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The point prevalence of otitis media with effusion in secondary school children in Pokhara, Nepal: A cross-sectional study

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ABSTRACT

Objective: Otitis media with effusion (OME) is a condition of uncertain aetiology seen in paediatric practice. It has important sequelae that can result in significant morbidity. Worldwide documentation of OME prevalence in older children is poor as OME is traditionally seen in children below the age of 6 years. Available research in Nepal reports a prevalence of OME in children between the ages of 3 and 8 years as high as 27%. This study aims to establish a reliable prevalence of OME in children between the ages of 9 and 16 years in order to inform public health policy and target limited resources.
Methods: This cross-sectional study was undertaken in Pokhara, Nepal. Two different school populations were examined, government and non-government. Children in these schools between 9 and 16 years underwent clinical assessment for OME with otoscopy and tympanometry. Demographic data were also collected to identify potential OME risk factors. For each school population the prevalence of unilateral, bilateral and all case OME was calculated as percentages with 95% confidence intervals.
Results: A total of 494 children were recruited in this study (government = 187, non-government = 307). Fourteen were excluded due to impacted cerumen or other ENT pathology making it very difficult to conduct a clinical assessment. In the combined school populations the point prevalence of OME was 12.9%. The peak prevalence of OME was found in children aged 10 years (23.1%). A higher point prevalence of OME was found in the non-government school population than the government school (government = 9.3%, non-government = 15.0%). This difference was not statistically significant ($\chi^2 = 3.209$, df = 1, $p = 0.073$). Age was found to be significant predictor of OME.
Conclusions: Contrary to its established natural history OME has been found to be widespread in older children in Nepal. No significant predictors of OME were established and rates did not vary significantly between school types. Studies need to be conducted in a larger population to investigate this further. To fully assess disease burden of OME amongst children in Nepal, prevalence in children not regularly attending schools also needs investigation.

1. Introduction

Otitis media with effusion (OME), commonly referred to as glue ear, is characterised by the presence of serous fluid in the middle ear in the absence of acute inflammation or infection [1,2]. Generally, OME is found in younger children with a prevalence of 20% at 2 years of age and a second peak at 6 years of age [3]. Although its aetiology is uncertain, low-grade infection, allergy and adenoidal infection or hypertrophy have all been implicated [4]. Case control studies have identified a number of risk factors including age below 6 years, a large number of siblings, low socioeconomic status, passive smoking and frequent upper respiratory tract infections [5,6]. Incidence of OME also has seasonal variation with higher rates during winter months [7].

The resolution of OME is often spontaneous with normal middle ear function returning within 3 months. However, approximately 35% of children have recurrent OME and 5–10% of episodes last for a year or more [1,8,9]. OME has few reported symptoms but can have important sequelae. It is the most common cause of acquired hearing loss in childhood as excess middle ear fluid produced impairs tympanic membrane mobility creating a barrier to sound conduction [10,11]. Studies have shown that OME can result in mild to moderately impaired hearing levels with hearing loss of up

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to 40 decibels reported [12,13]. In addition, OME may have negative effects on development of speech, language and learning [10,14]. OME is also closely related to the infectious condition acute otitis media (AOM). Persistent OME and AOM can predispose to other ear conditions such as cholesteatoma and chronic suppurative otitis media (CSOM), both of which can result in the fatal complication of brain abscess formation [15].

The recommended diagnostic technique for OME is pneumatic otoscopy with adjunctive tympanometry to confirm the diagnosis [16]. In the UK, OME can be treated by a simple surgical procedure whereby a ventilation tube is inserted into the tympanic membrane to aerate the middle ear and allow fluid to drain [17]. However, the public health impact of OME and its resultant hearing loss cannot be underestimated in poorer nations where preventative and routine care is often not affordable for such conditions. Nepal is one of the poorest countries in the world and 31% of its population live below the national poverty line. Therefore it is unsurprising that OME poses a significant public health issue [18].

The international trends in epidemiology of OME are difficult to ascertain due to poor documentation of its prevalence. Data is particularly scarce regarding prevalence of OME in older age groups as OME is traditionally a disease of younger children. Where studies have been conducted they are limited to a few nations and to children in young age groups (those attending pre-school or primary school) [19–23]. Available literature suggests the worldwide prevalence of OME to vary widely from 1.2%, found in children aged 5–6 years in Nigeria, to 72.9% in Brazil during winter months in children aged 3–4 years within a low socioeconomic group [24,25]. Research conducted in Nepal suggests that the point prevalence of OME is high when compared to other nations. An unpublished study by Wall et al. conducted in 2010 reported a point prevalence of OME of 27% in children aged between 3 and 8 years of age and in 2009 Amin et al. reported a point prevalence of 38.2% in the same age group [26,27]. When these figures are compared to the point prevalence of OME in similar age groups reported by European studies there is a marked difference [19].

Although in developed countries the prevalence of OME decreases after the age of 6 years, this may not be the case in Nepal due to the higher prevalence of OME that is found in younger children. It is possible that this high prevalence may continue into older age groups. The point prevalence of OME within secondary school children in Nepal has been largely unreported and available evidence from published papers is of poor methodological quality [28].

The primary objective of this study was to measure the point prevalence of otitis media with effusion in children between the ages of 9–16 years attending secondary schools in Pokhara, Nepal. There were three secondary objectives; to compare the prevalence of OME according to socioeconomic status gauged by school type attended, evaluate the change in prevalence of OME with age and identify potential predictors for developing OME in adolescence.

It was hoped this would enable the provision of better public health initiatives by local government and non-government organisations in Nepal to target prevention, early detection and management of OME, with the aim to decrease the health burdens of its resulting complications.

2. Methods

2.1. Population and sample selection

This quantitative, cross-sectional study aimed to determine the point-prevalence of OME in secondary school children aged 9–16 years. In Nepal, children begin to attend secondary school from a younger age than in Western Europe. The data collection for this research took place in both government and non-government run secondary schools in and around Pokhara, Nepal. Pokhara is the third largest city in Nepal and has a population of approximately 200,000 [29]. Children from these schools were screening for presence or absence of OME.

Government and non-government schools situated in and around Pokhara, Nepal were notified of the project by the International Nepal Fellowship (INF), a prominent non-governmental organisation based in Pokhara. Headmasters of these schools were provided with information regarding the research project and consent was gained from those schools who wished to take part. Convenience sampling was used to select one government and one non-government school. School type was a proxy for establishing socioeconomic status, as more affluent families were more likely to send their children to fee paying schools. The inclusion and exclusion criteria for the study are listed below:

Inclusion criteria

- Children attending secondary school aged 9–16 years.
- Children who consented to assessment or from whom consent from a parent or guardian was received.
- Children attending the school on the day of data collection.

Exclusion criteria

- Children with impacted cerumen in making a diagnosis of OME not possible.
- Children in whom clinical assessment was not possible due to other ENT pathology.

2.2. Sample size

Sample size calculation for this study was 2-fold due as this study laid down the groundwork for a secondary survey to be conducted looking at the prevalence of significant hearing loss amongst participants with OME. Due to the scarcity of reliable, good quality studies in Nepal looking at the prevalence of OME in children aged between 9 and 16 years it was difficult to estimate the percentage of participants who would be diagnosed with OME. Therefore, it was necessary to extrapolate OME prevalence from previous studies in Nepal conducted in younger age groups in order to calculate a sample size. In 2009 Wall et al. reported the prevalence of OME in primary school children in Nepal to be 27% [26]. From knowledge of the natural history of OME it was anticipated that this figure would be lower in secondary school children. Therefore, based on an extrapolated prevalence of 9% a sample size of 126 children was calculated to estimate prevalence of OME at a 95% confidence level with a precision of $\pm 5\%$. To estimate the prevalence of significant hearing loss as a result of OME at a 95% confidence level with a precision of $\pm 5\%$ a sample size of 656 was needed based on a prevalence of 4% [30].

2.3. Data collection

Data collection took place in February 2011. The primary outcome measured in this study was presence or absence of OME assessed by clinical examination using an otoscope and tympanometer. These are the recommended diagnostic tools for OME and have been shown to have the greatest sensitivity and specificity [2,16]. The clinical examinations were carried out by two 5th year medical students from the UK who had undergone training in examination and interpretation of results from these assessments by an ENT specialist registrar in the UK. An otoscope was used to visualise the pinna, ear canal and tympanic membrane. The colour and patency of the tympanic membrane were assessed for features of OME and to identify presence of wax, a perforation or AOM,