

PREVALENCE AND RISK FACTORS OF OTITIS MEDIA WITH EFFUSION IN SCHOOL AGE CHILDREN**Hayder S Atwan^{*}, Ahmed A Alansary^{**}, Abdulwahab B Abdulwahab[@] & Abdul-Razzaq H Alrubaiee[#]**

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Abstract

Otitis media with effusion, which refers to the accumulation of fluid in the middle ear cavity without any signs of infection, is a common health problem both in pre-school and school age children. The etiology of otitis media with effusion is multifactorial and many risk factors may increase its incidence.

The aim of this study is to determine the frequency and risk factors of otitis media with effusion in school age children in Basrah.

In this descriptive prospective study; sixty patients aged between 6-12 years were included; they were 34 males and 26 females diagnosed as having otitis media with effusion in the period between July 2013 to April 2014; at Basrah General Hospital, Iraq. Pure tone audiometry, tympanometry, and lateral x-ray film of post nasal space were done for each patient after a full ENT history and examination. A questionnaire form was constructed to apply for each patient including the possible risk factors for developing otitis media with effusion such as age group, gender, parental smoking, allergy, history of acute infection, maternal education, family income, school type.

Otitis media with effusion was found to be higher (66.7%) in children aged between 6-8 years, males more than females with male to female ratio 1.3:1. (61.6%) were from rural area, parental smoking present in (65%), (58.3%) had history of allergy, (66.6%) with history of upper respiratory tract infection, low maternal educational level, low financial income (66.6%), attendance to public school, and the presence of adenoid hypertrophy (71%) were found to be associated with otitis media with effusion.

Conclusion and Recommendation: Environmental, epidemiologic and familial factors play an important role in etiology of otitis media with effusion. The parents must be informed about these modifiable risk factors, by this way the development or delayed diagnosis of the disease that may cause serious consequences can be prevented.

Introduction

Otitis media with effusion, which refers to the accumulation of a nonpurulent effusion of the middle ear that may be either mucoid or serous fluid within the middle ear cavity and sometimes involve inflammation in the other 3 spaces: the mastoid, perilabyrinthine air cells, and the petrous apex, without any signs of infection^{1,2}. Otitis media with effusion has several potential causes, the leading causes include viral upper respiratory infection, acute otitis media (AOM), and chronic dysfunction of include viral upper respiratory infection, acute otitis media,

and chronic dysfunction of the Eustachian tube^{2,3}. However, other potential contributing causing factors include ciliary dysfunction; proliferation of fluid-producing goblet cells, allergy and residual bacterial antigens, and biofilm, more recently research suggests that mucoglycoproteins cause the hearing loss and much of the fluid presence that is the hallmark of otitis media with effusion⁴⁻⁶. Otitis media with effusion is a common health problem both in pre-school and school age children. Twenty to fifty percent of children aged (3–10) years experienced otitis media with effusion at

least once in this period⁷. Researchers showed multiple risk factors contribute in recurrent otitis media with effusion as sex, attending day cares, secondary household smoker, premature delivery; GERD, family size, bottle feeding, socioeconomic status, craniofacial anomalies, adenoids hypertrophy and maternal education, all of these have been studied and are still controversial⁸⁻¹⁰. The symptoms of otitis media with effusion are insidious mainly characterized by hearing loss due to decrease of tympanic membrane mobility secondary to middle ear effusion and occasionally pain from pressure changes¹¹. The diagnosis of otitis media with effusion usually is delayed so the potential risks of complications like tympanosclerosis, retraction pocket, adhesive otitis media and hearing or speech impairment make the disease an important public health problem¹². Various modalities were applied for treatment of otitis media with effusion include medical treatments such as antibiotics, antihistamines, decongestants and intranasal steroids, surgical therapy includes tympanocentesis, myringotomy with or without ventilation tubes plus adenoidectomy. Non pharmacological methods are also used for treatment of otitis media with effusion like nasal balloon autoinflation¹³⁻¹⁵.

Patients & methods

This is a prospective descriptive study carried out on patients attended the Department of Otolaryngology, Basrah General Hospital, Iraq; for the period between July 2013 to April 2014. A total number of 60 patients (34 male and 26 female) were included in this study. All patients were school age children, aged between 6 and 12 years. The patients were diagnosed to have otitis media with effusion by Otolaryngologist either in private clinic or in the Out-Patient Department of same hospital. A detailed ENT history was taken from every patient or his/her companion, then assessment of

each patient by full ENT examinations, including tuning fork test (Rinne's and Weber's tests) by tuning fork (512Hz). After that each was sent to the Department of Audiology for evaluation of hearing and middle ear pressure by doing of Pure tone audiometry and Tympanometry respectively. The machine which was used in Department of Audiology is called Impedance Audiometer AA222 manufactured by Interacoustics A/S on 2012, this machine is used for doing both pure tone audiometry and tympanometry at same time. Pure tone audiometry is used to detect the type and degree of hearing loss at designated frequencies, the pure tone audiometry was done by an audiologist by presenting a sound of different intensities at different frequencies using a headphone for air conduction and bone vibrator for bone conduction, then readings were presented in a graph called audiogram. Tympanometry is an objective clinical procedure that involves measures of acoustic emittance in the ear canal as air pressure in the canal varied above (+) and below(-) atmospheric level in the ear canal, based on the amount of energy ejected (impedance) or the amount of energy accepted (admittance) by the middle ear. Tympanometry provides an estimation of intra tympanic pressure, Eustachian tube, and continuity of the ossicular chain. The equipment consist of a probe which fits into the external auditory canal and has four channels; to deliver a tone of 220Hz, to pick up the reflected sound through a microphone, and to bring about changes in air pressure in the ear canal from positive to normal and then negative. Lateral x-ray film of the post nasal space was done for each patient to assess the size of adenoids. A questionnaire form was constructed for this study included several clinical and socio-demographical parameters which are supposed to be as a risk factors for development of otitis media with effusion such as residency, parental smoking,

allergy, past medical history of upper respiratory tract infection, previous head and neck surgery, income and maternal educational level. The questionnaire form which used in this study is shown in the appendix.

Statistical analysis was carried out using SPSS (Statistical Package for Social Sciences) program.

Results

Gender distribution: After collection of data related to the study, the number of female patients found to be 26 patients representing 43.3% of the total number of patients with otitis media with effusion while the number of males was 34 ones representing 55.7% of the total number with male to female ratio of 1.3:1.

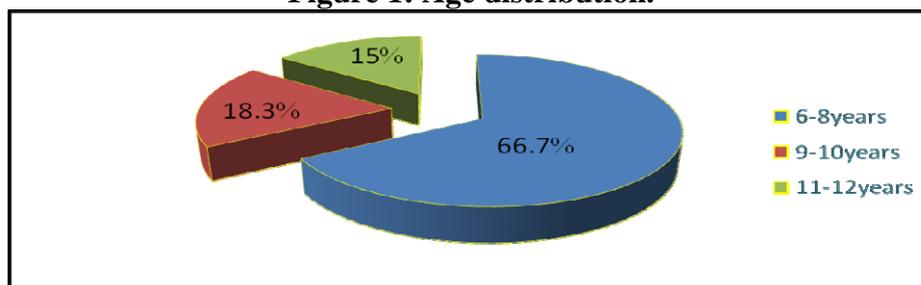
Table I: Gender distribution.

Gender	No.	Percentage
Male	34	55.7%
Female	26	43.3%
Total	60	100%

Age distribution: Figure 1 shows the age distribution of the studied sample, (66.7%) of children with otitis media with effusion their ages are between 6-8 years,

(18.3%) patients their ages ranging from 9-10 years and (15%) patients their ages are between 11-12 years.

Figure 1: Age distribution.



Residency distribution: As seen from table II, 37 patients (61.6%) with otitis media

with effusion are from rural areas, while 23 patients (38.3%) are from urban areas.

Table II: Residency distribution

Residency	No.	Percent
Rural	37	61.7%
Urban	23	38.3%
Total	60	100%

Parental smoking: Table III shows that 39 patients (65%) had history of parental

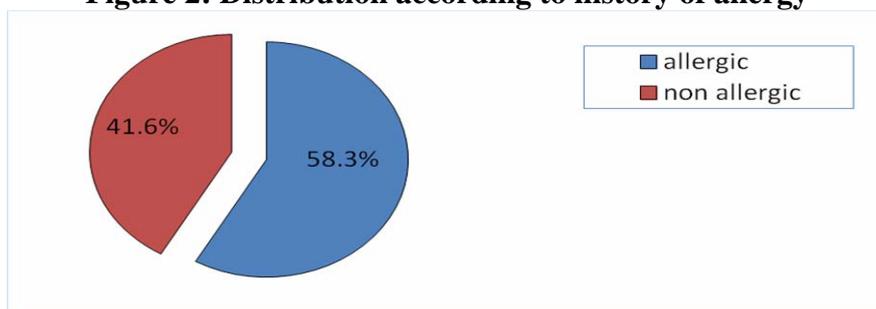
smoking, while 21(35%) with no history of parental smoking.

Table (III): Distribution according to parental smoking.

Parental smoking	No.	Percent
Present	39	65%
Absent	21	35%
Total	60	100%

Allergy: We found that 35 patients (58.3%) have history of allergy in compares to 25 patients (41.6%) was without history of allergy.

Figure 2: Distribution according to history of allergy



Past medical history: In the course of this study, 53 patients (88.3%) with otitis media with effusion had history of upper respiratory tract infection in the last 6 months, and 7 patients (11.6%) with no history of acute infection.

Table IV: Distribution according to past medical history

Past medical history	No.	Percent
Upper respiratory tract infection	53	88.3%
No history of acute infection	7	11.7%
Total	60	100%

Maternal educational level: According to maternal educational level the study population categorized into 14(23.3%) patients of illiterate mother, 24(40%) patients their mother completed the primary school, 9(15%) patients their mother completed the intermediate school, 8 (13.3%) patients their mother completed the secondary school and 5(8.3%) patients their mother completed university and above.

Table V: Distribution according to maternal education.

Maternal educational level	No.	Percentage
Primary school	24	40%
Illiterate	14	23.3%
Intermediate school	9	15%
Secondary school	8	13.3%
University and above	5	8.3%
Total	60	100%

Family income: According to family income precipitant there were 40 patients (66.6%) from families with low income, 17 patients (28.3%) from families with moderate income and 3 patients (5%) from family with high income.

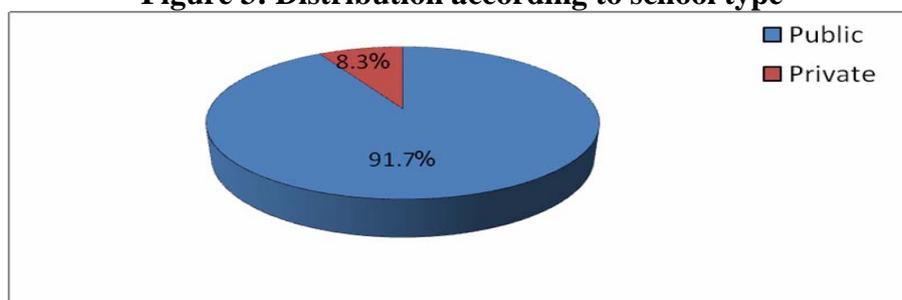
Table VI: Distribution according to family income.

Income	No.	Percent
Low	40	66.7%
Moderate	17	28.3%
High	3	5%
Total	60	100%

Cleft palate: no patients were found with history of cleft palate

School type: According to school type 55 (91.7%) patients with otitis media with

effusion in this study were in general school and 5(8.3%) patients were in private school.

Figure 3: Distribution according to school type

Adenoid hypertrophy: According to adenoid hypertrophy there were 43 patients (71.7%) had adenoidal

hypertrophy and 17 patients (28.3%) had no adenoidal hypertrophy.

Table VII: Distribution according to adenoid hypertrophy.

Adenoid hypertrophy	No.	Percentage
Present	43	71.7%
Absent	17	28.3
Total	60	100%

Discussion

Otitis media with effusion is considered a problem of childhood age group. One of the fundamental facts in the natural history of otitis media with effusion is that it usually resolves spontaneously within 3 months, 30 to 40 percent of children with otitis media with effusion have recurrent episodes and 5 to 10 percent of those episodes last more than 1 year^{11,16,17}. Some group of children are at high risk of having episodes of otitis media with effusion like patients with cleft palate,

Down syndrome, and other craniofacial anomalies who are at greater risk for anatomic anomalies that cause otitis media with effusion and decreased function of the Eustachian tube¹⁸. Some races like American Indian, Alaskan, and Asian backgrounds are believed to be at greater risk to have otitis media with effusion than other ethnics, also children with adenoid hyperplasia are more susceptible to have Otitis media with effusion more than others¹⁹. Otitis media

with effusion if left without proper management and treatment may lead to serious complications, such as hearing or speech impairment which may interfere with the child educational progress^{20,21}. (In this study, the percentage of males (55.6%) who had otitis media with effusion is more than females (43.3%), this finding goes with Caylan et al²² (2006) who found that frequency in males (60.8%) more than females (40.2%). Paradise et al²¹ (2000) and Tele et al²³ (1989) also reported higher frequency in males. While Aich et al²⁴ found that no sex difference. The higher percentage of the study sample that had otitis media with effusion were in children aged between 6-8 years (66.7%), this finding is similar to Caylan et al (2006)²² who found that high frequency of otitis media with effusion in children aged between 6-8 years, this can be explained by the possibility of immaturity of both Eustachian tube and immune system in children that may regard as a factor related to the development of otitis media with effusion in children. The current study shows that high percentage of patients with otitis media with effusion were from rural area (61.6%) and this may explain by poor medical service at rural area. This goes with the study done by Aich et.al²⁴ (2000) who found that otitis media with effusion is more frequent in rural area in comparison to the urban area (65.2% versus 34.8%). Regarding allergic status which was subjectively assessed by the parents, the finding was that, thirty five patients (58.3%) had a positive history of allergy, and twenty five patients (41.8%) had a negative history of allergy and this goes in correlation with the studies of Kiris et al²⁵ (2012) and Gultekin et al²⁶ (2010), both reported that allergy is a possible risk factor in etiology of otitis media with effusion. This can be explained by that the allergic reaction may be affect Eustachian tube epithelium causing Eustachian tube dysfunction. Another factor was taken in consideration,

which is parental smoking, as it is a risk factor for several health problems; thirty nine patients (65%) had positive history of parental smoking. This result is constituent with the result obtained by Erdivanli et al²⁷ (2012) who demonstrated that parental smoking results in higher prevalence of otitis media with effusion, so that exposure to cigarette smoke may be consider as a possible risk factor for occurrence of otitis media with effusion secondary to the effects of smoking on both respiratory tract and Eustachian tube epithelium. On other hand Caylan et al²² (2006) noted that the prevalence of otitis media with effusion of the children who had history of parental smoking was same for those children without history of parental smoking. In the present study regarding the past medical history of upper respiratory tract infection, fifty three patients (88.3%) gave positive history of previous attack of upper respiratory tract infection in association of occurrence of otitis media with effusion. Upper respiratory tract infection may be consider as predisposing factor for development of otitis media with effusion and its role in development of otitis media with effusion is probably due to damage to Eustachian tube epithelium. Studies such as Gultekin et al²⁶ (2010) and Martin et al²⁸ (2011) demonstrated that the frequency of otitis media with effusion is more in children who had history of upper respiratory tract infection. In the course of study, we found a clear association between level of maternal education and the disease, as we distributed the studied sample according to maternal education, we found that eleven patients (18.3%) of mother were illiterate, twenty patients (40%) of mother completed her primary school and eight patients (13.3%) of mother with high educational level this mean high frequency of otitis media with effusion had been seen in children of mother with low educational level. Aich et al²⁴(2000) found (17.9%) patients of illiterate mothers and (27.9%) patients

their mothers completed their primary school, this is similar to what was found in this study so the level of mothers education may be a risk factor for development of otitis media with effusion. Another important parameter was income of the individual patient, statistically known as income per capita, where we estimated the monthly income of the family divided by the number of family members. There was (66.6%) of patients with otitis media with effusion in this study was of family with low financial income. Caylan et al²² (2006) reported that low economic status was found to be a possible risk factor for the development of otitis media with effusion which can be attributed to inability of the family to provide the proper medical therapy to their children and also to overcrowding due to shortage of the number of rooms in the small sizes houses of poor families. High number fifty five patients (91.7%) of the study sample attend the public school and only five patients (8%) attend private school. so that children attending public school may be at high risk for the development of otitis media with effusion. This may be explained by the possibility of overcrowding at public school which helps in transmission of infectious disease like upper respiratory tract infection. Caylan et.al²² (2006) found that the prevalence is slightly higher in public than private school while Martin et al¹⁹ (2011) found no importance for school type. Adenoid hypertrophy which assessed by lateral x-ray film of post nasal space was found in Twenty nine patients (48.3%) of the study sample. The obstruction of the nasopharyngeal space by adenoid mass which lead to obstruction of Eustachian tube may play a role in pathogenesis of otitis media with effusion. Orgi et al²⁹

(2010) found that the risk of otitis media with effusion was more than seven times among children with adenoid hypertrophy. Although many studies show a strong correlation between the cleft palate and the occurrence of otitis media with effusion 18but unfortunately in this study there wasn't any patient with otitis media with effusion have a cleft palate.

Conclusion & recommendations

As an important health problem reflecting its effects on patient's health and quality of life, beside its financial burden upon individuals and government, different risk factors were studied and identified to have important impact upon the disease development and possibly upon its complications. The most important among these risk factors were related to social and economic background of patients, as residency, low income, low educational level, overcrowding, and smoking play an important role in development of otitis media with effusion in developing countries, including ours. Clinical risk factors like upper respiratory tract infection, adenoid hypertrophy had an association with the disease.

We recommend that the parents must be informed about these modifiable risk factors and by this way the development or delayed diagnosis of the disease that may cause serious consequences can be prevented. We also recommend that health education, improvement of housing conditions and family planning would have a good influence towards control of this disease and related illnesses. Finally further study should be carried out to confirm our results towards finding suitable solutions for the risk factors in order to decrease prevalence of the disease and its morbidity.

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