

# Role of dietary habits on fetal anomaly development: Review of 315 consecutive fetal anomaly cases

F.B. Cebesoy, M.D.; O. Balat, M.D.; E. Dikensoy, M.D.; M.G. Ugur, M.D.; I. Kutlar, M.D.;  
H. Kalayci, M.D.

*Department of Obstetrics and Gynecology, Gaziantep University Faculty of Medicine, Gaziantep (Turkey)*

## Summary

**Objective:** This study aimed to investigate and speculate on the dietary habits and certain environmental factors of the Southeast Anatolia region which are thought to be related with fetal anomaly development. **Materials and Methods:** Patients admitted to Gaziantep University Faculty of Medicine Obstetrics and Gynecology Department with fetal anomalies between January 2003 and June 2007 were evaluated. Three hundred and fifteen patients with intrauterine fetal anomaly were detected. The number of total deliveries during this period were 7,554. Twenty-eight of the patients were above the age of 35. According to the history of patient, mean gravidity was 6.6 (1-13), consanguineous marriage rate was 25%, previous abnormal rate was 15%, and previous missed abortion was 35%. Eighty-eight percent of patients were of low sociocultural status. The frequency of daily dietary habits, especially tea consumption, red chili pepper consumption and eating barbecued meat were questioned with the anamnesis. **Results:** Total fetal anomaly incidence was found to be 4.17%, neural tube defects 1.37%, renal anomalies 0.54%, non-immune fetal hydrops 0.46%, cystic hygroma 0.39%, central nervous system anomalies 0.36%, chromosomal anomalies 0.17%, gastrointestinal system anomalies 0.147%, sacrococcygeal teratoma 0.12%, cardiac anomalies 0.09%, and respiratory system anomalies 0.049%. Mean daily tea consumption during pregnancy was 8 cups/day. Mean frequency of eating barbecued meat was 4 times/week. Mean chili pepper consumption was 10 g/day. **Conclusion:** In this study, four times higher overall fetal anomaly incidence appeared to be strongly correlated with Southeast Anatolia region's dietary habits. In the future monitoring women's dietary habits should have an important role in the prevention of fetal anomaly development.

**Key words:** Fetal anomaly; High incidence; Dietary habits; Environmental factors.

## Introduction

Intrauterine fetal anomalies especially affecting the central nervous system (CNS) include neural tube defects, and cardiovascular, gastrointestinal and urinary abnormalities cause a wide spectrum of social and medical problems. There are many factors and agents that are known or suspected to be teratogenic and considered responsible in etiology [1]. There are also many compounds that are unidentified and effects are not well known.

Recently widespread use of fetal ultrasonography (US) in the first and second trimester screening resulted in early detection of fetal anomalies, and the possible termination before viable gestational age [2, 3].

In this study, 315 fetal anomalies in the Southeast Anatolia region were classified and the prevalence identified. Additionally, dietary habits, certain environmental features, and sociocultural status were investigated in addition to demographic factors. Based on the literature, compounds that were thought to be causative were discussed and speculated on.

## Material and Method

The study was performed on the patients admitted to Gaziantep University Faculty of Medicine Obstetrics and Gynecology Department with fetal anomalies between January 2003 and June 2007. Three hundred and fifteen patients with

intrauterine fetal anomalies were detected. The patients were in the 12<sup>th</sup> to 40<sup>th</sup> gestational week. The number of total deliveries during this period totaled 7,554. All of the patients admitted for delivery were living in the Southeast Anatolia region (Gaziantep, Sanliurfa, Adiyaman, Kilis, Diyarbakir).

Maternal mean age of the women with a diagnosed intrauterine fetal anomaly was 31.5 (17-46). Twenty-eight patients were above the age of 35. According to their histories mean gravidity was 6.6 (1-13), consanguineous marriage rate was 25%, previous abnormal neonate rate was 15%, and previous missed abortion rate was 35%. Eighty-eight percent of patients were of low sociocultural status.

The frequency of daily dietary habits, especially tea consumption, chili pepper consumption and eating barbecued meat were questioned with the anamnesis.

## Results

In the review of the patients between January 2003 and June 2007 total fetal anomaly incidence was found to be 4.17%. Detected anomalies included:

- 1) 105 patients with neural tube defects (1.37%):  
30 with spina bifida;  
30 with anencephaly;  
28 with meningocele and hydrocephalus;  
17 with encephalocele.
- 2) 42 patients with renal anomalies (0.54%):  
15 with renal agenesis;  
27 with polycystic kidney.
- 3) 35 with non-immune fetal hydrops (0.46%).
- 4) 33 with multiple anomalies (especially CNS and extremity anomalies) (0.44%).

Revised manuscript accepted for publication March 19, 2008

- 5) 29 with cystic hygroma (0.39%).
- 6) 27 with CNS anomalies (0.36%):  
three with Dandy-Walker syndrome;  
24 with hydrocephalus.
- 7) 13 with chromosomal anomalies (trisomy 21) (0.17%).
- 8) 11 with gastrointestinal system anomalies (0.147%):  
eight with omphalocele;  
three with gastroschisis.
- 9) nine with sacrococcygeal teratoma (0.12%) (Figure 5).
- 10) seven with cardiac anomalies (0.09%).
- 11) four with respiratory system anomalies (0.049%).

It has been documented that the neural tube defect is the most common fetal anomaly with an incidence of 1.37%. It is followed with renal anomalies and non-immune fetal hydrops.

Mean daily tea consumption during pregnancy was eight cups/day (7-9 cups/day) in the fetal anomaly group. Mean frequency of eating barbecued meat was four times/week (3-5 times/week). Mean chili pepper consumption was 10 g/day (9-12 g/day).

## Discussion

Congenital anomalies are serious problems especially in developing and underdeveloped countries. Many factors are considered to be responsible in the etiology and numerous agents are still to be evaluated.

Fetal anomaly types and rates have been reported in case series from different areas of the world with similar results. Especially changes in neural tube defect (NTD) incidence have been widely studied in many countries and areas of the world. The prevalence rates of NTD was found to decrease in the early seventies to late nineties from 0.33% to 0.08% [4-6].

There is also a report from the middle Anatolia region, in which the overall congenital anomaly incidence was 1.11% and neural tube defect incidence was 0.27% [7]. Urogenital system anomalies were found to be the second most common type of malformation with an incidence of 0.21% [7]. Facial and musculoskeletal system abnormalities were the third and fourth most common malformations. Omphalocele incidence was five in 9,160 births and gastroschisis was one in 9,160 [7]. These data are similar to other reports [6, 8].

In our study, overall congenital anomaly incidence in the Southeast Anatolia region was found to be 4.17%. The most commonly encountered anomaly was NTD with a rate of 1.37%, followed by renal anomalies and non-immune fetal hydrops. The rate of NTD was about six times higher than some other series reported from Turkey [7]. Also the overall anomaly incidence in the Southeast Anatolia region was four times higher compared to other series reported from Turkey and worldwide [4, 5, 7].

Many chemicals, pharmaceuticals used in medical therapy, environmental effects, pollution, infectious agents and solvents are considered to have role in the etiology of fetal anomalies. Moreover, numerous studies have reported the association of neural tube defects and

folic acid deficiency, and emphasized its importance in prophylaxis [5, 9, 10].

In our study, dietary habits were questioned and certain environmental factors were evaluated. Excess consumption of tea, chili peppers and barbecued meat were obvious in the dietary habits of the Southeast Anatolia region compared with other parts of the country. Thus we supposed such consumption could be related with fetal anomaly development.

In the Southeast Anatolia region, tea is an important part of dietary intake. Already in our patient group, mean tea consumption was eight cups/day. In some studies, especially including the English and Irish populations, teratogenic effects of the tea were evaluated and the results suggested increased NTD incidence [11].

Another characteristic of the Southeast Anatolia region is the tendency of eating barbecued meat. Compared to other regions of the country, it is a very common part of the culture and frequency of barbecue was found to be four times/week in the patient group. Although data in the literature indicate that barbecue and carbon exposure is carcinogenic, there are no clear reports suggesting teratogenicity. In our study, a 4-times higher anomaly incidence may suggest a teratogenic effect of barbecued meat.

Chili peppers, a common used spice in the region, can also contain some compounds that can be teratogenic due to inappropriate production, preservation conditions and use of color additives during production. In our study mean chili pepper consumption was documented as 10 g/day. There are reports in the literature pointing to a teratogenic effect of conserved foods containing nitrites, nitrosamines and fumonisin [12, 13]. Inappropriate preservation and preparation of chili peppers may produce nitrites and nitrosamines that cause fetal anomalies.

When demographic factors are evaluated, high gravidity and associated increase in advanced maternal age, and high incidence of consanguineous marriages may be factors in the increase of overall anomaly incidence. In some studies, congenital anomaly incidence is reported to be two-times higher in consanguineous marriages compared to non-relatives [14-16].

Low sociocultural status is another characteristic of the Southeast Anatolia region. Studies have shown that in low sociocultural populations, risk of NTD is especially increased, and this is related to poor nutrition and vitamin intake of women during pregnancy. Especially in reports from large series on Mexican people, association between increased fetal anomaly and low socioeconomic and sociocultural status was prominent [17-19]. Also studies on Mexican people evaluating the effect of maternal hyperthermia and high environmental temperature on fetal anomaly incidence have shown significant results [20]. The Southeast Anatolia region is one of the parts of Anatolia with a high average temperature. It has been thought that high environmental temperature may also be related to the increase of anomaly incidence in this region.

However how many cups of tea/daily, how frequent

consumption of barbecued meat, and what amount of chili pepper may cause fetal anomaly have not been reported clearly in the current literature. In our study, a 4-times higher overall fetal anomaly incidence appeared to be strongly correlated with the Southeast Anatolia region dietary habits: 1) 10 g/day chili pepper consumption, 2) eight cups/day tea consumption, and 3) four times/week barbecued meat consumption.

In conclusion, it should be mentioned that dietary habits of regions could contribute to fetal anomaly development. Perhaps in the future, preconceptional, antenatal evaluation, and monitoring of women's dietary habits could have an important role in prevention of fetal anomalies.

Undoubtedly, large prospective studies evaluating these factors all around the world are needed.

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Address reprint requests to:

F.B. CEBESoy, M.D.

Department of Obstetrics and Gynecology  
Gaziantep University Faculty of Medicine  
27060 Gaziantep (Turkey)

e-mail: fbcebesoy@yahoo.com