Unexpected trent of neural tube deffects in Elazığ: New data

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Birth prevalances of total neural tube defects and anencephaly were monitored among all live-and still-births delivered between January 1983 and December 1993. Of the 11502 newborns, 38 had neural tube defects, giving a birth prevalence of 3.3 per 1000 total births. Of these, 33 were anencephalic (2.8 per 1000). In all of 5532 conception estimated to have occurred prior to the Chernobyl disaster in May 1986, the birth prevalences of total neural tube defects and anencephally were the same (1.8 per 1000). However, the rates of neural tube defects and anencephaly increased to levels of 6.9 and 5.5 per 1000, respectively, during the period 1988-1990, subsequently gradually declining the previous levels within three years. This dramatic change in birth prevalence which parallels to a previous finding from Turkey, suggests that this finding may be associated with the Chernobyl disaster of May 1986. Therefore, new studies from both Turkey and other European countries are needed in order to explain this unexpected trend. [Turk J Med Res 1996, 14 (3):89-91]

Keywords: Neural tube defects, Anencephaly, Chernobyl disaster

Neural tube defects (NTDs), especially anencephaly constitute the most common type of malformations of the central nervous system in humans and have been attributed to a defect in the closure of the anterior and/or posterior portions of the neural tube early in embryogenesis (1). The aetiology is not fully understood but vitamin A, folic acid, zinc and selenium deficiency have all been suspected (2-6). Although various authors have reported a birth prevalence of 1.5 to 2.6 per 1000 births for Turkey, a marked increase in total NTDs including anencephaly among conceptions occuring after the Chernobyl disaster has been noticed in several recent studies and it is claimed that this might be due to the nuclear wave from Chernobyl affecting the conceptus after May 1986 (7-15). In the present study, we examined new data or the birth prevalence of NTDs for Eastern Turkey.

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MATERIALS AND METHODS

The study was carried out in Elazığ, Eastern Part of Turkey. The population of Elazığ itself is 205000, but is approximatelly half a million with the surrounding towns and villages. Our hospital, which was established in 1978, was a State Delivery Center until 1985, when the Medical School of Fırat University assumed this responsibility. Therefore, the early data including i983 and 1984 were collected from Delivery Centre records. The later data were obtained by us from the Departments of Pediatrics and Obstetrics and Gynecology dating from 1985. All livebirths and stillbirths resulting from pregnancies of more than 28 weeks gestation were reviewed from January 1983 to December 1993. Every newborn was examined by a pediatrician within 24 hours of birth and the number of total births and newborns with NTDs were determined. Additionally, mothers' ages and parity status, histories of present and previous pregnancies for pyrexial illness, radiography and medication, consanquinity rate and socioeconomic status of parents were recorded routinely.

Stastical evaluation was made using t test and chi-square analysis.

Table 1. Birth prevalence of NTD births in Elazığ,1983 to 1993.

Years	Total number of births	Total NTD n	Total NTD rate*	Anencephaly n	Anencephaly rate*
1984	1535	3	1.9	3	1.9
1985	1265	3	2.3	3	2.3
1986	1090	1	0.9	1	0.9
	5532	10	1.83	10	1.8b
1987	914	2	2.1	2	2.1
1988	562	7	12.4	5	8.9
1989	695	7	100	6	8.6
1990	714	4	5.6	3	4.2
1991	896	2	2.2	1	1.1
1992	1116	4	3.5	3	2.6
1993	1073	2	1.8	2	1.8
	5970	28	4.7°	23	3.8[d]
Total	11502	38	3.3	33	2.8

•Per 1000 total births

* p>0.05 (for a and c and for b and d)

Table 2. Several factors in the mothers of newborns with NTD and of randomized healthy newborns.

	NTD newborns (n=31)	Healthy newborns (n=50)	P
Maternal age (mean±SD, year)	27.6±5.2	25.6±5.2	>0.05[a]
Parity Status (mean±SD, number)	4.8±2.3	5.3±2.1	>0.05[a]
Consanquinity rate	24%	21%	>0.05b
Low socioeconomic status	76%	72%	>0.05b

a: t test

b: Chi-square test

RESULTS

Total births and births with neural tube defects between 1983 and 1993 are summarized in Table 1. Of the total of 11502 livebirths and stillbirths, 38 had a NTDs, a birth prevalence of 3.3 per 1000. Of these, 33 were anencephalic (birth prevalence 2.8 per 1000). In all of the 5532 conceptions estimated to have occurred prior to Chernobyl disaster, the birth prevalences of total NTDs and anencephaly were the same (1.8 per 1000). This contrasts with the years after Chernobyl, when the birth prevalence of NTDs were 4.7 per 1000 (birth prevalence of anencephaly 3.8 per 1000). The differences were not statistically significant (p>0.05). However, the insignificant increased rates reached a peak of 12.4 (for NTDs) and 8.9 (for anencephaly) in 1988. In 1989 and 1990 the rates of total NTDs decreased to 10.0 and 5.6, and that of anencephaly to 8.6 and 4.2 per 1000, respectively. During three years after the disaster the birth prevalence of NTDs was 6.9, that of anencephaly to 5.5 per 1000, and there was significant differences between the levels of pre-Chernobyl and of post-Chernobyl (for both p<0.001). In 1991, 1992 and 1993 the rates of total NTDs were 2.2, 3.5 and 1.8, and that of anencephaly were 1.1, 2.6 and 1.8, respectively.

For the mothers of 31 newborns with NTDs and of randomly selected sample of 50 healthy newborns, several factors including maternal age, parity, consanquinity rate, and socioeconomic status were unimportant (Table 2) and histories of present and previous pregnancies were similar.

DISCUSSION

Our previous study in Elazığ, Eastern Part of Turkey showed that the yearly birth prevalence of anencephaly between 1978 and 1987 was 1.5 per 1000, and the corresponding rate was 2.1 per 1000 in 1987 just after the Chernobyl disaster (11). Although there was a marked increase in total NTDs including anencephaly (20 and 8.9 per 1000 in the two recent studies in Western Turkey during 1987, in the same distance from Chernobyl, showed no significant increase in the birth prevalence of anencephaly (12, 13). This finding was in agreement with that of EUROCAT Working Group (16). However, during the period January 1988-December 1990 in our region higher birth prevalences in total NTDs (6.9 per 1000) and anencephaly (5.5 per 1000) were found, with a peak of 12.4 and 8.9 per 1000 in 1988, respectively (14). In contrast, an increased rate just after the Chernobyl disaster in two studies of the same period declined over the following 6-12 months and finally achieved pre-Chernobyl level (17). During the period January 1991-December 1993 in our region, total NTDs including anencephaly also dec-reased gradually returning back to the rates of 1983-1986.

According to several Turkish authors the dramatic change in birth prevalence may be associated with the Chernobyl disaster in May 1986 (12-15). Unfortunately, levels of radioctivity in the area monitored were not measured accurately and cannot be compared with other centers in Europe since there has been little evidence of a change in NTDs (16). However, Gedikoğlu and Sipahi reported recently the amount of the radioactivity that transfers into brewed tea grown in the Eastern Black Sea region (18). They could not detect any radioactivity in the samples which were produced before the disaster but found significantly higher levels

after Chernobyl accident. They concluded that if the tea in Turkey has been contaminated to such an extent, it is possible that the other food products in this region were contaminated as well and thus that Turkish people probably recevied higher exposure to Chernobyl radioactivity via the food pathway than through inhalation, especially for the populations living in the regions close to Chernobyl. It would be of major interest to ascertain whether there were similar increases in NTDs in the Soviet Union among conceptions immediately after the disaster (13). However, the cause of many congenital malformations of the central nervous system remains obscure, and the fact that in our recent study the increase occured mainly among infants conceived well over a year after the Chernobyl disaster suggests that other factors may be responsible (14). Poor nutrition and deficiencies of essential nutrients such as zinc, selenium, vitamin A and folic acid may be implicated in a multifactorial fashion in the production of NTDs (2-6). We recently showed that a significantly decreased selenium levels in serum and hair was found in newborns with a NTDs compared with healthy newborns (6). Therefore, further epidemiological and biochemical studies both Turkey and other European countries are needed in order to explain the unexpected increase of birth prevalence of NTDs.

Elazığ'da nöral tüp defekîJerinde beklenmeyen artış: Yeni veriler

Hastanemizde 1983 Ocak ve 1993 Aralık tarihleri arasında canlı ve ölü doğan bebekler arasında nöral tüp defekti ve anensefali bulunan bebeklerin sıklığı araştınldı. 11502 yenidoğandan 38'inde nöral tüp defekti bulundu (binde 3.3). Bunlardan 33'ü anansefalik idi (binde 2.8). Çernobil kazasından önceki döneme rastlayan gebelikte toplam nöral tüp defekti ve anensefali sıklığı benzerdi (binde 1.8). Bununla birlikte 1988-1990 döneminde nöral tüp defekti ve anensefali sıklığı, sonraki üç yıl içinde giderek önceki düzeylerine geri dönmek üzere sırasıyla, binde 6.9 ve 5.5 düzeylerine yükseldi. Türkiye'de yapılan diğer çalışmalara paralel olarak doğum oranlarındaki bu dramatik değişiklik, bulguların 1986 Mayısındaki Çernobil kazası ile ilgili olabileceğini düşündürdü. Ancak, Türkiye ve Avrupa ülkelerinden umulmayan yükselişi açıklayacak yeni çalışmalara gerek vardır. [Türk J Med Res 1996, 14(3):89-91]

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