traditional mysteries in rural population have a great impact on the reporting of epilepsy. Education of population about epilepsy is highly suggestive.

Key Words: Epilepsy; epidemiology; prevalence; adult

ÖZET Amaç: Epilepsinin, toplumda psikojenik ve sağlık etkileri kadar büyük sosyoekonomik etkileri vardır. **Gereç ve Yöntemler:** Standardize edilmiş bir sorgulama formu kullanılarak Türkiye Kırıkkale erişkin popülasyonda epilepsi prevalansını belirlemek için 1080 kişinin taranması planlandı. Tespit edilen epilepsi hastalarının detaylı öyküleri nörolojik ve fizik muayeneleri ve ileri tetkikleri yapıldı. Nörogörüntüleme ve EEG, nöbeti olanlara yapıldı. **Bulgular:** Kırk dört hasta nöbet tarifledi. Otuz üç hastanın bayılmaları, hipertansiyon ve migren atakları ve senkopla ilişkiliydi. 1080 hastanın 5'inde (4.6/1000) epilepsi tespit edildi. Epileptik hastaların yaşları 26-64 (ortalama 40.8 ± 11.4) arasında değişmekteydi ve 3 tanesi kadındı. Epilepsili hastalarda sosyoekonomik düzey ve eğitim seviyesi düşüktü. İki hastada jeneralize tonik-klonik, iki hastada kompleks parsiyel ve bir hastada atonik tarzda nöbet vardı. Hastaların hepsi tek ilaçla tedavi almakta idi. İki epilepsi hastasında rastlantısal olarak tüberküloz ve Behçet hastalığı saptandı. Aile öyküsü hiçbirinde yoktu. Kırsal alanda epilepsi tedavisi için dini tedavileri de içeren paramedikal metotlara sıklıkla başvurulduğu gözlendi. **Sonuç:** Düşük oranda epilepsi bildirimi sosyokültürel ve ekonomik durum ile güçlü bir şekilde ilişkili bulunmuştur. Bu nedenle toplumun epilepsi hakkında eğitimi gereklidir.

Anahtar Kelimeler: Epilepsi; epidemiyoloji; prevalans; erişkin

Turkiye Klinikleri J Neur 2010;5(1):1-7

Epilepsy is one of the major neurological disease worldwide resulting in significantly deleterious personal, familial and social consequences. Besides these, it has a great socioeconomic affects besides its psycho-

genic and health affects, so it is very important to determine the magnitude of epilepsy prevalence.[1-4] Epidemiological studies contribute to our understanding of the natural course, risk factors, and socio-cultural and economic features of epilepsy.[1-4] Although a number of studies on the epidemiological data of epilepsy are present in developed countries, at most developing countries, information about the epidemiology of epilepsy is limited. Prevalence studies of active epilepsy provide basic data to evaluate the need for health care for persons with epilepsy and the strain of the disorder on a population.[2-4] Nevertheless, such data are essential for providing and planning an effective health care system. Various population-based studies in western countries are focused on the prevalence of epilepsy. Although it has been reported that the prevalence of epilepsy varies among countries as the main etiology differs between developing and developed countries, it has been estimated as 4 to 57/1000.[2-8] Epilepsy is undoubtedly a major health problem in Turkey. Thus, there is a great deal of estimating the prevalence of active epilepsy in Turkey due to different regions, ethnicity, economical and social, cultural effects and limited access to healthcare.

This study was planned to determine prevalence of active epilepsy, using such a design in the adult population of the Kirikkale Province, Turkey. In our study we used the validated questionnaire for screening instrument, a slightly modified version of the WHO protocol, and followed the guidelines for epidemiologic studies on epilepsy proposed by the International League Against Epilepsy (ILAE) in 1993.[9]

MATERIAL AND METHODS

The study period was conducted between May 2001 and October 2001. One thousand and eighty people of adult population of Kirikkale according to clustering and layered sampling method for patients over 19-years-old were screened by the trained residents of neurology and public health departments with the standardized questionnaire. All houses in those randomly selected areas according to region, age, and sex were searched. Due to high migration rate and rural ethnic groups of Anatolia, Kirikkale has a heterogeneous population (Kirikkale City), representing both rural and urban populations. The Community Health Maintenance Centers provided health service to the community with free of charge. A validated screening questionnaire consisting of 15 questions was used for screening. In this validated screening questionnaire, which was derived from the questionnaire suggested by WHO, indirect questions regarding other treatment modalities were asked.[10,11] Three of the 15 questions were aimed at disclosing the presence of epilepsy and were derived from the questionnaire suggested by WHO. Twelve additional questions, including Turkish dialectic synonyms of epilepsy like "tutarik, havale, sara, boncuk" were included to increase the sensitivity of the questionnaire (Table 1).

This was a two-phase study. During phase 1, the sample of the rural communities randomly selected from the 20 areas of the Kirikkale Province was screened door-to-door to identify persons who may have had a disorder of seizure. The screening included standardized questions and simple tasks. The interviewers who carried out the screening were neurology residents and supervised by at least one of the two attending physicians involved in the study. During phase 2, all Individuals suspec-

TABLE 1: Validated questionnaire for epilepsy screening in Turkey.[11]

Have you ever lost consciousness?
Have you recurrently lost consciousness
Have you ever had a "sara"?
Have you had a "havale", "boncuk" or "tutarik"?
Do you sometimes have blank spells?
Do you sometimes have panic attacks?
Have you ever visited Hodja? Why?
Have you ever received long term therapy for any reason?
Have you ever had an electroencephalogram (EEG)?
Do you sometimes wet your bed during sleep?
Have you experienced periods of tongue-biting or spasms in your limbs during your sleep?
Does anyone in your family have epilepsy?
Does anyone in your family febrile seizures?
Do you have any problems sleeping?
Have you experienced involuntary movements such as jerks?

ted to have seizure or epilepsy, through questionnaire, were invited to the clinic for interview. First, a detailed history and other demographic features were obtained then, complete neurological and physical examination that was performed by attending neurologist (Dr. AKE). Patients with probable cases were further investigated with clinical grounds, laboratory examinations; EEG and neuroimaging screening were performed.

Terminology and seizure classification of international league against epilepsy's were used in this study. The definition proposed by the ILAE was accepted: "Epileptic seizure is a clinical manifestation presumed to result from an abnormal and excessive discharge of a set of neurons in the brain." "Epilepsy is a condition characterized by recurrent (two or more) epileptic seizures, unprovoked by any immediate identified cause. Multiple seizures occurring in a 24-h period are considered a single event. Individuals who have had only febrile or neonatal seizures are excluded from this category. "Diagnosis of epilepsy was made mainly on a clinical basis, relying on description of seizures, results of EEG and other investigations, where available. Investigations were not applied as independent inclusion or exclusion tools. On the basis of these ILAE definitions, we considered "prevalent cases" of epilepsy patients to be indicative of those who had at least one epileptic seizure in the previous five years, regardless of any anti-epileptic drug treatment". Adult cases with active epilepsy were studied for the prevalence of the disease. Cases with active epilepsy with exclusion of pediatric patients, febrile and other provoked seizures, were included. The present study applied the classification proposed by the ILAE Guidelines.[9,12,13] The major categories of risk factors for epilepsy were screened as (a) head injuries (severe and moderate trauma); (b) cerebrovascular diseases; (c) CNS infections (abscesses, encephalitis with all etiologies and bacterial meningitides); (d) pre- and perinatal risk factors; (e) CNS neoplasms; and (f) other predisposing causes (post-encephalopathic states, structural brain lesions probably related to genesis of seizures not defined above).

In an attempt to determine the accuracy of classification, patients with a clinical diagnosis of epilepsy underwent a standard and evoked EEG recording. We performed all EEG recordings in the field using 20-channel (digital) equipment. Electrodes were placed according to the International 10-20 System International system, using referential and bipolar montages. Hyperventilation and intermittent photic stimulation were used routinely during EEG recording. We classified the EEG records as normal or with abnormalities consistent with generalized, focal, or multifocal epileptiform discharges. Seizure types were identified on the basis of the classification proposed by the ILAE in 1981.[12] The classification was based on descriptions of seizures obtained from patients or eye-witnesses and EEG recordings. Neuroimaging was performed in all investigated cases which epilepsy was suspected.

RESULTS

A total of 1080 people were screened as the sample group by using screening questionnaire for epilepsy. The percent of females was 60%, the mean age was 42.64 ± 13.17 years (range 20-80). Table 2 presents the age and sex distribution of the eligible population (Table 2). At the end of the screening, 1080 questionnaires had been completed. Of the 1080 subjects screened, the crude data obtained in the field screening revealed that 44 (40.7 per 1000) individuals had a presumptive diagnosis of epilepsy. As the study was planned to determine the prevalence, individuals suspected to have epilepsy through questionnaire, were invited to the clinic for

TABLE 2: The distribution of individuals according to age and gender.

Age groups	Percent
20-29	16.2
30-39	30.3
40-49	24.1
50-59	14.6
60-69	12.0
70-80	2.4
Over 80	0.4
Total	100

interview, neurological examination, EEG and neuroimaging. Forty-four patients were reported to have a spell. Thirty-six had spells of hypertension, migraine attacks, and syncope or hypotension attacks. After an extensive neurologic evaluation of the positive subjects detected during phase 1, we found 8 (7.4 per 1000) potential epileptic subjects-of whom three (2.8 per 1000) experienced acute symptomatic seizures (one related to acute alcohol intoxication, one that occurred during a course of active CNS infection, and one who had a case of eclampsia). The diagnostic criteria were fulfilled for five subjects, of whom three were not considered to be a prevalent case. Epilepsy was confirmed in five of one thousand and eighty (4.6 per 1000).

The prevalence of epilepsy was 4.6/1000 for active epilepsy. Ages of epileptics were ranged 26-64 (mean 40.8 ± 11.4), three of them were female. Demographic features were; all patients were married, the socioeconomic status and the education level of epileptic patients were low. Mean duration of education was three (range: 1-5) (Figure 1, 2). Overall, the prevalence was slightly higher in women (3/1080) than in men (2/1080). The mean duration of the epilepsy was 7.6 ± 6.7 (range: 1-16.3 years). The frequency of seizures was 3.8 ± 2.4 per year. All of them were using monotherapeutic agents (carbamazepine, phenytoin and valproic acid). One patient had a history of status epilepticus. Family history was negative in all patients. None of them had a history of head trauma, leptomeningeal infection, birth trauma or febrile convulsion in birth. Tuberculosis and Behçet's Disease was found in two epileptic patient as a coincidental disease. When the seizures were classified according to the 1981 ILAE classifications, seizure type was generalized tonic-clonic in two patients, complex partial in two patients, and atonic in one patient. Of the 8 patients including acute symptomatic seizure, all had a standard and evoked interictal EEG recording. All symptomatic and one epileptic patient had a normal EEG findings, one patient had multifocal discharges, one patient had a focal discharge, and two patients had a pattern consistent with generalized seizure. However, on the basis of the clinical history and the neurologic examination, EEG and neuroimaging, we have not found any possible causes of epilepsy.

FIGURE 1: The Distribution of Occupation of the Study population.

FIGURE 2: The Distribution of The education Level of the Study population.

Paramedical methods including religious treats, are highly demanded way of treating the epileptic patients in rural areas. In the survey, most of patients including epileptics (72.7%) had been reported to be tried paramedical treatments.

DISCUSSION

The prevalence of epilepsy varies considerably in different populations ranging from 1.5/1000 to 57/1000.[3-8] The prevalence of active epilepsy tends to be lower in developed countries, ranging 1.5-7.5/1000 and remarkably higher in developing countries, ranging 17-57/1000.[3-8,14-18] The lowest prevalence of epilepsy was reported to be in Japan with 1.5 per 1000 and the highest 57 per 1000 in the rural areas of Panama.[7,19,20] A number of factors contribute to the higher prevalence in developing countries. The wide variability in the rates is partially caused by geographical and medico-social differences; however, a considerable part of the variation may be explained by different case-finding techniques and dissimilar inclusion criteria.[3-5,21,22] As there were various factors such as design of the studies, rural or urban localization and selection of the target group, WHO recommendation on designing the epidemiological research studies

on neurological disorders should be used in order to minimize the variations in the results. The reported prevalence of epilepsy tends to be high in early childhood and low between 20 and 50 years of age and high after 50 years of age.[17,23-25] There is little published information on the prevalence of epilepsy in adult population from Turkey and other worldwide. Epidemiologic figures for adults are not readily available in every country and the prevalence of epilepsy in adult population in Turkey has to be determined.

In Turkey, a number of epidemiological studies on epilepsy were published and the prevalence rate was reported to be with a range of 6.1 and up to 10.2%.[11,26-30] Low prevalence values, close to values from industrialized countries, that range from 6.1 to 7.8/1000 were detected in several studies carried out in Turkey (Sivas; 6.1/1000, Ankara; 7.0-7.4/1000 and Istanbul 7.8/1000). Conversely, very high prevalence values are reported in other studies such as in Silivri (10.2/1000) and Bursa (8.5/1000). When the epidemiological studies were further analyzed according to the adult population (age over 20), it was estimated that the prevalence of epilepsy in adult population of Turkey varied between 6.1 and 11.2 per 1000 in these studies (Table 3). The results were not similar with our study for active epilepsy in adults over age 20. In our study, epilepsy prevalence of a defined adult population in Kirikkale province, Turkey was found to be 4.6 per 1000. However, our results are comparable with the reports from adults in developed countries such as Sweden; (5.5/1000); European countries France and Sweden (6.26-6.3/1000), Estonia and Singapore (5.3/1000) (Table 3).[15,31-34] On the other hand, our study shows a slight decrease in regard of the previous studies data of Turkey, reporting the prevalence of 4.6/1000. This study shows a slight decrease in regard of the previous studies data of Central Anatolia of Turkey, reporting the 7.8 and 8.7 per 1000 in all age groups. The decrease in the prevalence rate may be due to many facts. One of the facts may be due to low reporting or methodical differences. The low rates also can be correlated to low socio-cultural and education level of the population. Besides these, the economic states of the studied population are not well enough to reach the health-care or get the necessary information about what the epilepsy is.[35,36] The other reason might be related with the methodological differences with the reported studies. In these reported studies, case ascertainment was choosen based on the registry, not the field. Most of the data on epilepsy available from developing countries are based on case-ascertainment surveys using health care files or databases instead of door-to-door case ascertainment with a two-phase design. The complexity of case-ascertainment seems to be one of the most important confounding factors in epidemiologic studies for epilepsy. A case-collection

TABLE 3: The studies reporting the prevalence (estimated) in Adults from Turkey and Worldwide.

	Population from	In all Ages Included	Active epilepsy	/1000	Adult (age over 20) Population Included	Active epilepsy	/1000
Aziz and Guvener et al. (1997)	Ankara, Turkey	11497	81	7.0	6198	38	6.1
Topalkara et al. (1999)	Sivas City, Turkey	5248	32	6.1	3105	19	6.1
Karaağac et al. (1999)	Silivri, Turkey	4803	49	10.2	3048	34	11.6
Onal et al. (2002)	Istanbul City, Turkey	2187	17	7.8	1384	8	5.8
Calisir et al. (2006)	Bursa City, Turkey	2116	18	8.5	2053	22	10.7
Aziz et al. (1997)	Pakistan	24130	241	9.9	18770	116	6.2
Keranen (1989)	Finland				178073	1129	6.3
Forsgren et al. (1992)	Sweden				129005	713	5.5
Kun Adult (1999)	Singapore				20542	108	5.3
Oun (2003)	Estonia				75245	396	5.3
Picot et al. (2008)	France				55516	348	6.3

method which rely on prior diagnosis, may be not be a reliable method and it has other drawbacks, e.g. lack of ideal screening method, poor reproducibility and expensiveness.[3-5] Even though it was reported that a few number of cases were undiagnosed. A U.S. study conducted in the general population using a screening questionnaire found that around 7% of subjects with apparent epilepsy had not been diagnosed.[16] Considering the current prerequisite of medical care in Turkey and effort to improve awareness of epilepsy, the rate here is probably lower than it was expected. Furthermore, such cases remain insufficient to be taken into account when planning and managing healthcare resources.

Besides these factors, the perception of epilepsy in societies may differ depending on the level of education and cultural background of the society. People might associate epilepsy with supernatural causes.[26,37] In rural areas, most patients may prefer paramedical treatments including alternative or religious treats and some of them; especially non-epileptic seizures can be cured so they do not report their illnesses. As in our study, most of epilepsy suspected cases had applied to the paramedical treatments.[37,38] The low level of education may be another aspect of unawareness of the nature of the disease attacks and may not seek medical care. This type of patients can change the data of the studies. The physician should give general information about what epilepsy is and what is valuable about the treatment, and what a patient and their family could do for high life-quality in order to get most accurate values. The beliefs about the nature and cause of epileptic seizure may be the other aspect of underreporting. The attitudes of epileptics' family members and environment for living and working if they are unaware or uneducated about epilepsy or seizure disorders may have a significant impact on the quality of life of patients with epilepsy. The tendency to not allowing the epileptics to live alone, getting job, participating in certain social and occupational activities, driving or even negative attitudes getting married with epileptic patients might be the one of the main reasons for over cover up of having epilepsy among Turkish population.[39,40] The quality of life of epileptics may seriously be affected by the attitudes of their families and social or work environment if the people around them are unaware of or uneducated about their condition.[39] This fact renders the patients with epilepsy helpless, fragile, and unconfident. There is still need to educate the public about the epilepsy via improving the awareness, knowledge, attitude and management of epilepsy.[41,42]

The sample group of our study was much smaller that the groups used in some of the epidemiological research from other developing countries. Although the reliability of the results increases with a large sample population, the method of field screening and interviewing the patients with neurology residents was one the advantage of the accuracy of the field screening. This method makes the certain the accurate identification of patients with detailed interviews by neurology residents and attending, minimizing the probability of missing cases compared with other epidemiological studies. A lack of financial and logistic support impeded to study a larger number of people.

It is hard to claim that the results of this study are relevant throughout Turkey. In order to maintain an optimal prevalence rates for active epilepsy in turkey, it is mandatory to include many different social and geographical areas which may represent whole population of Turkey. Such a survey would require more extensive organization and support. Therefore, this study cannot be accepted as a model for the whole country. Indeed, it is a highly civilized rural area, which cannot represent less-developed Anatolian country sides.

Our data shows that the low rate of reporting epilepsy was strongly correlated with socio-cultural and economic state of screened population. Traditional mysteries in rural population have a great impact on reporting of epilepsy. Education of population about epilepsy is highly suggestive.

REFERENCES

1. Naz Yeni S, Epilepsi Epidemiyolojisi [Epidemiology of Epilepsy]. Turkiye Klinikleri J Neurol-Special Topics 2008, 1(2):9-16..
2. Leonardi M, Ustun T B. The global burden of epilepsy Epilepsia. 2002;43(Suppl. 6):21-25.
3. Banerjee P N, Filippi D, Allen Hauser W. The descriptive epidemiology of epilepsy-a review. Epilepsy Res 2009;85(1):31-45.
4. Senanayake N, Román GC. Epidemiology of epilepsy in developing countries. Bull World Health Organ 1993;71(2):247-258.
5. Forsgren L, Beghi E, Oun A, Sillanpaa M. The epidemiology of epilepsy in Europe: a systematic review. Eur J Neurol 2005;12(4):245-253.
6. Hauser WA, Kurland LT. The epidemiology of epilepsy in Rochester, Minnesota, 1935 through 1967. Epilepsia 1975;16(1)1-66,
7. Gracia F, Loo de Lao S, Castillo L, et al. Epidemiology of epilepsy in Guaymi Indians from Bocas del Toro Province, Republic of Panama. Epilepsia 1990;31(6):718-723.
8. Hauser WA, Hesdorffer DC. Incidence and prevalence. In Hauser WA, Hesdorffer DC (Eds) Epilepsy: frequency, causes and consequences . Demos, New York , 1990, pp. 1-51.
9. Commission on Epidemiology and Prognosis, International League Against Epilepsy. Guidelines for epidemiologic studies on epilepsy. Epilepsia 1993;34(4):592-596.
10. World Health Organization. Research protocol for measuring the prevalence of neurological disorders in developing countries. Neurosciences program, Geneva: World Health Organization, 1981.
11. Karaağaç N, Yeni N, Şenocak M, Bozluolçay M, Savrun FK, Özdemir H, Cağatay P. Prevalence of epilepsy in Silivri, a rural area of Turkey. Epilepsia 1999,40(5):637-642
12. Commission on Classification and Terminology of the International League Against Epilepsy. Proposal for revised clinical and electroencephalographic classification of epileptic seizures. Epilepsia 1981;22(4):489-501.
13. Commission on Classification and Terminology of the International League Against Epilepsy. Proposal for revised classification of epilepsies and epileptic syndromes. Epilepsia 1989;30(4):389-399.
14. Annegers, F.J., Epilepsy. In: Nelson, L.M., Tanner, C.M., VanDen Eeden, S.K., McGuire, V.M. (Eds.), Neuroepidemiology. From Principles to Practice. Oxford University Press, New York, 2004: pp. 303-318.
15. Forsgren L. Prevalence of epilepsy in adults in Northern Sweden. Epilepsia 1992;33(3): 450-458
16. Haerer AF, Anderson DW, Schoenberg BS. Prevalence and clinical features of epilepsy in a biracial United States population. Epilepsia 1986;27(1):66-75.
17. Hauser WA, Annegers JF, Kurland LT. Prevalence of epilepsy in Rochester, Minnesota: 1940-1980. Epilepsia. 1991;32(4):429-445.
18. Shorvon SD, Farmer PJ. Epilepsy in developing countries: a review of epidemiological, sociocultural and treatment aspects. Epilepsia 1988;29(suppl 1):36-54.
19. Sato, S. The epidemiological and clinico-statistical study of epilepsy in Nigata City. Clinical Neurology (Tokyo), 1964;4(4): 313-24.
20. Fong GC, Mak W, Cheng TS, Chan KH, Fong JK, Ho SL. A prevalence study of epilepsy in Hong Kong. Hong Kong Med J 2003;9(4):252-7.
21. Sander JW. The epidemiology of epilepsy revisited. Curr Opin Neurol 2003;16(2):165-70.
22. ILAE Commission Report. The Epidemiology of the Epilepsies: Future Directions. Epilepsia 1997;38(5):614-8.
23. Hauser, WA, Annegers, JF, Kurland, LT. Incidence of epilepsy and unprovoked seizures in Rochester, Minnesota:1935-1984. Epilepsia 1993;34(3):453-468.
24. Wallace H, Shorvon S, Tallis R. Age-specific incidence and prevalence rates of treated epilepsy in an unselected population of 2,052,922 and age-specific fertility rates of women with epilepsy. Lancet 1998;352(9145):1970-1973.
25. Christensen J, Vestergaard M, Pedersen MG, Pedersen CB, Olsen J, Sidenius P. Incidence and prevalence of epilepsy in Denmark. Epilepsy Res. 2007;76(1):60-5.
26. Aziz H, Güvener A, Guvener A, Akhtar SW, Hasan KZ. Comparative epidemiology of epilepsy in Pakistan and Turkey: population-based studies using identical protocols. Epilepsia 1997;38(6):716-722.
27. Calisir N, Bora I, Irgil E, Boz M. Prevalence of epilepsy in Bursa City center, an urban area of Turkey. Epilepsia 2006;47(10):1691-9.
28. Onal E, Tumerdem Y, Ozturk M, Gurses C, Baykan B, Gökyiğit A, Ozel S. Epilepsy prevalence in a rural area in Istanbul. Seizure 2002;11(6):397-401.
29. Güvener A, Işık A, Ilbars Z, Gelişen İ. Orta Anadolu Bölgesinde Epidemiyolojik, Klinik Ve Sosyokültürel Yönleriyle Epilepsi Araştırması. T J Research Med Sci.1990,8(3):151-159.
30. Topalkara K, Akyüz A, Sümer H. A study on epilepsy prevalence in Sivas city centre performed with stratified sampling method. Epilepsia (Turkish) 1999;5(1):24-29.
31. Keranen T, Riekkinen PJ, Sillanpaa M. Incidence and prevalence of epilepsy in adults in Eastern Finland. Epilepsia 1989;30(4):413-21.
32. Oun A, Haldre S,MagiM. Prevalence of adult epilepsy in Estonia. Epilepsy Research 2003; 52(3):233-242.
33. Kun LN, Ling LW, Wah YW, Lian TT. Epidemiologic study of epilepsy in young Singaporean men. Epilepsia. 1999;40(10):1384-7.
34. Picot MC, Baldy-Moulinier M, Daurès JP, Dujols P, Crespel A. The prevalence of epilepsy and pharmacoresistant epilepsy in adults: a population-based study in a Western European country. Epilepsia. 2008;49(7):1230-8.
35. Scott, RA, Lhatoo SD, Sander JW. The treatment of epilepsy in developing countries: where do we go from here? Bull World Health Organ. 2001;79(4):344-351.
36. Meinardi H, Scott RA, Reis R, Sander JW; ILAE Commission on the Developing World. The treatment gap in epilepsy: the current situation and ways forward. Epilepsia. 2001;42 (1):136-49.
37. Aziz H, Ali SM, Frances P, Khan MI, Hasan KZ. Epilepsy in Pakistan: a population-based epidemiologic study. Epilepsia 1994;35(5): 950-958.
38. Fatovic-Ferencic S, Durrigl MA. The sacred disease and its patron saint. Epilepsy Behav 2001;2(4):370-3.
39. Jacoby A, Austin JK. Social stigma for adults and children with epilepsy. Epilepsia. 2007;48 (Suppl) 9:6-9.
40. Bandstra NF, Camfield CS, Camfield PR. Stigma of epilepsy. Can J Neurol Sci. 2008;35(4): 436-40.
41. Bekiroğlu N, Ozkan R, Gürses C, Arpaci B, Dervent A. A study on awareness and attitude of teachers on epilepsy in Istanbul. Seizure 2004;13(7):517-22.
42. Demirci S, Dönmez CM, Gündoğar D, Baydar CL. Public awareness of, attitudes toward, and understanding of epilepsy in Isparta, Turkey. Epilepsy Behav 2007;11(3):427-33.