Profile of Adults with Acute Suppurative Otitis Media: An insight for primary care providers.

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ABSTRACT:

Objective: To evaluate the clinical profile and determine the risk factors associated with acute suppurative otitis media among adults presenting to the outpatient section of the Otorhinolaryngology department with recent onset ear symptoms.

Methodology: This hospital-based analytical cross-sectional study was conducted in the Otorhinolaryngology outpatient department of Niazi Welfare Foundation Teaching Hospital, Sargodha, between April 2025 and March 2026. Adults aged ≥18 years presenting with recent-onset ear symptoms (≤2 weeks) were consecutively enrolled. A detailed clinical history followed by otoscopic examination was performed to confirm the diagnosis of acute suppurative otitis media (ASOM). Binary logistic regression analysis was applied to identify independent predictors, with odds ratios (ORs) and 95% confidence intervals (CIs) reported. Statistical significance was set at a p-value ≤0.05.

Results: Among 305 participants, 73 (23.9%) were diagnosed with ASOM. Logistic regression analysis identified smoking, nasal pathologies, history of recurrent ear infection, self-induced Valsalva maneuver and recent air travel are recognized as independent predictors of ASOM (p≤0.05).

Conclusion: Strengthening primary healthcare capacity for recognition of aforementioned risk factors may promote timely diagnosis and referral, consequently disease burden and preventing long-term complications will be prevented.

Keywords: Earache, Eustachian Tube, Hearing loss, Otitis Media, Mastoiditis, Tympanic membrane, Valsalva maneuver.

Cite as: Hussain J, Sadiq SM, Mirza F. Profile of Adults with Acute Suppurative Otitis Media: An insight for primary care providers. J Muhammad Med Coll. 17(1) May-October 2026

Introduction:

Acute suppurative otitis media (ASOM) refers to the acute inflammation of the mucosa overlying the middle ear cleft, marked by accumulation of purulent effusion.[1] It is characterized by rapid onset of earache, decreased hearing, accompanied by constitutional symptoms like fever and malaise. Clinical signs include a congested or bulging tympanic membrane, along with mastoid tenderness.[2] The commonly isolated causative bacteria include Streptococcus pneumoniae, Moraxella catarrhalis, and Haemophiles influenzae.[3] Pathogenesis of ASOM is largely linked to Eustachian tube (ET) dysfunction, which allows infections from neighboring structures like the nose, paranasal sinuses, and throat to reach the middle ear (M.E.).[4] If untreated, ASOM can lead to complications such as mastoiditis, facial nerve palsy, labyrinthitis, mastoid abscess, or, in extreme cases, intracranial infections like meningitis or brain abscess.[5]

Release of pus due to spontaneous rupture of tympanic membrane may resolve symptoms but can also predispose to chronic otitis media and long-term hearing loss.[6]

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Received: August 2026.
Accepted: October 2026

Early management involves institution of systemic antibiotics, Eustachian tube aeration, and treatment of adjacent infections, while surgical intervention may be required in complicated cases.[1,3,4] In a primary care-based cohort, Rijk et al.[7] reported an adult incidence of 5.3/1000 person-years, decreasing with age (7.1 in patients 15-39 years of age). Despite its clinical significance, adult ASOM remains under-researched, and most evidence is pediatric focused.[8]

Adults with recent onset ear pain commonly present first to primary care, where timely recognition is essential to prevent complications. This study aimed to provide primary care providers with evidence on the clinical profile and risk factors of adult ASOM, guiding early diagnosis, rational antibiotic use, and timely referral decisions. Understanding these patterns can optimize patient outcomes, reduce unnecessary investigations, and prevent progression to severe complications, highlighting the importance of adult ear care at the frontline level.

Objective:

To evaluate the clinical profile and determine the risk factors associated with acute suppurative otitis media among adults presenting to the outpatient section of the Otorhinolaryngology department with recent onset ear symptoms.

Methodology:

This hospital-based analytical cross-sectional study was conducted at the Otorhinolaryngology outpatient department at Niazi Welfare Foundation Teaching Hospital, Sargodha, from 1st April 2025 to 31st March 2026. All the adults ≥18 years presenting with recent onset ear symptoms (≤ 2 weeks), including ear pain along with dull hearing were eligible for inclusion. Patients with chronic ear disease (≥ 3 months), permanent perforation of tympanic membrane,

history of ear surgery and severe immunocompromised states were excluded.

In the absence of recent regional data, a moderate and clinically meaningful association was assumed (odds ratio [OR] = 3.0), with an exposure prevalence of 20%. Using the two-proportion formula, a sample size of 61 ASOM cases was required to achieve 80% statistical power at a 5% significance level. Assuming a 20% prevalence of ASOM among symptomatic adults, approximately 305 adults needed to be recruited to obtain the desired number of ASOM cases.

All eligible participants were recruited through consecutive sampling after obtaining informed consent. Data were collected using a structured proforma, which included demographic details, clinical symptoms, history of ENT pathology, smoking status, systemic comorbidities, recent air travel, and recurrence of the same condition. Otoscopic examination was performed by a senior consultant in Otorhinolaryngology to confirm the diagnosis. Acute suppurative otitis media (ASOM) was clinically defined as the presence of acute-onset (≤2 weeks) ear symptoms, such as severe otalgia and/or subjective conductive hearing loss,[9] accompanied by objective otoscopic and microscopic evidence of middle ear inflammation and suppuration.[2] Diagnostic criteria included visualization of a bulging, erythematous tympanic membrane with loss of normal anatomical landmarks.[10] The suppurative nature of the condition was confirmed by the presence of visible purulent middle ear effusion or purulent otorrhea through a spontaneous tympanic membrane perforation. Participants not fulfilling these criteria were classified as non-ASOM cases.

Data were analyzed using SPSS version 25. The Shapiro-Wilk test was applied to assess the normality of the continuous variable (age). For non-normally distributed data, the median with interquartile range (Q1-Q3) was reported. Categorical variables were summarized as frequencies and percentages. Binary logistic regression analysis was performed to identify factors independently associated with acute suppurative otitis media (ASOM), with results expressed as adjusted odds ratios (aORs) and 95% confidence intervals (CIs). Statistical significance was defined as a p-value ≤0.05.

Results:

Out of 305 participants, 73 (23.9%) cases were clinically diagnosed as cases of ASOM while rest of the 232(76.1%) cases were diagnosed with other causes of ear pain and results are shown in table 1Binary logistic regression analysis indicated that the overall model containing the selected predictors was statistically significant in predicting ASOM status ($\chi^2(9) = 160.667$, $p <$ 0.001). The model demonstrated strong explanatory power, as reflected by Cox & Snell $R^2 = 0.409$, Nagelkerke $R^2 = 0.614$, and a −2 log-likelihood value of 175.030. The Hosmer-Lemeshow goodness-of-fit test ($\chi^2(8) = 6.930$, $p = 0.544$) confirmed that the model was well calibrated. Age emerged as a significant predictor (aOR = 0.936, 95% CI: 0.880-0.996, p = 0.036), indicating that ASOM was more commonly observed among younger individuals compared to older age groups. The categorical variables independently associated with ASOM are depicted in table 2.

Gender (male vs. female; OR = 1.618, p = 0.345), residential region (urban vs. rural; OR = 0.837, p = 0.690), and the presence versus absence of throat pathology (OR = 0.693, p = 0.554) were not significantly associated with acute suppurative otitis media (ASOM).

Table No1: Descriptive analysis of study variables: ASOM* versus Non- ASOM* cases (n=73 versus 232)

Study variables	ASOM* (n=73)	Non-ASOM* (n=232)
Median age (IQR?)	22.0(19-26.50)	24.5(20.0-33.0)
Gender distribution		
Male	61 (83.6%)	173 (74.6%)
Female	12 (16.4%)	59 (25.4%)
Residential area		
Rural	23 (31.5%)	84 (36.2%)
Urban	50 (68.5%)	148 (63.8%)
Smokers	38 (52.1%)	71 (30.6%)
Nose pathology	48 (65.8%)	28 (12.1%)
Throat pathology	14 (19.2%)	12 (5.2%)
Habitual Valsalva	29 (39.7%)	13 (5.6%)
Recent air-travel	18 (24.7%)	4 (1.7%)
H/O recurrence	22 (30.1%)	3 (1.3%)
Comorbid	5 (6.8%)	9 (3.9%)

ASOM: Acute suppurative otitis media*
IQR?: Interquartile range Q1-3

Table No 2: Categorical variables independently associated with ASOM* occurrence as per binary logistic regression analysis (n = 73)

Study Variable	Comparison Group	OR*,**	p-value	95% CI^
Smoking	Yes vs @ No	0.394	0.024	0.175 - 0.885
Nasal pathology	Present vs @ Absent	0.082	<0.001	0.036 - 0.186
Valsalva maneuver	Yes vs @ No	0.123	<0.001	0.047 - 0.327
Air travel	Yes vs @ No	0.046	<0.001	0.009 - 0.237
Recurrence	Yes vs @ No	0.014	<0.001	0.002 - 0.093

ASOM: Acute suppurative otitis media, OR*,**: Odds ratio, CI^: Confidence interval vs@: Versus*

Discussion:

The present study highlights that acute suppurative otitis media (ASOM) continues to be a substantial contributor to otological morbidity among adults, accounting for nearly one-quarter of all diagnosed cases (23.9%) in this cohort. Although the association was statistically insignificant (p > 0.05), a greater proportion of cases originated from urban

regions (68.5%). These findings closely align with a Karachi-based study that reported a 24% prevalence of ASOM, with 62% of participants residing in industrial zones.[11] This parallel suggests that environmental pollution and urban living conditions may exert a significant influence on ear health. In this study, clinical trend showed the higher frequency of younger adults and male gender but none of these variables reached statistical significance ($p > 0.05$), to classify as independent risk factors in this cohort. Taha et al. retrospectively analyzed equal numbers of both genders and reported a young age profile (male 27.53 ± 6.19, female 27.68 ± 6.21 years; $p = 0.69$).[12] An Indonesian study recorded the presence of males as 65.7%, while adult cases of ASOM in their cohort constituted up to 34.3% cases.[13] Collectively, these demographic patterns may suggest higher exposure to environmental pollutants, occupational risk factors, and infectious triggers, subjective to greater social activity levels among younger and male participants.[14]

The present study further evident that smoking has significant association ($p=0.024$) with ASOM consistent with findings of Binkhamis et al. who recorded 1.28 OR in Cigarette smoking and 2.77 ORR in shisha smoking.[15] Scientific evidences suggest that cigarette smoke induces goblet cells proliferation and mucus hypersecretion in the ET, causing mucosal irritation and mucociliary dysfunction that impair M.E. drainage and ventilation, thereby increasing susceptibility to bacterial colonization and M.E. infection.[16] This set of data identified nasal pathologies ($p < 0.001$) as the strongest predictor of ASOM in adults, in contrast to throat pathologies ($p > 0.05$), underscoring the primary role of nasal obstruction caused by a variety of conditions (Table II) in impairing ET function. The resulting 'vacuum effect' and the retrograde spread of secretions contribute to ASOM pathogenesis.[17] Islam, M. Z et al.[18] in their study cohort evident that all cases with various nasal or nasopharyngeal obstructive diseases resulted in conductive hearing loss in 100% of participants, indicating a substantial burden of M.E. disease in nasal pathologies.

In this cohort, people who attempted Valsalva maneuver at home, an attempt to unclog their ears, had higher trends for developing ASOM. A forceful Valsalva maneuver performed during an upper respiratory tract infection can drive contaminated nasopharyngeal secretions retrogradely into the middle ear via the ET, facilitating the onset of M.E. disease.[19] Similarly reported by Alshehri et al., performing the Valsalva maneuver in the presence of a malfunctioning ET demonstrated the OR = 1.78 and regression coefficient $\beta = 0.65$, indicating a significant synergistic effect on OM recurrence.[20] Another significant predictor in the present study was recent air travel ($p<0.001$), as rapid changes in ambient air pressure can create negative M.E. pressure[21] and challenge ET function, facilitating fluid accumulation or retrograde pathogen entry.[22] Notably, in this research, a history of recurrence showed a noteworthy ($p<0.001$), emphasizing that prior middle ear disease strongly predisposes individuals to subsequent episodes,[23] suggesting the need for a thorough ENT examination to identify and address possible underlying causes possibly inducing a substantial degree of subclinical inflammation.[24]

A low prevalence of comorbidities (diabetes mellitus and hypertension) was observed in this cohort (6.85%), which may be attributable to the hospital-based, cross-sectional design and the relatively small sample size. To minimize sparse data bias and avoid unstable parameter estimates, this variable was excluded from the logistic regression analysis. In contrast, Kui et al.[25] reported a significant association between type II diabetes and ASOM (OR = 1.07). The hospital-based outpatient setting, limited sample size, and cross-sectional design restrict the generalizability of our findings and preclude causal inference regarding the identified risk factors. Future multicenter longitudinal studies with larger sample sizes are warranted to validate and extend these observations.

Conclusion:

The commonly identified risk factors of ASOM in adults are potentially recognizable within routine clinical practice. Strengthening the capacity of primary healthcare providers through targeted training is essential for early detection, timely referral to specialist services, and prompt initiation of appropriate management. Such measures can substantially reduce the disease burden and help prevent long-term complications associated with ASOM.

ETHICAL APPROVAL

Before the study, approval was obtained from the ethical review committee with reference number NWFTH-ERC/14-25, received on 29th March 2025.

CONFLICT OF INTEREST

Declared none.

FUNDING

None.

ACKNOWLEDGEMENTS

Nil

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Authors' Contribution	
Junaid Hussain	Study conceptualization, critical review of the manuscript
Sana Muhammad Sadiq	Data collection and assembly and statistical analysis
Furqan Mirza	Drafting of manuscript and statistical review
All authors read and approved the final manuscript.	