



The effect of passive smoking on the etiology of serous otitis media in children

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ABSTRACT

Serous otitis media (SOM) is a disease mostly seen in the pediatric age group and characterized by serous effusion in the middle ear. The disease which is mostly silent can cause permanent hearing loss if it is not diagnosed and treated early. Passive smoking is one of the environmental factors in the etiopathology of the disease and risk factors for SOM formation in children. In our study, smoking habits of family members of 75 children with SOM and 50 healthy controls were investigated. At the end of the study, the correlation between SOM and passive smoke exposed was statistically significant in children ($p < 0.01$). In this study, the effect of passive smoking, which is a preventable and controllable risk factor in the etiology of the SOM in children is emphasized.

1. Introduction

Serous otitis media (SOM) is a type of otitis media characterized by fluid collection behind the intact eardrum without signs and symptoms of general and local infection. The disease occurs especially in infants and early childhood. The prevalence of SOM varies between 2 and 18% in different studies [1,2]. Due to the silent course of the disease, delayed diagnosis and inadequate treatment may cause permanent hearing loss at an early age. The etiopathogenesis of SOM is both related to the child itself and the environmental factors. Risk factors related to child include; gender, race, eustachian tube anatomical features, cleft palate, allergy and immunological status of the child. While environmental factors include bad socio-economic situation, seasons, the child going to kindergarten or nursery school and the child is exposed to cigarette smoke at home [3]. In many studies about the formation of serous otitis, in children passive smoke exposure by their parents has been found to cause middle ear effusion. In various studies, cigarette smoke causes; epithelial damage, release of proteases, inhibition of antiproteases, deterioration of bactericidal activity of macrophages and neutrophils, goblet cell hyperplasia, squamous metaplasia, decreased mucociliary activity and eustachian dysfunction in the middle ear. The fact that children also have to live in a smoking environment adversely affects their health and their future lives. Tonsillitis, otitis media, allergy, sinusitis and lung infections are more common in these children. However, children living in a continuous smoking environment perceive smoking as a normal behavior and play an important role in starting smoking at an early age [4,5].

In this study, the effects of passive or second hand smoke exposure on the formation of serous otitis media in children living in the same environment with smoking family members was investigated.

2. Material and method

A total of 75 children (26 girls, 49 boys) aged between 3 and 11 years who were admitted to Ankara University Faculty of Medicine, Department of Otorhinolaryngology and diagnosed as SOM and 50 healthy children were included in the study.

Complaints related with ears, medical histories and physical examination findings were evaluated. In the story; the patient's age, symptoms and duration, previous treatment modality and duration were taken into consideration. In addition to the patients who were diagnosed for the first time, patients who had previously been treated for SOM and who were operated and followed by ventilation tube insertion were included in the study.

Patients were examined by the same senior ENT specialist. In otological examination; dulling of the eardrum, retraction, increased vascularity, thickening and atrophy, prominence in the malleus processus brevis, changes in the plane of the manubrium mallei, air-fluid level behind the eardrum, and the presence of air bubbles were considered to be favorable for SOM. Middle ear pressure, compliance, stapes reflex results were evaluated by tympanometric method in patients with SOM. In our study, middle ear pressure less than $-250 \text{ mmH}_2\text{O}$, type B or C tympanograms detected in the cases were accepted as favorable findings of SOM.

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Table 1

Distribution of mothers according to smoking status among children with SOM and healthy controls ($p > 0.05$).

Smoking (mother)	Children with SOM	Healthy controls	Total
Smoke (+)	21 (63%)	12 (27%)	33 (100%)
Smoke (-)	54 (58%)	38 (42%)	92 (100%)
Total	75 (60%)	50 (40%)	125 (100%)

The smoking characteristics of the family members of children with SOM and healthy children were evaluated. Both mothers and fathers were asked for smoking separately and then were also asked for the amount of cigarettes smoked at home and in the same room with the children. If both parents were smoking, the total number of cigarettes smoked at home and in the same room with the children was recorded. Parents of children who smoke with their children in the common living spaces at home and parents of children who smoke out of their common living spaces were investigated. The results were evaluated using Chi-Square test. Statistical analysis was performed by SPSS program.

3. Results

In our study, 33 (26.4%) of the mothers were smoking, 92 (73.8%) were non-smokers (Table 1), and 55 (44%) of the fathers were smoking, while 70 (56%) were non-smokers (Table 2). There was no significant correlation between the smoking status of the mother or father and the presence of SOM ($p > 0.05$). The rate of smoking in the homes of children with SOM was 68%, while it was 48% in the homes of healthy controls (Table 3). Family members' smoking places at home were investigated; and it was found that the families of children with SOM smoked mostly in the living room (41%) and then in the kitchen (25%), while the families of the normal children preferred open spaces such as balconies or gardens (54%) (Table 4).

In both groups it was found that family members don't prefer smoking in the child's room. The number of cigarettes smoked by family members at home was examined; and it was found that the family members of children with SOM mostly smoked 6–10 cigarettes at home (44%), while the normal children's families were mostly smoking 1–5 cigarettes (42%) at home (Table 5). The correlation between the number of cigarettes smoked at home and SOM was also significant ($p < 0.01$).

Smoking near the children at home (in the same room) (passive smoke exposure) was examined; and it was determined that while 62% of the parents of children with SOM were smoking near them, this rate was 38% among normal children (Table 6). In children, whose parents were smoking in the same room with them, at home; 71% were having SOM and in children, whose parents were not smoking in the same room with them, at home; 55% were having SOM. A statistically significant association was found between the presence of SOM and passive cigarette smoke exposure ($p < 0.01$).

4. Discussion

Serous Otitis Media is the most common disease in childhood requiring medical and surgical treatment. In this period of childhood when the children begin to adapt the environment and learn to speak

Table 2

Distribution of fathers according to smoking status among children with SOM and healthy controls ($p > 0.05$).

Smoking (father)	Children with SOM	Healthy controls	Total
Smoke (+)	34 (62%)	21 (38%)	55 (100%)
Smoke (-)	41 (58%)	29 (42%)	70 (100%)
Total	75 (60%)	50 (40%)	125 (100%)

Table 3

Distribution of parents according to smoking status at home among children with SOM and healthy controls ($p < 0.01$).

Smoking in house	Children with SOM	Healthy controls	Total
Smoke (+)	51 (68%)	24 (32%)	75 (100%)
Smoke (-)	24 (48%)	26 (52%)	50 (100%)
Total	75 (60%)	50 (40%)	125 (100%)

Table 4

Distribution of parents' smoking areas at home among children with SOM and healthy controls ($p < 0.01$).

Smoking areas at house	Children with SOM	Healthy controls
Living room	31 (41%)	18 (36%)
Kitchen	19 (25%)	7 (14%)
Toilet-bathroom	9 (12%)	3 (6%)
Balcony-garden	16 (22%)	27 (54%)
Children bedroom	0	0
Total	75	50

Table 5

Distribution of fathers and mothers number of smoked cigarettes at home children with SOM and normal children ($p < 0.01$).

The number of smoked cigarettes at home	Children with SOM	Healthy controls
1–5	24 (35%)	10 (42%)
6–10	30 (44%)	8 (33%)
> 10	13 (21%)	6 (25%)
Total	67 (100%)	24 (100%)

Table 6

Distribution of fathers and mothers smoking the children with SOM and normal children ($p < 0.01$).

Smoking near the children	Children with SOM	Healthy controls	Total
Smoke (+)	47 (71%)	19 (39%)	66 (100%)
Smoke (-)	38 (55%)	31 (45%)	69 (100%)
Total	75 (60%)	50 (40%)	125 (100%)

properly, the deterioration of auditory functions related to SOM can lead to social incompatibilities and disruptions in education and training. Smoking by parents or other members of the family and consequently children's exposure to cigarette smoke at home is highly important to control and prevent. The social damages of smoking, which is one of the underlying risk factors of many chronic diseases, are increasingly being demonstrated. As information about smoking studies and their results increased, anxiety was also felt for those who were exposed to passive cigarette smoke. According to the World Health Organization (WHO), the prevalence of smoking in the world is still around 20–25%, indicating that the number of passive smokers is also very high. Unfortunately, children are the mostly affected group by this condition and are known to be more vulnerable to cigarette smoking. Exposure to cigarette smoke caused the way for many important diseases [1,2]. In many studies; it is reported that lower respiratory tract infections, middle ear effusion, allergy, asthma, sudden infant death are seen more commonly in children exposed to cigarette smoke at home. It is clear that children who were exposed to smoke at home are at risk because of the high rate of smoking in community. In addition to health risks, one of the most important effects of passive smoke exposure on children is its inducing smoking in later years. Yüksel et al. reported that 74.6% of the children who were passive smoke exposures become active smokers in their adulthoods and 65.9% of them smoke near the children [19]. In their study, Liao et al. found that two-thirds of

mothers and fathers who smoke also smoke near their children [20]. In another study in China, it was found that 48.3% of children were exposed to cigarette smoke at home and 76.5% of family members who smoke were also smoking near the children [21]. In another study conducted in the UK, it was found that 54% of the participants had at least one smoker at home and 42% of the smokers smoked while they were with children [22]. Bildik and colleagues reported that smokers were smoking in all parts of the family living at home, but showed that they take care not to smoke in children's rooms [23]. In our study, also smokers reported that they were not smoking in children's rooms.

In the studies, many mechanisms have been mentioned about how middle ear diseases occur in children exposed to cigarette smoke. Accordingly, cigarette smoke directly changes the quality and quantity of surface mucus, disrupting the coordination of ciliary activity in the epithelium of the respiratory tract, middle ear and eustachian tube. Indirectly, chemical irritation leads to obstruction of the eustachian tube or influences the immune system, paving the way for bacterial and viral infections [3–6]. Agius et al. found a significant decrease in the activity of middle ear ciliary activity of children exposed to cigarette smoke and stated that ciliary dysfunction due to passive smoke exposure plays a role in the etiopathogenesis of SOM [11]. We found a significant association between passive smoke exposure and the presence of SOM in children. Moreover, the number of cigarettes smoked by the parents was also significantly higher in children with SOM. In most of the studies, it was stated that there was a relationship between passive smoke exposure and Upper Respiratory Tract Infection (URTI), and frequent URTIs may occur in children exposed to home cigarette smoke, and thus it was a risk factor for AOM. The risk of effusion was increased and the ear discharge was more difficult to recover in children exposed to cigarette at home [7–10]. In a study by Naini et al. that investigated the families of children with AOM, 34.4% of children with AOM had a history of smoking in the family and the rate was 19.3% in the control group.

In our study, the association between SOM and smoking of the family members was not statistically significant ($p > 0.05$). The child must be in the same environment with the family members who smoke in order to passively expose to cigarette smoke. This situation is attributed to the fact that although most of the families smoke, they take care not to smoke with their children at home. When we examined whether or not smoking with the child, we found that the relationship between smoking in the same environment and SOM was statistically significant ($p < 0.01$). Similarly the exposure of the child to cigarette smoke in the same environment increases according to the amount of cigarettes smoked, the risk of SOM increases. This result; is consistent with the view that passive cigarette smoke exposure plays a role in the pathogenesis of SOM [12–16]. In addition to these findings, there are studies showing that there is no relationship between SOM and cigarette smoke exposure [17,18]. However, these data is not recent and pathogenetic mechanisms are not analyzed in those studies.

There are some limitations of the study that should be mentioned.

First is the low number of patients included in the study, to perform a general conclusion. Second, the assessment of the time parents spent with the child was not performed. In conclusion, passive smoke exposure is an important health problem and poses a risk for SOM in children. Therefore, the families of children should be informed about the importance of the disease, and should be warned about smoking as a preventable risk factor. Larger prospective studies are warranted to determine the exact role of passive smoke exposure in the future lives of children.

Therefore, the families of children should be informed about the importance of the disease, family should be warned about smoking as a preventable risk factor and they should be allowed to quit smoking.

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