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# Is food insecurity a newly identified risk factor in febrile convulsion?

# Gıda güvencesizliği febril konvulziyon'da yeni tanımlanan bir risk faktörü mü?

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**Abstract**

**Aim:** Food insecurity status was evaluated in the cases diagnosed with febrile convulsions (FC) and whether food insecurity was a risk factor in FC was investigated.

**Materials and Methods:** A questionnaire consisting of 18 questions was applied to the parents of 40 patients who were diagnosed with febrile convulsions in order to determine food insecurity (Study group). The parents of the patients who were admitted to the general pediatric outpatient clinic were included in the study as the control group.

**Results:** A statistically significant difference was found between the groups in terms of food insecurity ($p$=0.019). The data obtained in the study were found to increase the febrile convulsion food security status 1.67 times and the county of residence 0.45 times

**Conclusion:** The high rate of food insecurity in the patients diagnosed with FC indicates a new risk factor in addition to existing FC risk factors

**Keywords:** Food insecurity; Febrile convulsion; Sociodemographic characteristic; Children; Risk
.

**Öz**

**Amaç:** Febril konvülziyon (FK) tanısı konulan olgularda gıda güvencesizliği durumunu değerlendirilmesi ve gıda güvencesizliğinin FK'da risk faktörü olup olmadığı araştırıldı.

**Gereç ve Yöntem:** Febril konvülziyon tanısı konulan 40 hastanın ebeveynine, gıda güvencesizliğini belirlemek amacı ile 18 sorudan oluşan anket uygulandı (Çalışma grubu). Çalışma ile aynı dönemde, genel çocuk polikliniğine başvuran, hastaların ebeveynleri kontrol grubu olarak çalışmaya dahil edildi.

**Bulgular:** Gruplar arasında gıda güvencesizliği açısından istatiksel olarak anlamlı fark saptandı ($p$=0,019). Çalışmada elde edilen veriler febril konvülziyonda gıda güvenliği durumunu 1,67 kat, ikamet yeri 0,45 kat arttırdığı tespit edilmiştir.

**Sonuç:** FK tanılı hastalarda gıda güvencesizliği oranının yüksek olması FK risk faktörlerine ek yeni bir risk faktörüne işaret etmektedir.

**Anahtar Kelimeler:** Gıda güvencesizliği; Febril konvülsiyon; Sosyodemografik özellik; Çocuklar; Risk.

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## Introduction

Febrile convulsions (FC) are seizures seen in children between 6 month and 5 years of age, accompanying febrile diseases other than central nervous system (CNS) infection, without previous neonatal convulsion or afebrile convulsion history, and not meeting other acute symptomatic convulsion criteria.[1] However, there are few studies focusing on the effects of common environmental components such as socio-demographic characteristics, economic status of the family and educational status of the parents in the patient groups diagnosed with febrile convulsion.[2,3]

Food insecurity exists whenever "the availability of nutritional adequate and safe foods or ability to acquire acceptable foods in socially acceptable ways is limited or uncertain".[4] Food insecurity at the family level generally arises from the inadequate food availability due to limited resources.[5] It has been shown in many studies that the academic performances and psychosocial development of children in the family with food insecurity are negatively affected.[6]

There is no study in the literature on food insecurity in the cases diagnosed with febrile convulsions. The purpose of this study was to determine food insecurity status was evaluated in the cases diagnosed with febrile convulsions and whether food insecurity was a risk factor in FC was investigated.

## Materials and Methods

### The samples of the research

A questionnaire consisting of 18 questions was applied to the parents of 40 patients who were diagnosed with febrile convulsions between 01.05.2019-01.07.2019 in a pediatric neurology outpatient clinic in order to determine food insecurity (Study group). The parents of the patients who were admitted to the general pediatric outpatient clinic in the same period as the study, who were in the age range of 6-60 months were included in the study as the control group (Table 1).

**Table 1.** Sociodemographic characterictics of the study group and the control group.

| | | Study Group N=40 (100%) | Control Group N=40 (100%) |
|---|---|---|---|
| **Sex** | **Male** | 21 (52.5%) | 19 (47.5 %) |
| | **Female** | 19 (47.5%) | 21 (52.5%) |
| **Years (month)** | | 26.8 ±12.5 | 29.65±11.53 |
| **Mother's mean age (year)** | | 31.1 ±5.31 | 30.2±4.91 |
| **Father's mean age (year)** | | 34.1±4.74 | 35.3±4.85 |
| **Survey Participant** | **Mother** | 21 (52.5%) | 27 (67.5%) |
| | **Father** | 18 (45%) | 12 (30%) |
| | **Others** | 1 (2.5%) | 1 (2.5%) |
| **Caretaker's education level** | **Illiterate** | 2 (5%) | 0 (0%) |
| | **Primary school** | 29 (72.5%) | 24 (60%) |
| | **Middle Schools** | 6 (15%) | 11 (27.5%) |
| | **High School** | 3 (7.5%) | 5 (12.5 %) |
| | **Higher education** | 0 (0%) | 0 (0%) |
| **County of Residence** | **Slum** | 8 (20%) | 5 (12.5%) |
| | **Flat** | 10 (25%) | 23 (57.5%) |
| | **Detached house** | 22 (55%) | 12 (30%) |
| **Economic status*** | **<80 $** | 7 (17.5%) | 1 (2.5%) |
| | **80-160 $** | 7 (17.5%) | 3 (7.5%) |
| | **160-200 $** | 12 (30%) | 19 (47.5%) |
| | **>200 $** | 14 (35%) | 17 (42.5%) |
| **Food insecurity** | **Food security** | 8 (20%) | 15 (37.5%) |
| | **Borderline food security** | 4 (10%) | 11 (27.5%) |
| | **Food insecurity** | 13 (32.5%) | 7 (17.5%) |
| | **Severe food insecurity** | 15 (37.5%) | 7 (17.5%) |

* In our country, the equivalent of the minimum wage in dollars. American Dollar Exchange Rate (Avarage of May-July 2019) is equal to 1 $=5.9 TL.

The cases who applied to the pediatric neurology outpatient clinic and were diagnosed with FC were included as the study group. Patients with clinically suspected meningitis or encephalitis, known case of

epilepsy with fever, any neuro-developmental co-morbidity were excluded from the study.

The questionnaire applied was taken from the "Household Food Security Survey Module" of the US Department of Agriculture and adapted to Turkish by us.[7] Survey form is a public, permissionless. The parents were asked to answer the questions in the questionnaire, considering the last 12 months. In cases where the parents filling in the questionnaires were illiterate, the questions were read out face to face, and the parents were asked to answer. The answer to 15 of the questions was "yes" or "no", and the answer to three questions was "almost every month", "some months but not every month" or "only 1 or 2 months" if the answer to the previous question was "yes". All "yes", "almost every month" and "some months but not every month" answers were considered positive. The "no" and "only 1 or 2 months" answers were considered negative. The cases were divided into four groups according to the number of positive answers. The absence of any positive answers was classified as “high food security”, 1-2 positive answers as “marginal food security”, 3-7 positive answers as “low food security” and 8-18 positive answers as “very low food security” (Table 2). Informed consent forms were obtained from all participants.

**Table 2.** Used questionnaire.

**Questions**

1. Did you ever worry whether the food for you and your family would run out before you have money to buy more?
   A) Yes B) No
2. Were there times when the food for you and your family just did not last, and there was no money to buy more?
   A) Yes B) No
3. Were there times when you and your family could not afford to eat healthy food?
   A) Yes B) No
4. Were there times when you could only feed your children less expensive foods because you were running out of money to buy food?
   A) Yes B) No
5. Were there times when it was not possible to feed the children a healthy meal because there was not enough money?
   A) Yes B) No
6. Were there times when the children in the house were not eating enough because there was no money to buy enough food? A) Yes B) No
7. Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money for food? A) Yes B) No
8. How often did this happen?
   A) Almost every month B) Some months C) 1-2 months
9. Did you ever eat less than you felt you should because there wasn’t enough money to buy food?
   A) Yes B) No
10. Were you ever hungry but didn’t eat because you couldn’t afford enough food?
    A) Yes B) No
11. Did you lose weight because you didn’t have enough money for food?
    A) Yes B) No
12. Did you or other adults in your household ever not eat for a whole day because there wasn’t enough money for food? A) Yes B) No
13 How often did this happen?
    A) Almost every month B) Some months C) 1-2 months
14. Did you ever cut the size of the children’s meals because there wasn’t enough money for food?
    A) Yes B) No
15. Did any of the children ever skip meals be- cause there wasn’t enough money for food?
    A) Yes B) No
16. How often did any of the children ever skip meals because there wasn’t enough money for food?
    A) Almost every month B) Some months C) 1-2 months
17. Were the children ever hungry but you just couldn’t afford more food?
    A) Yes B) No
18. Did your children ever not eat for a whole day because there wasn’t enough money for food?
    A) Yes B)No

## The ethical aspect of research

The study protocol was approved by Ethics committee of Adiyaman University Non-invasive Clinical Research Ethics Committee (Decision No. 2019/3-15). The principles of the Declaration of Helsinki were complied with while conducting the study.

## Statistical analysis

The SPSS (Statistical Package for Social Sciences) for Windows 23.0 program was used for statistical analyses in the evaluation of the data obtained in this study. The Independent Sample T-test was used for parameters with normal distribution, and the Mann-Whitney U test was used for parameters without normal distribution. Chi-square test was used to evaluate categorical variables. The relationship between febrile seizures and "food security status" and "county of residence" as a risk factor was evaluated with logistic regression (multivariate) analysis. Odds ratios (OR) with a 95% confidence interval (CI) were reported for each risk factor. A *p*-value of <0.05 was considered significant.

## Results

40 patients in both groups were included in the study as 21 (52.5%) boys and 19 (47.5%) girls in the study group and 19 (47.5%) boys and 21 (52.5%) girls in the control group. The mean age of the cases included in the study group was 26.8±12.5 months, while the mean age of the cases included in the control group was 29.65±11.53 months. There was no statistically significant difference among the groups with regard to gender ($p$=0.823) and age ($p$=0.293).

When the parents who filled in the form in the SG and CG were evaluated, the parent who filled in the form was seen to be the "mother" most often, and there was no statistically significant difference among the groups with regard to the parent filling in the form ($p$=0.204) (Table 1). There was no statistically significant difference among the SG and CG with regard to the mean age of the mother ($p$=0.473) and father ($p$=0.287) (Table 1). There was no statistically significant difference among the parents of the SG and CG groups with regard to educational status ($p$=0.259). When evaluated with regard to place of residence, it was determined that 14 cases (35%) were living in the village in the SG, and 26 cases (65%) were living in the city center in the CG. There was a statistically significant difference among the SG and CG when compared with regard to place of residence ($p$=0.017). When the type of house in which the cases were living was examined, it was determined that 22 patients (55%) were living in detached houses in the SG, and 23 (57.5%) were living in apartments in the CG. There was a statistically significant difference among the groups with regard to type of house ($p$=0.013).

In line with the answers given to our questionnaire, 8 (20%) of the families were with high food security, 4 (10%) were with marginal food security, 13 (32.5%) were with low food security, and 15 (37.5%) were with very low food security in the SG. 15 (37.5%) of the families were with high food security, 11 (27.5%) were with marginal food security, 7 (17.5%) were with low food security, and 7 (17.5%) were with very low food security in the CG. A statistically significant difference was found among the groups with regard to food insecurity ($p$=0.019) (Table 1).

In multivariate analysis, food security status [OR 1.67 (1.098-2.543), $p$=0.017], county of residence [OR 0.45 (0.246-0.846), $p$=0.013] remained associated with febrile convulsion (Table 3).

**Table 3.** Multivariate regression analyses for association of county of residence and food security status variables for febrile convulsion.

| | Multivariate regression analyses | | |
|---|---|---|---|
| **Variables** | **Odds Ratio** | **95%CI** | **p value** |
| **County of Residence** | 0.456 | 0.246-0.846 | 0.013 |
| **Food security status** | 1.671 | 1.098-2.543 | 0.017 |
| CI, confidence interval | | | |

## Discussion

In this study, food insecurity was observed more frequently in the cases who were diagnosed with febrile convulsions compared to the healthy group, which was determined for the first time in the literature. Increasing prevalence of a wide variety of chronic diseases such as epilepsy, asthma, diabetes, depression and cancer has been associated with low socioeconomic status.[8,9] Due to crowded family structure, the possibility of malnutrition, decreased access to health services, increased frequency of infectious diseases, late diagnosis and treatment of diseases is high in the populations with low socioeconomic level.[10]

It has been reported in the literature that febrile convulsions have a higher prevalence in developing countries compared to developed countries. This rate is stated to be 9.7% in Turkey.[11] The low prevalence of FC in developed countries has been emphasized to be associated with high socioeconomic level, more informed patient and family profiles, and better and more accurate hospital records in these countries.[12] Aydin *et al*. researched the relationship among demographic factors and the prevalence of FC in Turkey and noticed that FC was almost 2.13 times more common in the families with low socioeconomic and cultural levels. They emphasized in the same study that the main reason for this was the families who did not have the knowledge of FC and had insufficient access to health services.[11]

It can be anticipated that the parents with good socioeconomic status will have easier access to health facilities and are more likely to obtain information about the disease. With a similar logic, it can be thought that the educational status of the parents will also be effective.[11] Forsgren et al. investigated socioeconomic variables in a case-control study and only reported the educational status of the mothers and full-time day-school attendance as risk factors.[13] They suggested that the literacy level of the parents was associated with the awareness of the symptoms of their children, and on the contrary, the educational status of the fathers was found to be a risk factor in this study.[13,14] In our study, the difference was not statistically significant when educational status was compared among the groups, while there was a statistically important difference with regard to place of residence and type of house in which they were living.

Food insecurity is not being able to obtain enough nutritious and balanced foods in socially appropriate forms and ways or obtaining them in limited quantities.[5] Health problems (acute infections, chronic disease, developmental and mental health problems, depression, anxiety and stress) are more common in the populations with food insecurity.[15-17] It was found that the total number of the families with food insecurity constituted 50.5% (143 families) of 283 families included in the study, and this rate was quite high in a study evaluating the cases who were admitted to a tertiary hospital in Turkey.[18] In another recent study in Turkey, the reported prevalence of food insecurity among Turkish agricultural engineering students is one-third (33.0 %) of the total. In this study, it was found that there are significant relationships between food insecurity status and students' year of study, employment status, grant/credit status and living arrangements.[19]

The most significant risk components for febrile convulsions are the age and body temperature of the child. The risk of FC increases with increasing body temperature. Four risk components have been identified for the first FC as FC history in first-degree family members, neurodevelopmental abnormality, more than 30 days of hospitalization in the neonatal intensive care unit and attending nursery school. FC develops by 28% if two or more of these risk factors are present for the first FC.[14] Atesoglu et al.[20] reported chronic diseases with continuous need for medication, developmental retardation, consanguineous marriage, educational status of the mother, educational status of the father, hospitalization in the neonatal intensive care unit, intrauterine growth retardation and gestational hypertension history as the risk components for the emergence of FC in children in a study published in 2018. As a result of the study, the frequency of food insecurity was statistically significantly higher in the SG compared to the

CG. The data we obtained in our study show that a different risk factor can be determined by examining the families in terms of "food insecurity" in addition to FC risk factors known in the literature. In a letter to the editor published by Nagata in 2019, it was stated that the prevalence of migraine was statistically significantly lower in the patients with food security compared to those with food insecurity.[21]Apart from this study, there are few studies examining the coexistence of food insecurity and neurological diseases.

The small number of cases and the shorter duration of the questionnaire are the limitations of our study.

In conclusion, the high rate of food insecurity in the patients diagnosed with FC indicates a new risk factor in addition to existing FC risk factors. The cases with food insecurity need to be examined with regard to FC, and further studies are needed in this area.

## Ethics Committee

The study protocol was approved by Ethics committee of Adiyaman University Non-invasive Clinical Research Ethics Committee (Decision No. 2019/3-15). The principles of the Declaration of Helsinki were complied with while conducting the study.

## Informed Consent

Informed consent forms were obtained from all participants

## Author contributions

Conception–H.A., I.H.B Design– H.A., I.H.B Supervision– H.A., I.H.B Materials– H.A., I.H.B Data Collection–H.A. Analysis and/or Interpretation–I.H.B. Literature review– H.A., I.H.B. Critical Review– H.A., I.H.B

## Conflict of Interest

No conflict of interest was declared by the authors.

## Financial Disclosure

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## Statements

These research results have not previously been presented.

## Peer-review

Externally peer-reviewed.

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