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Prevalence of group C and G streptococcus in pediatric acute tonsilopharyngitis in Turkey

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ÖZET

Türkiye'de akut tonsillofarenjitli çocuklarda C ve G grubu streptokok sıklığı

Bu çalışmanın amacı akut tonsillofarenjit tanısı alan çocuklarda C ve G grubu streptokokların sıklığını saptamaktır .
Akut tonsillofarenjit tanısı alan 1-15 yaş arası 200 çocuk çalışmaya kabul edildi. Olguların hepsinden alınan boğaz kültür örneği % 5 kanlı agara ekildi. Basitrasin direnci olan beta hemolitik streptokoklar Lancefield lateks aglütinasyona göre gruplandırıldı.
Boğaz kültüründe A grubu streptokoklar % 21, C grubu streptokoklar % 3, B grubu streptokoklar % 2, F grubu streptokoklar % 2, G grubu streptokoklar % 1 oranında saptandı. Dört yaşın altındaki olgularda pozitif kültür saptanmadı. Kültürde C ve G grubu streptokok saptananlar ile A grubu streptokok saptananlar arasında yaş, şikayet ve bulgularda fark saptanmadı.
Çocukluk çağı akut tonsillofarenjitlerinde C ve G grup streptokoklar, A grubu streptokoklara göre daha az sıklıkla etken olmasına rağmen çocuklarda akut tonsillofarenjitte C ve G grubu streptokoklar endemik ve sporadik enfeksiyonlara neden olabilir.

Anahtar Kelimeler: *Akut tonsillofarenjit, çocuk, C grubu streptokok, G grubu streptokok*

SUMMARY

The aim of this study is to determine the prevalence of group C and group G streptococci in children with acute tonsillopharyngitis.
A total of 200 children between 1-15 years of age with symptoms of acute tonsillopharyngitis were admitted to this study.
Throat culture samples collected from all of the patients were inoculated on to 5% blood agar. Beta hemolytic streptococci that had bacitracin resistance were grouped according to Lancefield latex agglutination.
Throat cultures resulted in group A streptococcus in 21% of the patients and group C streptococcus (GCS) in 3%, group B streptococcus in 2%, group F streptococcus in 2%, group G streptococcus (GGS) in 1%. There were no positive culture findings at children under four years of age. There were no difference between patients with positive culture findings of group C/G and group A streptococci in terms of age, symptoms and findings.
Although the rate of GGS and GCS is found to be lower than GAS in children with acute tonsillopharyngitis in this study, group G streptococci and group C streptococci may cause endemic or sporadic infections in children with acute tonsillopharyngitis.

Key Words: *Acute tonsillopharyngitis, children, group C streptococcus, group G streptococcus.*

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Introduction

Group A streptococcus (GAS) is the most common cause of acute bacterial pharyngitis, rheumatic fever and rheumatic heart disease. GAS is isolated in 15-30% of all acute pharyngitis cases in children (1). Certain strains of group C streptococcus (GCS) and group G streptococcus (GGS) have been increasingly reported to cause infections similar to those caused by GAS such as pharyngitis, sepsis, skin and soft tissue infections, toxic shock, reactive arthritis, and postinfectious glomerulonephritis (2-4). GCS is reported for pharyngitis in adults, school and family epidemics in children (5-8). GCS and GGS can cause infection by drinking non pasteurized cow milk and brushing teeth and the gum. In GCS and GGS infections fever, sore throat, pharyngeal exude and lymphoid hyperplasia are the symptoms like GAS (9).

The most common diagnostic laboratory method in streptococcal pharyngitis is throat culture. In recent years rapid antigen test is also used commonly for this purpose. GAS are determined with high sensitivity by rapid antigen tests. But it is reported that GCS and GGS cannot be determined by any of these tests (9,10).

There are reports the prevalence of GCS and GGS infections in children between 1.7 – 13.5 per cent in English literatures (5,6,10). There are few studies conducted in Turkey concerning acute tonsillopharyngitis in childhood. In a retrospective study, non- group A streptococcus was detected in 10.8% of children with acute tonsillopharyngitis (11). In another study, GCS prevalence was found to be 16.5% among children with acute tonsillopharyngitis (12).

Our aim is to determine the prevalence of group C and G streptococcus in children with acute tonsillopharyngitis.

Methods and results

From December to May, 200 children who had the diagnosis of acute tonsillopharyngitis participated in this cross sectional study. The study was approved by the Local Ethics Committee.

Acute tonsillopharyngitis was diagnosed by Centor criteria (presence of two or three of the following: fever, pharyngeal exudate and erythema, cervical lymphoid hyperplasia, nonproductive cough) (13). Children who had received antibiotics for three or more days were not accepted in the study.

Throat culture samples were collected by a sterile swab from tonsillary area and posterior pharynx. Samples were inoculated on to 5% sheep blood agar (OR-BAK, Turkey) without any delay. Plates were incubated in 37oC in aerobic atmosphere

for 48 hours. Growth of the bacteriae were checked twice after 24 and 48 hours. The samples which had no growth of beta hemolytic streptococcus were reported as normal throat flora. The samples which had beta hemolytic streptococci were tested with 0.04 units of Bacitracin disc for susceptibility. All beta hemolytic streptococci which showed bacitracin resistance were grouped according to Lancefield latex agglutination test (Omega Diagnostics, Scotland, United Kingdom).

All data analyses were conducted using SPSS for Windows, version 15 (SPSS Inc, Chicago, IL). We compared categorical variables using the chi-square and the others by non-parametric Mann-Whitney U Test. A value of $p \leq 0.05$ was considered statistically significant.

Result

The age interval of children who were included in this study was 1 - 15 years (mean age 8.2 ± 3.0) and the ratio of girls to boys was 0.9.

Symptoms were sore throat in 122 (61%) and fever in 66 (33%) of children. The time between the onset of symptoms and the application to the hospital was 2.0 ± 1.0 day.

In systematic examination, we found sore throat in 196 (98.0%) of children, fever in 187 (93.5%). In the physical examination exudative tonsillitis was detected in 150 (75.0%) patients and lymphadenopathy in 75 (37.5%).

At the time of diagnosis, acute otitis media was detected in 19 patients (9.5%), deep neck infection in 12 patients (6.0%), acute rheumatic fever in one patient (0.5%).

Acute tonsillopharyngitis was most common (33.5%) in March.

Children lived in apartment houses in 102 (51%) of the cases and in shanty houses in 96 (48%). The median of the people who lived in the house was five (3-9) and the median number of siblings was two (1-5).

Throat culture findings were group A in 21% (n=42), group C in 3% (n=6), group B in 2% (n=4), group F in 2% (n=4), group G in 1% (n=2).

There were no positive culture findings for the cases under four years of age.

The mean age of cases who had no positive culture findings was 7.9 ± 2.9 years, who had positive group A beta hemolytic streptococcus was 9.1 ± 2.8 years and who had positive culture of other streptococci was 9.4 ± 2.8 years. The difference between the mean ages of children with positive and negative culture findings was significant ($p = 0.026$).

There were no statistical difference between groups of positive and negative culture findings in terms of physical examination, social factors and symptoms ($p > 0.05$).

Fever, sore throat and exudative tonsillitis were detected in children with positive cultures for GCS and GGS. There was no difference between GCS, GGS or GAS in terms of symptoms and findings.

Discussion

Group C and group G streptococcus have been increasingly reported to cause infections similar to those caused by Group A streptococcus (GAS) (2-4,14). The reported prevalence of GCS/GGS carriage and incidence of related disease varies greatly worldwide specially in temporal climate regions (14,15).

Group C streptococcus is more common in adolescent and adult pharyngitis, school epidemics and family endemics (9). In Spain, streptococcus prevalence was determined among children who had symptoms of tonsillopharyngitis under two years of age and group A streptococcus was isolated in 12.0%, group C streptococcus in 5.2% (16). In physician's practice, group G streptococcus pharyngitis was detected at 25% (8). Patil et al (17) evaluated a total of 100 patients of acute pharyngitis, among them 17 patients proved positive for beta-haemolytic streptococci. Out of 17 isolates, 13 (76.47%) belonged to group A and 2 (11.76%) belonged to each of the group C and group G.

In a retrospective study conducted in Turkey, non-group A streptococcus was detected in 10.8% of children with acute tonsillopharyngitis (11). In another study, GCS prevalence was found as 16.5% among children with acute tonsillopharyngitis (12).

In our study, group A, C and G streptococcus were not isolated in children under 4 years of age. The reason for this may be due to the small number of cases.

It is believed that the role of group G and C streptococcus in streptococcal disease burden is under-recognized by clinicians and microbiologists, and suggested that pharyngitis resulting from GGS/GCS should also be treated actively (18). Lindboek et al. (19) showed that symptoms of group C-G streptococcus and group A streptococcus were similar. Moreover they defined prevalence ratio as 1/5. In this study group C and G streptococcus prevalence was in a ratio of 1/5 with group A streptococcus (n=40). Little et al. (20) showed that 33% were non-group A streptococci, mostly C (n = 29), G (n = 18) and B (n=17).

Non-group A strains commonly cause streptococcal sore throat, and present with similar symptomatic and clinical features to group A streptococci. The best features to predict streptococcal sore throat presenting in primary care deserve revisiting (8). Also in our study there were no difference between group C, G and A streptococcus either in terms of age or symptoms.

In all of the world prevalence of acute rheumatic fever (ARA) differs according to communities. The lowest ratios are reported from USA and European countries (9.5-18/100000) and the highest ratios are reported from Australia -New Zealand Aborgins (80-508/100000) (21). In Aborgins ARA is common but pharyngitis of group A streptococcus is uncommon. Trait of group A and G streptococcus are common and relation with ARA is questioned (22).

In our country ARA is still common and it is a public health problem (23). But the prevalence of group C and G streptococcus are not known in Turkey. In cases which applied with acute tonsillopharyngitis symptoms and had positive culture findings, we established 16% group C and G streptococcus.

In Bangladesh, in a study of 2175 children who had tonsillopharyngitis; positive culture findings were determined in 428 cases and dispersion of these cases were 74% group C,

21.5% group A. It was reported that advanced studies were necessary (24).

Peritonsillar abscess, wound infection, perirectal abscess, septic arthritis, cellulitis, reactive arthritis, keratouveitis, which were caused by group C and G streptococcus (10, 25-27). All of these children were older than 12 years of age and it was reported that the authors did not know the reason of this. In our study group C streptococcus caused deep neck infection and group G streptococcus caused acute otitis media in one child each.

Our study is first in this area and in cases who applied with acute tonsillopharyngitis symptoms and had positive culture findings. We emphasize that group C and G streptococcus should be isolated from throat cultures. Not only school age and adolescents but also in preschool age, streptococcus may cause endemic or sporadic infections.

References

1. Gerber MA. Group A streptococcus. In: Kliegman RM, Stanton BF, St.Geme JW, Schor NF, Behrman RE, eds. Nelson Textbook of Pediatrics. 19 th ed. Philadelphia: Sounders Elsevier; 2011: 914-920.
2. Gerber MA. Non-Group A and B streptococci. In: Kliegman RM, Stanton BF, St.Geme JW, Schor NF, Behrman RE, eds. Nelson Textbook of Pediatrics. 19 th ed. Philadelphia: Sounders Elsevier; 2011: 928.
3. Williams GS Group C and G streptococci infections: emerging challenges. Clin Lab Sci 2003;16:209–213.
4. Ekelund K, Skinhøj P, Madsen J, Konradsen HB. Invasive group A, B, C and G streptococcal infections in Denmark 1999–2002: epidemiological and clinical aspects. Clin Microbiol Infect 2005; 11: 569–576.
5. Gonzalez-Lama Z, Gonzales JJ, Lupiola P, Tejedor MT. Carries of β- haemolytic streptococci from groups A, B and C among schoolchildren in Las Palmas. Enferm Infecc Microbiol Clin 2000; 18 (6): 271-273.
6. Cimolai N, MacCulloch L, Damm S. The epidemiology of beta- haemolytic non-group A streptococci isolated from the throats of children over a one year period. Epidemiol Infect 1990; 104(1): 119-112.
7. Pulian V. Prevalence β- haemolytic streptococci from throat swaps in health in healty care area from Pontevedra, Spain (Abstract 902-p1674). In: 24 th European Congress of Clinical Microbiology and Infectious Diseases, Czech Republic; 2004.
8. Gerber MA, Randolph MF, Martin NJ, et al. Community wide outbreak of group G streptococcal pharyngitis. Pediatrics 1991; 87(7): 598-603.
9. Gerber MA. Diagnosis and treatment of pharyngitis in children. Pediatr Clin North Am 2005; 52(3):729-747.
10. Faden H. Groups C and G streptococcal disease among children. Pediatr Infect Disease J 2005; 24(11): 1014-1015.
11. Gözüküçük R, Göçmen İ, Kılıç M, ve ark. Çocukluk çağının akut tonsillofarenjitinde A grubu olmayan beta hemolitik streptokokların rolü. Çocuk Dergisi 2012; 2(4): 182-185.
12. Ergin MA, Şener B, Günalp A. Farenjit ve akut tonsillit olgularında C grubu beta hemolitik streptokok izolasyon sıklığı ve tiplendirmesi. Mikrobiyol Bült 1997;31(4):325-330.
13. Centor RM, Witherspoon JM, Dalton HP, Dalton HP, Brody CE, Link K. The diagnosis of strep throat in adults in the emergency room. Med Decis Making 1981; 1(3): 239-246.
14. Barnham MRD, Weightman NC. Changing incidence of detected streptococcal bacteraemia in North Yorkshire, England. Indian J Med Res 2004; 119:160-163.
15. McDonald M, Towers RJ, Andrews RM, Carapetis JR, Currie BJ. Epidemiology of Streptococcus dysgalactiae subsp. equisimilis in Tropical Communities, Northern Australia. Emerg Infect Dis 2007; 13(11): 1694–1700.
16. Penalba Citores AC, Riano Mendez B, Maranon Pardillo R, et al. Incidence of streptococcal pharyngitis. An Pediatr 2007; 67 (3): 220-224.
17. Patil HB, Shahapur PR. Clinicomicrobiological profile of children with acute pharyngitis with special reference to streptococcol grouping. J Indian Med Assoc 2011;109(12):906-907.
18. Bramhachari PV, Kaul SY, McMillan DJ, et al. Disease burden due to Streptococcus dysgalactiae subsp. equisimilis (group G and C streptococcus) is higher than that due to Streptococcus pyogenes among Mumbai school children. J Med Microbiol 2010; 59:220-223.
19. Lindbœk M, Høiby EA, Lermark G, Steinsholt IM, Hjortdahl P. Clinical symptoms and signs in sore throat patients with large colony variant β- haemolytic streptococci groups C and G versus group A. B J Gen Pract 2005;55(517): 615-619.
20. Little P, Hobbs FD, Mant D, McNulty CA, Mullee M; PRISM investigators. Incidence and clinical variables associated with streptococcal throat infections: a prospective diagnostic cohort study. Br J Gen Pract 2012 ;62(604):e787-94.
21. Department of Child and Adolescent Health and Development World Health Organization. The current evidence for the burden of group a streptococcal diseases. Available from: www.who.int/entity/child-_adolescent_health/dokuments, Accessed, December,20,2008.
22. Haidan A, Talay SR, Rohde M, Sriprakash KS, Currie BJ, Chhatwal GS. Pharyngeal carriage of group C and group G streptococci and acute rheumatic fever in an Aboriginal population. Lancet 2000; 356 (9236):1167-1169.
23. Türk Kardiyoloji Derneği. Ülkemizde kalp-damar hastalıklarının epidemiyolojisi ile ilgili gerçekler. Aviable from: www.tkd-online.org/UKSP/UKSP_Bolum02.pdf, Accessed, March, 02,2009.
24. Ahmed J, Zaman MM, Kerama Ali SM. Identification of serogroups of beta haemolytic streptococci in children with tonsillo-pharyngitis. Bangladesh Med Res Counc Bull 2003; 29(3):113-117.
25. Nataneli N, Aguilera ZP, Rosenbaum PS, Goldstein T,

Mayers M. Poststreptococcal keratouveitis associated with group C streptococcus pharyngitis. Clin Ophthalmol 2011;5:1257-1259.

26. Schattner A, Vosti KL. Bacterial arthritis due to beta-hemolytic streptococci of serogroups A, B, C, F, and G. Analysis of 23 cases and review of the literature. Medicine (Baltimore) 1998 ;77(2):122-139.

27. Jansen TL, Janssen M, Traksel R, de Jong AJ. A clinical and serological comparison of group A versus non-group A streptococcal reactive arthritis and throat culture negative cases of post-streptococcal reactive arthritis. Ann Rheum Dis 1999;58(7):410-414.