

Association between otitis media with effusion & body mass index in preschool age children

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Abstract

Background and objectives: Some clinical studies have suggested that otitis media with effusion may be associated with body mass index. The objective of this study is to evaluate the association between otitis media with effusion and body mass index in preschool age children.

Methods: A cross-sectional study conducted on 270 cases in preschool age children. All children from hospital outpatient department & kindergarten were examined by otoscope for the signs of otitis media with effusion and their body mass index was calculated based on their height and weight tympanometry was done for all of them. those with type A & B were included in our study.

Results: A total of 270 children enrolled in our study. Most of them 74% (201) did not have otitis media with effusion while only 69 kids had otitis media with effusion which was equal to 25.6% of the total participants there was a significant statistical association between study groups and BMI of children. More than half of the otitis media with effusion cases (53.7%) had normal body mass index in reverse to most (74.1%) of children without ear infection. Around quarter (23.2%) of otitis media with effusion participants were over-weight, while only 8.5% of control cases were over-weight. The obesity was more prevalent (13%) among otitis media with effusion cases than normal children (4%).

Conclusions: In this study we concluded that there is a significant relationship between otitis media with effusion & body mass index in preschool age children. The prevalence of obesity was higher among children with otitis media with effusion than those unaffected.

Key words: Child; Overweight; Obesity; Otitis Media with Effusion

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Introduction

Otitis media is an otological pathology that affects many children, about 80–90% of them having otitis media more than once up to the age of three years, and 10–15% having chronic or repeated attacks of otitis media¹. Millions of children around the world are affected with otitis media yearly with attendant complications². Otitis media with effusion (OME) is a pathology in which there is asymptomatic fluid accumulation in the middle ear cavity³. The most common cause of hearing loss in pediatric age group is (OME) which occurs more often at the time of language development and causing delay in speech⁴. The most common ambulatory surgery performed for children age group in the United States is for OME, with nearly one million operations being performed each year⁵. It is common enough to be known as a job related risk of early childhood as around 90% of children have OME before going to school and they acquire, on average, 4 attacks of OME each year. Substituted word for OME compromise middle ear fluid and serous, secretory, or non suppurative otitis media³. Regardless of the growth of antimicrobial substances and operative techniques, the rate of occurrence of OME has been rising, and the relationship between

OME and age, gender, seasons, way of life, sustenance, environment, and hypersensitivity have been described⁶. The majority of attacks of OME resolve without treatment within three months, whereas around 30% to 40% of children have recurrent OME attacks, and 5% to 10% of attacks last ≥ 1 year. Continuous middle ear fluid from OME result in reduced movability of the ear drum and acts as a barrier to sound conductivity. However, 25% of OME attacks continue for three months and may be related with decreased hearing, balance (vestibular) symptoms, poor school capabilities, behavioral problems, ear uncomfortableness, repeated acute otitis media, or decreased quality of life³. As most cases of (OME) resolve without treatment for this reason a “watch and wait” interval must be taken and therapy only given to those in whom middle ear fluid is persistent⁷. It is related with numerous elements, like adenoidal enlargement, upper respiratory tract infection, cleft palate and contact to cigarette smoke⁸. Among the elements considered to influence the effects of OME are age, gender, ethnic group, season of the year, inherited elements, number of family members, smoking status of parents, diseases encountered by children,

and nursing ways⁶. Obesity in pediatric age group is a significant worldwide health problem. The prevalence of obesity in pediatric age group is increasing in a dramatic manner, as per World Health Organization, around forty -one million children less than five years of age are obese or overweight globally⁹. The incidence of childhood overweight and obesity has also been rising, but the relationship between childhood obesity and OME has not yet been determined. Obesity is the presence of excessive accumulation of fat in various tissues, especially in hypodermal tissues. Obesity is generally defined by body mass

Patients and methods

It's a prospective, cross-sectional study carried out in the Department of Otolaryngology, Rizgary Teaching Hospital from July 2018 to October 2019. Our study included 355 preschool age (4 to 6) years children from 10 kindergartens & ENT outpatient department, they were randomly chosen through simple sampling method, 114 children from kindergarten & 156 children from ENT outpatient department, almost all children present in selected kindergartens at the day of data collection were included in this study. Around eighty-five children with perforated tympanic membrane, children with past or present ear

index (BMI) (calculated as weight in kilograms divided by height in meters squared), It is usually diagnosed by methods including height and weight, with BMI being the most commonly used. For pediatric age group, those with a BMI greater than the 95th percentile by age and gender are defined as obese⁶. However, the relationship between obesity & OME in children has not been determined yet, we planned to conduct such a study in our department to assess the relationship between otitis media with effusion & body mass index.

problems and craniofacial abnormalities, cleft palate and Down syndrome patients were excluded from our study, so the final number was 270 children. Regarding the data collection of our study in kindergarten, a special questionnaire and consent paper were given to all parents one day before examining the children, we answered most of the parents' questions through cell phone and their answers were collected on the day of examining the children and the questionnaire were about: age, sex, previous history of ear discharge, symptoms of suspecting decreased hearing, previous history of ear discharge, history of previous

ENT surgery, height in meter and weight in kilograms. On the day of the examination, the otoscope and portable tympanometry examination done to all children from the selected kindergartens. The findings on otoscopic examination which is suggestive for otitis media with effusion are loss of tympanic membrane translucency (yellow-orange, dull, or bluish color of tympanic membrane), horizontally located handle of malleus with prominence of its short process, cone of light distorted or diffused, presence of increased vascularization along the handle of malleus and radiating vessels from the handle to the tympanic ear drum regarded as a sign of otitis media with effusion. Tympanogram was performed after otoscopic examination, the device used was a portable tympanometry machine (ampivox/otowave tympanometry). Tympanograms were divided into these types: type A: peak between (+100 and -100), and type B (flat curve without peak identification). Kids with an otoscopic findings of otitis media with effusion and abnormal tympanogram (type B) were given a diagnosis of otitis media with effusion, Body mass index (BMI) for each child was calculated as the directly measured weight (kg)/square of height (m²). In pediatric patients, BMI increases with age and BMI

percentiles vary by gender and age, then each BMI calculated over special growth chart according to age & sex¹⁰. Children with a BMI greater than or equal to the 85th percentile were considered overweight and those with a BMI greater than or equal to the 95th percentile were considered obese and then all cases with features of otitis media with effusion were referred to consultant center(Rizgary teaching hospital/department of otolaryngology) for further evaluation and management. The data were recorded on a specially designed questionnaire, collected and entered in the computer via Microsoft Excel worksheet (Excel 2010) and then analyzed using appropriate data system which is called Statistical Package for Social Sciences (SPSS) version 25 and the results were compared between patients with different variables, with a statistical significance level of ≤ 0.05 . The results presented as rates, ratio, frequencies, percentages in tables and figures and analyzed using Chi square tests. This study was submitted to the Ethics and Scientific committees of Surgery of the Kurdistan Board of Medical Specialties for scientific and ethical approval. This study was explained for each patient and a verbal consent was obtained from each patient or

his/her guardian. Confidentiality of data was ensured.

Results

A total of 270 children enrolled in this study. Most of them (201) did not have otitis media with effusion while only 69 kids had the infection which was equal to 25.6% of the total participants, Figure (1).

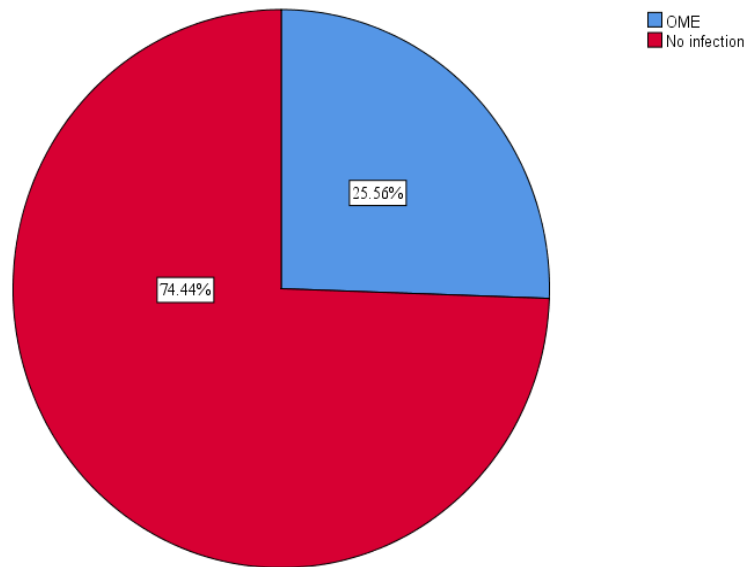


Figure (1): Distribution of study groups.

The data of Table 1 reveal that there was a significant statistical association between study groups and BMI of children. More than half of the OME cases (53.7%) had normal BMI in reverse to most (74.1%) of children without ear infection. Around quarter (23.2%) of OME participants were over-weight, while only 8.5% of control cases were over-weight. The obesity was more prevalent (13%) among OME cases than normal children (4%). Pearson Chi square test was done and p-value was 0.001.

Table (1): Association between study groups and BMI.

BMI	Study groups		Total	p-value
	OME	No infection		
Under weight	7	27	34	0.001
	10.1%	13.4%	12.6%	
Normal	37	149	186	
	53.7%	74.1%	68.9%	

Over weight	16	17	33	
	23.2%	8.5%	12.2%	
Obese	9	8	17	
	13%	4%	6.3%	
Total	69	201	270	
	100%	100%	100%	

According to findings of table (2), approximately half of the OME cases were male (50.7%) and the other half female (49.3%). More than half of ear infections were bilateral (59.5%), while only 15.9% of the cases the infection was in the left side and the remaining 24.6% were in the right ear. Around half of the participants (53.6%) had normal BMI, while 23.3% and 13% of

them were over-weight and obese consecutively. During autumn, 30.4% of the infections had been diagnosed, however less cases were encountered in winter (24.6%), spring (24.6%) and summer (20.4%). Approximately half of OME cases have been diagnosed in hospital (49.3%) and the other half in the kindergarten (49.3%).

Table (2): Side of ear infection, sex, BMI, season and place of diagnosis of OME cases.

Variables	Categories	No.	%
Side of ear infection	Right ear infection	17	24.6
	Left ear infection	11	15.9
	Bilateral ear infection	41	59.5
Sex	Male	35	50.7
	Female	34	49.3
BMI	Under weight	7	10.2
	Normal	37	53.6
	Over weight	16	23.2
	Obese	9	13
Season of infection	Autumn	21	30.4
	Winter	17	24.6
	Spring	17	24.6

	Summer	14	20.4
Place of diagnosis	Hospital	34	49.3
	Kindergarten	35	50.7
	Total	69	100

Discussion

A common health problem, especially in preschool age children is otitis media with effusion, if not managed completely, it might result in a number of complications & sequelae, such as hearing or language difficulties¹¹. The incidence of childhood obesity has been rising globally, with 20% of children considered to be obese. As being defined as a universal ill health, obesity has been considered to be a condition that should be actively managed and treated¹. In our study there was a significant relationship between otitis media with effusion & body mass index in preschool age children than in unaffected children, suggesting that child obesity may affect the occurrence of OME. In Kim et al study, showed the prevalence of obesity was significantly higher in children with OME than the control group, furthermore, there may be damage to middle ear structures like chorda tympani in those with previous history of OME which may cause a change in the sense of taste,

particularly a preference for sweet flavors, thus result in obesity¹. In Kaya et al study, described that the prevalence of overweight or obesity was higher in children with otitis media with effusion, according to the weight for height percentiles, also states that Changes in cytokine levels, increased plasminogen activator factor inhibitor-1 (PAI-1) levels, Eustachian tube dysfunction and gastro-esophageal reflux disease are all thought to have a role in occurring otitis media with effusion¹². Interestingly, these factors also either play a role in the pathogenesis of obesity or are related with it. The similarity of cytokine profiles (e.g. tumor necrosis factor-alpha (TNF α), interleukin-1 beta (IL-1 β), IL-6, IL-8) in obese persons and OME patients suggests an association between these conditions. moreover, PAI-1 levels are increased in mucoid effusions; PAI-1 is also produced by adipose tissue and its levels are increased in obese individuals¹². Aoki et al. had showed

an important link between obesity and OME; probably related to the role of Ostmann's fatty tissue in eustachian tube function, as a result, there is increase adipose tissue growing around the Eustachian tube and nasopharynx in obese

Conclusions

In this study, we concluded that there is a significant relationship between otitis media with effusion & body mass index in preschool age children. The prevalence of obesity was higher among children with OME than those who have no otitis media with effusion. As otitis media with effusion is a common health problem among

children which might predispose them to developing OME^{13,14}. In our study there is higher incidence of OME in autumn than in winter & spring may be due to chronicity of the disease or improper management of the disease.

pediatric age group & it affects hearing & school performance, we recommend that the ministry of education to have a screening program to all of those who newly enter kindergarten and primary school to diagnose those children with otitis media with effusion & to have a healthy program of nutrition

Conflict of interests

The authors recorded no conflict of interests.

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