J Pediatr Res 2018;5(3):124-7
DOI: 10.4274/jpr.33716

Original Article

Evaluation of Child Cases Admitted for Tick Bite and Tick Species in İstanbul

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ABSTRACT

Aim: The Crimean-Congo Haemorrhagic Fever (CCHF) is a tick-borne infection that has a high mortality. In Turkey, the total number of cases reported between 2002-2014 was 9.069 and 440 of them died. The aim of this study is to evaluate the demographic characteristics of the children with the complaint of tick bite and to determine the species of the ticks seen in İstanbul.

Materials and Methods: A hundred sixty two tick bite cases were analyzed with respect to demographic, clinical and laboratory findings between January and December 2014. The blood samples for whole blood count, prothrombin time, activated partial thromboplastin time, alanine aminotransferase, aspartate aminotransferase and creatinine were obtained from all cases and they were followed up for 10 days. The ticks removed from patients were classified by the Department of Parasitology in the Veterinary Faculty of İstanbul University.

Results: The mean age of the patients was 6.1±3.7 years and 76% of them were male. Eighty four (52%) of the cases had additional complaints other than tick bite. The most frequently complaints were nausea/vomiting (26%), fever (19%) and cough (14%). We found that 34 (20%) of them had abnormal laboratory results such as elevated liver enzymes, leukocytosis, leukopenia, thrombocytopenia and prolonged prothrombin time. August was the month in which most patients applied (56 cases, 34%). The regions of body that were most bitten by the ticks were the extremities (35.8%). The total number of larvae, nymphs and adult ticks were found as 4, 88 and 14 respectively.

Conclusion: This study showed that the tick species in the İstanbul province were largely different from the species causing CCHF. Although the incidence of CCHF in İstanbul is lower than in other regions of Turkey, children and their families who live in or travel to rural areas in Istanbul should be informed about this disease.

Keywords: Crimean-Congo Haemorrhagic Fever, child, tick bite

Introduction

The Crimean-Congo Haemorrhagic Fever (CCHF) is a tick-borne infection which is characterized by fever, haemorrhage, liver dysfunction and it has a high mortality. CCHF is caused by CCHF virus (CCHFV) which is a member of the Nairovirus genus from the Bunyaviridae family and it is transmitted to humans by infected ticks (1). In 1944, a haemorrhagic fever disease was first described in the Crimea. In 1956, it was named as CCHF after the virus was isolated from a feverish patient in the Congo (2). CCHF has been reported over a wide area including Asia, Africa and Europa similar to the distribution of the ticks. However, most of the cases are seen around the axis extending from South Russia and Black Sea region to Africa (3). The first case in Turkey was identified in Tokat province in 2002. The majority of the cases were reported from the Central Anatolia and Eastern Black Sea regions (4,5). In Turkey, the total number of cases reported

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Received: *30.07.2017* **Accepted:** *08.03.2018*

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The Journal of Pediatric Research, published by Galenos Publishing House.

between 2002 and 2014 was 9.069 and 440 of them died. While the mortality rate is about 5% in Turkey, worldwide the mortality rate has been reported between 20-50% (2,6). The aim of this study is to evaluate the demographic characteristics of the children with the complaint of tick bite and to determine the species of the ticks seen in İstanbul.

Materials and Methods

This study was performed in the Child Emergency Department of Kanuni Sultan Süleyman Training and Research Hospital between January and December 2014. A hundred sixty two cases of tick bites were retrospectively analyzed in terms of demographic, clinical and laboratory findings. The cases were evaluated using the algorithm of the Ministry of Health's "approach to people with tick bites". Firstly, the tics were removed with pincers from the patients and the wound was cleaned with antiseptic solution. The patients were evaluated for clinical signs and symptoms. Afterwards, whole blood count, prothrombin time (PT) activated partial thromboplastin time, international normalized ratio, alanine aminotransferase, aspartate aminotransferase and creatinine were obtained from all cases. The patients were followed up for 10 days and the findings were recorded. The ticks removed from patients were classified according to morphological characteristics by the Department of Parasitology in the Veterinary Faculty of İstanbul University.

Results

A hundred sixty two patients who were admitted to our hospital were retrospectively evaluated. The mean age of the patients was 6.1±3.7 years (range 0.5-16 years), 76% of them were male. When the patients were analyzed according to age groups, 58 of them (35%) were between 0-4, 62 (38%) were between 4-8, 30 (19%) were between 8-12 and 12 (7%) were between 12-16 years of age. The mean weight of the patients was 22.2±11.8 kg (range 8-70). Seventy eight (48%) of the patients had no complaint except for the tick bite. However, 84 (52%) of them had additional complaints; nausea and vomiting (22; 26%), fever (16; 19%), fever and cough (12; 14%), erythema (8; 10%), fatigue (6; 7%), abdominal pain (6; 7%), headache and sore throat (6; 7%), diarrhea (4; 5%), arthralgia (3; 4%) or skin eruption (1; 1%). Although the mean values of the laboratory parameters are within the normal range, we found that 34 (20%) of them had abnormal results; 12 of them had slightly elevated liver enzymes, 7 of them had leucocytosis, 7 of them had slightly prolonged PT, 4 of them had leucocytosis and elevated liver enzymes, 3 of them had thrombocytopenia and 1 of them had leukopenia. In follow up, all of these laboratory abnormalities improved (Table I). When we evaluated the diagnosis of the patients, we found that 53 (33%) of them had additional diseases; 35 of them had upper respiratory tract infection, 13 of them had acute gastroenteritis, 3 of them had superficial skin infection, 1 of them had urticaria and 1 of them had rubella. None of the patients developed the clinical and laboratory findings related with CCHF in follow up.

When the admission time was evaluated, it was found that there were no patients who applied to hospital in December or January. Most patients applied in August (56

Table I. Demographics and laboratory results of the patients

	n (%)
Age (y) (Mean ± SD)	6.1±3.7
0-4	58 (35%)
≥4-8	62 (38%)
≥8-12	30 (19%)
≥12	12 (7%)
Gender n (%)	
Male	123 (76%)
Female	39 (24%)
Weight (kg) (Mean ± SD)	22.2±11.8
Body regions bitten by ticks	
Extremities	58 (35.8%)
Head-neck	52 (32%)
Trunk	45 (27.7%)
Genital-groin	7 (4.3%)
Complaint	
Tick bite only	78 (48%)
Additional complaint	84 (52%)
Leukocyte (mm^3)	10.297±2.845
Platelet (mm^3)	287.425±68.419
ALT (UI/L)	16.5±4.2
AST (UI/L)	29.8±8.6
Creatinine (mg/dL)	0.54±0.1
PT (sec)	12.6±0.9
aPTT (sec)	29.2±3.1
INR	1.0±0.1

INR: International normalized ratio, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, aPTT: Activated partial thromboplastin time, SD: Standard deviation, PT: Prothrombin time

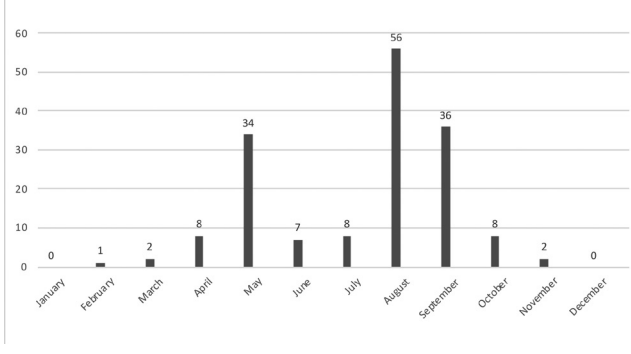

Figure 1. Number of case per month

cases, 34%), September and May were second (36 cases, 22%) and third (34 cases, 20.9%) respectively (Figure 1). All of the cases except one had contacted with ticks in rural areas in the İstanbul region. A hundred thirty one of the ticks (81%) were removed in hospital and 31 (19%) of them were removed at home. When the body regions which were bitten by ticks were evaluated, it was found that 52 of them (32%) were in the head-neck region, 45 of them (27.7%) were in trunk, 58 of them (35.8%) were in the extremities and 7 of them (4.3%) were in genital-groin region (Table I). A hundred six ticks that were removed from the cases were able to be classified but 56 samples were excluded from classification due to fragmentation. The classified ticks included 14 (13%) adults, 88 (83%) nymphs and 4 (4%) larvae. The total number of larvae and nymphs were 92; 43 (47%) of them were *Hyalomma* spp., 38 (41%) were *Ixodes* spp., 10 (11%) were *Rhipicephalus* spp. and 1 (1%) was *Haemaphysalis* spp. (Table II). There were 14 adult ticks including 1 *Hyalomma marginatum*, 1 *Rhipicephalus sanguineus*, 4 *Ixodes ricinus*, 6 *Rhipicephalus turanicus* (Table III).

Discussion

Although, epidemics of CCHF have been reported from different countries in Europa, Africa and Asia in previous years, the first case in Turkey was not reported until 2002. In the following years, the number of reported cases from Turkey increased. The total number of cases between 2002 and 2014 was 9.069, 440 of these have died (1,2,4,6). CCHF can be transmitted to humans via exposure to blood or body fluids of patients or infected animals or rarely by nosocomial transmission as well as by infected tick bite. For this reason, health workers and patients' close relatives are considered as an at risk group as well as farmers and rural residents (2). Because the ticks are inactive in low temperatures, CCHF is more common in warm weather months, especially between April and October (6-8). The admission time of our cases was consistent with this, although the number of cases declined in June and July. We think that this decline in the number of cases is related to the month of Ramadan. This is because most people in İstanbul go to their hometown or holiday places for the Ramadan holiday every year. The course of the disease includes incubation, pre-haemorrhagic, haemorrhagic and convalescent periods. The duration of the incubation period ranges from 2 to 12 days. Clinical symptoms include fever, headache, chills, myalgia, vomiting, diarrhea, conjunctival haemorrhage, rash, petechiae and purpura. In the following periods, unconsciousness and coagulopathy may develop and result in coma and death (2,6). The basis of treatment is supportive care. Although, ribavirin is the only drug used in the treatment of this disease, its efficacy is controversial (9-12). In our study, 84 of the patients had additional signs and symptoms and 34 of them had abnormal laboratory results but none of the clinical and laboratory findings were severe. Although these patients have at least one or two risk factors, all of these resolved in follow up. Also, additional diseases that were detected in 53 of the patients were treated and followed closely. The previous studies reported that the majority of adult cases with tick bite lived in rural areas and engaged in agriculture and animal husbandry (4,6,9). Similarly, the majority of children with tick bite belonged to families who lived in rural area (8,13,14). All of the cases in our study lived in rural areas or participated in weekend trips to these places and 73% were under 8 years of age. The preventive measures include staying away from the regions where the ticks live and using closed shoes and clothes (2,15). In accordance with these recommendations, when the areas of attachment of the ticks were examined, we found that unprotected body parts such as the head, neck and extremities are mostly affected. *Hyalomma genus* of Ixodes ticks, especially *Hyalomma marginatum* (H.m.) *marginatum*, *H.m. rufipes*, *H. anatolicum anatolicum* have been reported as the main vector and reservoir for CCHF (2,4,6). In the previous studies on tick fauna, 46 tick species were found in Turkey and 38 of them belong to the Ixodidae family. *Ixodes* spp, *Hyalomma* spp., *Haemaphysalis* spp., *Dermacentor* spp. and *Rhipicephalus* spp. were the most common species of ticks. However, *H.m. marginatum* is the main vector for CCHF in Turkey (14,16-21). In a study in İstanbul, it was found that 27% of the tics were *Ixodes ricinus* and 50% were *Hyalomma aegyptium* (22). Similarly, in a study in the Thrace region, it was found that the main vector responsible for bites was *H. aegyptium* (23). Also, in another study conducted on the

Table II. The classification of larvae and nymphs

Genus	Larvae	Nymph	Total
Hyalomma spp.	1	42	43 (47%)
Ixodes spp.	3	35	38 (41%)
Rhipicephalus spp.	0	10	10 (11%)
Haemaphsalis spp.	0	1	1 (1%)
Total	4	88	92 (100%)

Table III. The classification of adult ticks

Species	Adult male	Adult female	Total
Hyalomma marginatum	1	0	1 (7%)
Ixodes ricinus	0	4	4 (29%)
Rhipicephalus turanicus	6	0	6 (43%)
Rhipicephalus sanguineus	1	0	1 (7%)
Dermacentor niveus	1	0	1 (7%)
Haemapyhsalis otophila	0	1	1 (7%)
Total	9	5	14 (100%)

tortoises in the Thrace region, 81% of the ticks were found to be *H. aegyptium* (24). Similar to the other studies in Turkey, *Hyalomma* spp. and *Ixodes* spp. were the most common genus in our study. When the adult ticks were evaluated, *Rhipicephalus turanicus* was the most common species and *H. marginatum* was detected in only one case.

Study Limitation

Our study was carried out in the European region of İstanbul. Therefore, this study may be insufficient to evaluate all of İstanbul.

Conclusion

This study showed that tick species in the İstanbul province were largely different from those species causing CCHF. It is necessary to know the seasonal and regional characteristics of this disease and the geographical distribution of these tick species. Thus, unnecessary investigations and hospitalization can be avoided. Although the incidence of CCHF in İstanbul is lower than in other regions of Turkey, children and their families who live in or travel to rural areas in İstanbul should be informed about this disease and its prevention methods.

Ethics

Ethics Committee Approval: Retrospective study.

Informed Consent: Consent form was filled out by all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Y.Y., A.G., İ.E., Concept: A.A.Ö., Design: Y.Y., Data Collection or Processing: Y.Y., A.G., Analysis or Interpretation: A.A.Ö., A.G., İ.E., Literature Search: A.A.Ö., Writing: A.A.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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