



International Journal of Pediatric Otorhinolaryngology
62 (2002) 219–222



www.elsevier.com/locate/ijporl

Epidemiology of acute otitis media among Saudi children

Siraj M. Zakzouk *, Tarek S. Jamal, Kamal J. Daghistani

Security Forces Hospital, Riyadh and King Abdulaziz University Hospital, Jeddah, Saudi Arabia



Epidemiology of acute otitis media among Saudi children

Siraj M. Zakzouk *, Tarek S. Jamal, Kamal J. Daghistani

Security Forces Hospital, Riyadh and King Abdulaziz University Hospital, Jeddah, Saudi Arabia

Received 12 June 2001; received in revised form 11 October 2001; accepted 14 October 2001

Abstract

An epidemiological survey was carried out with 9540 children aged up to 12 years to study the prevalence of acute suppurative otitis media and the rate of hearing impairment. A total of 100 (1.05%) were diagnosed with acute otitis media (AOM). The incidence was found to be higher among young children up to 4-years-old and lower in the age group 8–12 years. The male children had slightly higher rate of AOM as compared with female (1.36 and 0.80%), respectively, ($P < 0.01$). The prevalence of AOM in the children from the different provinces varied, being higher in those from the Southern and Central regions. Also it was found that the prevalence of ASOM was higher among children whose parents were cousins compared with non-relative parents (1.38 and 0.74%) ($P > 0.001$). Those with poor socio-economic condition showed higher rate especially those living in the Southern part with poor or inadequate health services provided. ASOM was significantly associated with hearing impairment ($P < 0.00001$). © 2002 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Acute otitis media; Children; Prevalence

1. Introduction

Acute otitis media (AOM) is an episode of inflammation of the middle ear with pain, fever within 48 h or sometimes discharge and hearing loss.

Epidemiological studies of AOM in developing country are rare. In Australian aboriginal children of the rural and remote area the rate of AOM is high [1]. In Saudi Arabia, to our best knowledge there has been only one such study done (1990

[2]. We conducted an epidemiological survey to cover all different area of the kingdom, rural as well an urban community to study primarily the prevalence of hearing impairment among Saudi children and its causes. The other objectives were to study the prevalence of acute and chronic otitis media as well as otitis media with effusion and to carry out laboratory investigations, microbiology of otorrea and serology.

The Kingdom of Saudi Arabia occupies most of the Arabian Peninsula with its empty quarter (Fig. 1). The area is vast equal to that of West Europe. It is divided administratively into four provinces. The Central province occupies the mid central part of the kingdom with the capital City of Riyadh. The Western Province near the red sea

* Corresponding author. Present address: PO Box 3848, Riyadh 11481, Saudi Arabia. Tel.: +966-1-491-1374; fax: +966-1-491-3634.

E-mail address: profzakzouk@hotmail.com (S.M. Zakzouk).

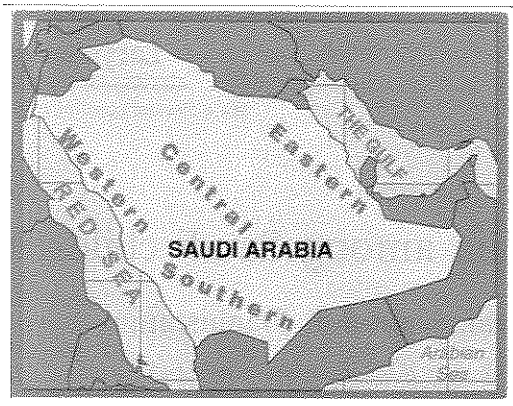


Fig. 1. Map of Arabian Peninsula showing the four provinces of Arabia.

with the holy MAKKAH as the capital. These two provinces have most of the population of the country where the health care and socio-economic standards are higher and with better environment compared with the eastern and southern provinces.

In this report we will address the epidemiological data of AOM only.

2. Materials and methods

A survey was conducted during the periods September 1997 to May 2000. In this survey 9540 Saudi infant and children were screened. A questionnaire (WHO/PD/HI) modified to include family relationship, antenatal care attendance, delivery, immunization and postnatal infections were completed. Details of the ear drum appearance, nasal and pharyngeal abnormalities were also included in the form. A pilot study was done in one health center in Riyadh with the objective to ensure that the questionnaire elicited the required information. At that time there were 1750 health centers scattered all over the kingdom. Seventy centers were randomly selected to represent the various socio-economic and demographic status of the population.

There were four teams, which included an otorhinolaryngologist, an audiologist mainly a physician audiologist, a nurse, social worker and a field supervisor.

The population registered in each selected center were called to bring their children for otological examination and hearing assessment, most of the families came accompanied by one or both parents. The overall response was 69%.

Clinical examination especially otological was carried out by the ENT specialist and the relevant questionnaire was completed. The ENT doctor followed the otoscopic criteria recommended by Paradise to identify children with AOM. All children were audiologicaly assessed by our qualified audiologist except those in pain who were given the proper treatment and re-examined and their hearing assessed. Those with otorrhea, had swabs for culture and sensitivity taken for laboratory investigation of offending organisms.

Tympanometry, free field and pure tone audiometry was done using Madsen and Intercoustics audiometers at frequencies 0.5, 2 and 4 kHz. The children younger than 5 years were tested by free field, tympanometry, those failing the test or in doubt were referred to the main hospital in the area for full audiological assessment using evoked response brain stem audiometry. Otoacoustic emission tests was not used except in the late phase of study. The results were analyzed and chi square tests applied.

3. Results

The target was to screen 10 000 children—460 with incomplete data were excluded. This left 9450. Their ages varied between 3 months and 12 years. A few children between 12 and 15 years were also screened since they came with the family. There were 4188 (44%) boys and 5352 (56%) were girls. One hundred children (1.05%) were diagnosed with AOM.

About 62 of the children had upper respiratory tract infection at the time of examination (62%) six children with nasal septum deviation on the affected side and two had foreign bodies in their ears, 22 of the children were seen with allergic rhinosensitis. The number of discharging ears with perforation was 43 (20.5%).

The characteristic of the whole sample and those with AOM are shown in Tables 1 and 2.

Table 1
Details of subjects about their sex age category, living province and consanguinity of parents

Subjects	Male	Female	Total
Total subjects Total number	4189	5351	9540
<i>Age category</i>			
Up to 4 years	1108	946	5054
>4–8years	1749	1682	3431
>8–12 years	1251	2364	3615
>12 years	81	35	440
<i>Province</i>			
Central	2067	1733	3800
Eastern	330	317	647
Southern	360	675	1035
Western	1432	2626	4058
<i>Consanguinity of parents</i>			
Cousins	815	994	1809
Relative	1211	1461	2672
Not related	1890	2549	4439
Unknown	273	815	620

4. Discussion

AOM or acute suppurative otitis media is a common occurring disease of childhood. Middle ear infection usually occur during some viral illness as an upper respirator tract infection (URTI) and predispose to secondary bacterial infection. It may follow trauma or the presence of ventilating tube. Epidemiological study by Stangerup and Tos [3] showed that 90% of children attending school have experienced at least one episode of AOM. The risk factors suggested to be important in the incidence and severity of the disease included race, ethnicity, genetic predisposition and mode of infant feeding [4]. Saudi Arabia has different, geographical areas and customs of the population in the four provinces of the country, e.g. the Southern area is a mountain area with difficult roads and people are scattered in several villages as a closed community. The number of health centers and health services are not enough, indeed it is difficult to reach some of the villages. Overcrowding, the increased number of siblings with poor water supply and sanitation were noticed more in the Southern and Eastern provinces.

Recently water supply for drinking, etc. is provided by the desalination plants but still insufficient. The customs of the population are different in each province. The Southern province is a mountainous area with difficult roads and also has different weather. Family intermarriage is commonly practiced, more in the southern province.

These communities in addition to their interrelated marriage, are fond of having large families with increased number of siblings in one family.

The high rate of consanguinity among these people may explain the occurrence of many genetic diseases. The high rate of AOM among children with consanguineous parents may be explained in part by the possible genetic factor playing part in addition to other factors.

Our study findings, showed clearly and significantly that young children aged < 4 years old are more affected than older children of 8–12 years. Also male children were more affected than female ($P > 0.001$). These findings are with agreement of the findings of a study done in Norway by Kari et al. [5].

Table 2
Characteristics of children with ASOM

	Number	Significance
<i>Sex</i>		
Male	57	$P > 0.01$
Female	43	
<i>Age</i>		
Up to 4 years	40	$P > 0.001$
>4–8	41	
>8–12	19	
<i>Parents relation</i>		
Cousins	37	$P > 0.001$
Relative	30	
Not related	30	
Undecided	3	
<i>Province</i>		
Central	43	$P > 0.001$
Eastern	13	
Southern	32	
Western	10	
Hearing impairment	50	$P > 0.00001$
Hearing within normal	50	
Total	100	

5. Conclusions

1. The prevalence of AOM was found to be higher among very young children up to 4 years.
2. More children from the Eastern and Southern provinces were affected, 1.76 and 1.25%, respectively, than children from the other two provinces.
3. The occurrence rate of AOM was found more in children whose parents were cousins or relative than non-relatives ($P > 0.001$) Genetic factor?
4. Further study was needed to determine the various risk factors associated with AOM in Saudi Arabia.

Acknowledgements

This study was supported by King Abdulaziz City for Science and Technology (KACST).

References

- [1] P.S. Morris, A systematic review of otitis media in Australian Aboriginal children. In: D.J. Lim, C.D. Bluestone, M. Casselbrant, J.O. Klein, P.L. Ogra, (Eds.), *Proceedings of the Sixth International Symposium on Recent Advances in Otitis Media*. Hamilton, Canada, BC Decker Inc, 1996: 35–40.
- [2] S.M. Zakzouk, S.S. Wong, Y. EL Sayed, A. Shaalan, Final report Epidemiological study of hearing impairment among Saudi children in Riyadh King Abdullah City of science and technology chapter, 5 (1991) 73–74.
- [3] S.E. Stangerup, M. Tos, Epidemiology of acute suppurative otitis media, *Am. J. Otolaryngol.* 7 (1986) 47–54.
- [4] C.D. Bluestone, Epidemiology and Pathogenesis of chronic suppurative otitis media Implications for prevention and treatment Otitis Media Today, In: M. Tos, J. Thomsen, V. Balle (Eds.), *Proceedings of the Third Extraordinary Symposium on Recent Advances in Otitis Media*, Copenhagen, June 1–5, 1997, 1999 Kugler Publications, The Hague, The Netherlands, pp. 27–36.
- [5] Kari J. Kvaerner, Jorgen A. Hagen, Iain W.S. Mair, Jouni J.K. Jaakkola, proneness to otitis is this predicted by the age of the first ear infection? In: M. Tos, J. Thomsen, V. Balle (Eds.), *Proceedings of the Third Extraordinary Symposium on Recent Advances in Otitis Media*, Copenhagen, June 1–5, 1997, Kugler Publications, The Hague, The Netherlands, 1999.