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The Relationship between the Incidence of Acute Otitis Media in Patients with Upper Respiratory Tract Infections at PKU Muhammadiyah Yogyakarta Hospital

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ABSTRACT

Acute Otitis Media (AOM) is an inflammation of the middle ear caused by blockage of the Eustachian tube, impaired immune factors, and recurrent Upper Respiratory Tract Infections (URTI). The highest incidence of AOM can be found in developing countries. Among the numerous cases, 70% of AOM cases begin witha history of URTI. As a result of URTI history, congestion, and swellingoccur in the nasal mucosa, nasopharynx, and eventually the Eustachian tube, leading to the development of AOM symptoms. The purpose of this study is to determine the relationship between the occurrence of acute otitis media and patients with upper respiratory tract infections at PKU Muhammadiyah Yogyakarta Hospital. This study is descriptive-analytical quantitative research with a cross-sectional design and retrospective study. Data collection was conducted through the collection of secondary data obtained from medical records of otitis media patients. This research was conducted from November to December 2022 at PKU Muhammadiyah Yogyakarta Hospital. The research subjects consisted of 113 individuals with otitis media. This study reports the analysis of the relationship between the occurrence of acute otitis media and patients with upper respiratory tract infections. There is no significant relationship between AOM and URTI among patients at PKU Muhammadiyah Yogyakarta Hospital, with a p-value of 0,457. There is no relationship between the occurrence of acute otitis media and patients with upper respiratory tract infections at PKU Muhammadiyah Yogyakarta Hospital

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INTRODUCTION

Acute Otitis Media (AOM) is an inflammation in the middle ear caused by blockage of the Eustachian tube, immune system disorders, and recurrent upper respiratory tract infections. Bacteria such as Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis are the main causes of AOM[1]. Generally, otitis media can occur in all age groups, but it is more common in children aged 6 months to 3 years[2]. About 80% of children will experience at least one episode of Acute Otitis Media (AOM), and between 80%-90% will have at least one episode of Otitis Media with Effusion (OME) before school age[3]. Otitis media can occur in teenagers and adults, although its incidence is lower. Approximately 3%-15% of patients with OM seeking ENT medical treatment are adults[2].

In developing countries, the majority of cases of AOM can easily be found. One of the contributing factors to this issue is the lack of public awareness regarding the importance of maintaining ear and respiratory health. Additionally, another cause is that society tends to underestimate personal hygiene[4]. Standardized data on the prevalence of AOM in Indonesia have yet to be obtained. Previous research evidence, such as a 2013 study at Immanuel Hospital Bandung, revealed variations in the occurrence of Acute Otitis Media (AOM). AOM was found to be more common in males (52%), children whose mothers were homemakers (48.1%), and toddlers (40.4%) in that study. Furthermore, data on AOM can be found in a 2015 study conducted at the ENT-KL Clinic of Dr. M. Djamil Padang Regional General Hospital. The study included 192 AOM patients, with the highest incidence among those with a history of Upper Respiratory Tract Infection (URTI) (85.9%), occurring during the rainy season (65.6%), presenting with otalgia complaints (57.3%), male gender (56.3%), unilateral occurrence in the erythematous stage (46.7%), bilateral erythematous-erythematous stage (36.8%), and ages 6 - 12 years (30.7%)[5].

Out of the many cases, as many as 70% of AOM cases begin with a history of Upper Respiratory Tract Infection (URTI). In addition to infections in the upper respiratory tract, infections can also occur in the lower respiratory tract. Acute Respiratory Tract Infection (URTI) starts from the nasal passage and involves the vocal cords in the larynx, as well as the paranasal sinuses and the middle ear. The history of URTI leads to congestion and swelling of the nasal and nasopharyngeal mucosa, extending to the Eustachian tube. This occurrence then leads to blockage of the Eustachian tube, causing the accumulation of secretory fluid in the middle ear. Consequently, secondary infection in this effusion triggers the onset of suppuration and signs of AOM[4].

Until now, Acute Respiratory Tract Infection (URTI) remains a significant issue in Indonesia. It is known that complications from URTI are more dangerous than the infection itself. This is

because it can lead to sinus and middle ear infections, especially in children[6]. Based on preliminary study conducted at PKU Muhammadiyah Yogyakarta Hospital; 122 individuals were identified as outpatient cases diagnosed with otitis media. The data was recorded from January 1, 2021, to June 30, 2022. The number of cases remains relatively high as occurrences of AOM. This has prompted researchers to conduct a study at PKU Muhammadiyah Yogyakarta Hospital. In addition to the continued high incidence of AOM due to complications from URTI, another issue, particularly the high cost of surgery in Indonesia and the limited research on the relationship between these cases, has piqued the interest of researchers to address this topic.

METHODS

The population in this study consisted of outpatient otitis media patients who visited the Polyclinic of PKU Muhammadiyah Yogyakarta Hospital from January 1, 2021, to June 30, 2022, totaling 122 individuals, obtained through a total sampling technique. This research employed a descriptive-analytic method with a cross-sectional study design aimed at analyzing the relationship between the occurrence of acute otitis media and upper respiratory tract infection patients at PKU Muhammadiyah Yogyakarta Hospital.

Data collection was carried out through the collection of secondary data sourced from the medical records of otitis media patients at PKU Muhammadiyah Yogyakarta Hospital. The inclusion criteria for this study are as follows outpatient visiting the Polyclinic of PKU Muhammadiyah Yogyakarta Hospital, patients diagnosed with otitis media, and otitis media patients with complete medical record data. The exclusion criteria for this study are as follows otitis media patients with medical record lacking data related to the variables under investigation, otitis media patients with a history of diabetes mellitus, otitis media patients with a history of hypertension, and otitis media patients with a history of asthma. The obtained data was then analyzed using bivariate analysis by calculating the frequency and percentage of predetermined variables, namely the AOM and URTI variables. The next step involved analysis using the chi-square test. The calculation results were presented in the form of data presentation tables and descriptions of the findings contained therein using data processing software, specifically Statistical Package for Social Sciences (SPSS) version 26. This study obtained research ethics committee approval from the Ethics Committee of PKU Muhammadiyah Yogyakarta Hospital.

RESULTS

Based on the collected data from outpatient visits at PKU Muhammadiyah Yogyakarta Hospital,a total of 113 individuals were found to be suffering from otitis media, with 53 of them diagnosedwith Acute Otitis Media (AOM). The data was gathered through a secondary source, namely medical records. The comprehensive findings of the conducted research are as follows:

Characteristics of Research Subjects

Table 1. Frequency Distribution of Patient Data Based on Gender and Age

Gender	Frequency (n)	Percentage (%)
Male	41	36.3
Female	72	63.7
Age		
Toddlers < 6 years	8	7.1
Children 6-18 years	25	22.1
Adults > 18 years	80	70.8
Total	113	100.0

From Table 1, out of the 113 individuals suffering from otitis media, it is known that the largest frequency distribution is among female patients, totaling 72 individuals (63.7%), and those who are adults (>18 years old), amounting to 80 individuals (70.8%).

Table 2 shows out of the 113 individuals suffering from otitis media, it was found that 53 patients had Acute Otitis Media (AOM), with the highest frequency distribution among them being as follows: 37 werefemale (69.8%), 29 were adults (>18 years old) (54.7%), 23 had a high school education (43.4%), 36 were unemployed (67.9%), and 44 had no health insurance (83.0%).

Bivariate Analysis

The collected data on the relationship between AOM and URTI in patients at PKU Muhammadiyah Yogyakarta Hospital was conducted by categorizing AOM into AOM and non-AOM, and URTI into URTI and non-URTI.

Table 2. Frequency Distribution of Acute Otitis Media Patients Based on Gender, Age, Education Level, Profession, and Health Insurance

Gender	Frequency	Percentage

	(n)	(%)
Male	16	30.2
Female	37	69.8
Age		
Toddlers < 6 years	8	15.1
Children 6-18 years	16	30.2
Adults > 18 years	29	54.7
Education Level		
Non formal education/incomplete elementary school	14	26.4
Elementary school	5	9.4
Junior high school	3	5.7
Senior high school	23	43.4
Diploma	2	3.8
Bachelor's Degree	6	11.3
Postgraduate Degree	0	0.0
Profession		
Entrepreneur	10	18.9
Homemaker	4	7.5
Teacher/ Lecturer	0	0.0
Worker	2	3.8
Civil servant	1	1.9
Unemployed	36	67.9
Health Insurance		
No health insurance	44	83.0
National Health Insurance	3	5.7
Hospital insurance	4	7.5
Contractual	2	3.8
Total	53	100.0

Table 3. Relationship between the Incidence of Acute Otitis Media and Upper Respiratory Tract Infection Patients at PKU Muhammadiyah Yogyakarta Hospital

Acute Otitis Media	Upper Respiratory Tract Infection				*Total*		*Chi-square*
	URTI		*Non-URTI*				
	n	***%***	***N***	***%***	***n***	***%***	
AOM	46	86.8	7	13.2	53	100.0	
Non-AOM	49	81.7	11	18.3	60	100.0	0.457
Total	95	84.0	18	16.0	113	100.0	

Out of the patients diagnosed with AOM, 46 individuals were confirmed to have URTI, while 7 individuals were confirmed to be non-URTI. Among the non-AOM patients, 49 individuals werediagnosed with URTI, and 11 individuals were confirmed to be non-URTI. The result of the analysis of the relationship between AOM and URTI in patients at PKU Muhammadiyah Yogyakarta Hospital was obtained by entering the sample categories into a 2x2 contingency table. From the data analysis, it was found that the p-value is 0.457 (>α 0.05), indicating that the null hypothesis is rejected. This means that there is no significant relationship between the incidence of acute otitis media and upper respiratory tract infection patients at PKU Muhammadiyah Yogyakarta Hospital.

DISCUSSION

The research results indicate that the majority of acute otitis media patients at PKU Muhammadiyah Yogyakarta Hospital are adults (>18 years old), totaling 29 individuals (54.7%). Meanwhile, acute otitis media patients who are toddlers amounted to only 8 individuals (15.1%), and children aged 6-18 years amounted to 16 individuals (30.2%). Similar findings were reported in the study by Astuti[4], which stated that AOM patients are more prevalent in the adult (>18 years old) age group. The study mentioned that the likelihood of AOM patients being more prevalent in the adult (>18 years old) age group is due to the progression of AOM cases, which are generally more severe in adults compared to children. This is because children usually show improvement with specialized care without needing specific types of antibiotics, except in cases with other indications. Another possibility is that toddlers or children have already undergone treatment with a pediatric specialist or at another healthcare facility such as a health center (Primary Health Care Center).

Similar results were also obtained from the research conducted by Rizka Dwi Lestari, and Zulhafis Mandala[7], which states that AOM patients are more commonly found in the adult (>18 years old) age group. The study mentions that the high incidence of AOM in adults is estimated to

occur due to several factors, including smoking activities, both active and passive smokers, as well as otitis-prone individuals. Smoking habits and frequent exposure to cigarette smoke have also been studied to contribute to the occurrence of AOM among adults, especially passive smokers. In reality, cases of AOM in adults tend to occur repeatedly (in otitis-prone individuals), even since childhood. After intensive examination, it turns out that these individuals have a hypotonic Eustachian tube, known as a Patulous Eustachian Tube. The definitive etiology of this disorder is not yet clearly understood, but its specific manifestation is a decrease in the tone of the tensor veli palatine muscle in the Eustachian tube, causing it to tend to remain open. This, in turn, allows invading pathogens to more easily move from the nasopharynx and Eustachian tube to the middle ear, triggering upper respiratory tract infections. On the other hand, detecting this disorder is generally difficult in children. Other studies mention that the incidence of this disorder is more commonly detected in adults, ranging from 0.3% to 6.6%, and is very rarely detected in children. Therefore, this also contributes to the relatively higher number of cases in adults.

The differing results from the research by Yuniarti, Triola, and Fitriyasti[5] indicate that infants aged 0-5 years are more prone to experiencing acute otitis media at a rate of 19%. The age range of infants carries a 2.46 times higher risk of experiencing acute otitis media compared to other age groups. In infants and children, there are several factors contributing to the increased cases of acute otitis media. One of these factors is the shorter and flatter Eustachian tube, making it easier for upper respiratory infections to spread to the middle ear. Physiological function and immune systems in infants and children are still low and in a developmental stage. Furthermore, the adenoid factor also plays a significant role in the immune system of children. The adenoid, located in the upper throat, has a greater role in children compared to adults. Due to its proximity to the Eustachian tube opening, enlarged adenoids can obstruct the Eustachian tube. Adenoids themselves can also become infected, and this infection can spread to the middle ear through the Eustachian tube. These three factors collectively make infants and children more susceptible to infections.

Different results were also obtained from the research conducted by Utomo and Siregar[8], who found that the highest incidence of acute otitis media was observed in children aged 1-3 years, accounting for 60%. The cause of this increased incidence of acute otitis media is due to the Eustachian tube in infants having a shorter length, larger width, and a more horizontal position compared to adults. This allows bacteria from the nasopharynx to enter the middle ear cavity more easily, facilitating the occurrence of acute otitis media. By the age of 7, the shape of the Eustachian

tube in children is similar to that of adults, leading to a reduced occurrence of acute otitis media. The Eustachian tube plays roles as a pressure regulator (ventilation), protector, and drainer (drainage).

In the previous study, a comparison was made between the Eustachian tube function in children and adults. Based on this research, it was found that 35.8% of children could not stabilize negative pressure in the middle ear, whereas only 5% of adults exhibited the same condition. The ability to stabilize negative pressure in the Eustachian tube indicates the potential to prevent fluid reflux from the nasopharynx to the middle ear. The conclusion drawn from this study states that the Eustachian tube function is better in children aged 7-12 years compared to those aged 3-6 years, and this function improves further with increasing age. As the Eustachian tube function improves, it indicates a reduced potential for occurrences of Otitis Media with Effusion (OME).

PKU Muhammadiyah Yogyakarta Hospital reported that the differing results from the previous study might be attributed to the fact that some patients visited the Pediatric Clinic, where they were identified solely based on respiratory infection symptoms, while it is highly likely that they were also suffering from Otitis Media with Effusion (OME). However, if patients were to visit the Ear, Nose, and Throat (ENT) Clinic, the diagnosis of OME could likely be established with greater accuracy.

The research results indicate that the majority of acute otitis media patients at PKU Muhammadiyah Yogyakarta Hospital are female, totaling 37 individuals (69.8%). Meanwhile, male patients with acute otitis media amounted to 16 individuals (30.2%). Similar findings were obtained from the study by Astuti[4], which reported that the gender distribution among Acute Otitis Media (AOM) patients consists of 49% male and 51% female. This demonstrates that there is a higher number of females affected by AOM compared to males. Gender is likely not influential in terms of Eustachian tube patency in infection occurrence, nor does it affect the risk of an individual contracting AOM. Another possibility is that the risk of developing AOM in both males and females could be influenced by how frequently an individual is exposed to cigarette smoke or other air pollutants, both actively and passively, as well as residing or working in industrial areas. Toxins present in cigarettes and industrial smoke can damage the cilia in the respiratory tract and disrupt the airway clearance process. Consequently, this can make an individual more susceptible to infections, thereby increasing the risk of AOM. Similar findings were also obtained in the research by Yuniarti, Triola, and Fitriyasti[5], which stated that a higher percentage of females (55.6%) were affected by acute otitis media incidents.

Differing results were obtained from the research conducted by Rizka Dwi Lestari and

Zulhafis Mandala[7], who reported that the gender distribution among AOM patients was 84% male and 59% female. This study indicated that males have a greater risk of developing acute otitis media compared to females. This association is related to factors such as smaller mastoid pneumatization in males, exposure to pollution, recurrent upper respiratory infections, and more frequent occurrences of trauma in males. Different results were also obtained from the research by Utomo and Siregar[8], which stated that the number of males suffering from Acute Otitis Media (AOM) was higher at 80% compared to females at 20%. Some studies report no significant difference in AOM incidence based on gender. However, a definite conclusion regarding AOM incidence based on gender is still uncertain.

The research results indicate that the majority of acute otitis media patients at PKU Muhammadiyah Yogyakarta Hospital have an educational level of incomplete primary school or no education, totaling 14 individuals (26.4%). This is followed by the highest percentage of acute otitis media patients with a high school education, comprising 23 individuals (43.4%). Similar findings were reported by the research conducted by Syahidi, Gayatri, and Bantas[9], which suggests that education can influence an individual's preventive behavior. Education can enhance an individual's understanding of health-related information, leading to increased awareness and proactive health check-ups. Education can also boost an individual's motivation, driving them to adopt healthier lifestyles. Therefore, the research results indicate a significant relationship between education level and the occurrence of Acute Otitis Media (AOM) in patients at PKU Muhammadiyah Yogyakarta Hospital.

The research results indicate that the majority of acute otitis media patients at PKU Muhammadiyah Yogyakarta Hospital choose not to use health insurance, totaling 44 individuals (83.0%). This demonstrates a connection between the choice of health insurance and socio-economic factors, which ultimately affect the occurrence of acute otitis media. Previous research conducted by Sari and Imanto[10] suggests that individuals from lower socio-economic backgrounds have a higher incidence of experiencing acute otitis media. Low socio-economic factors are closely related to conditions such as malnutrition, crowded living environments, substandard health levels, recurrent upper respiratory infections, and inadequate healthcare facilities. Favorable socioeconomic factors can influence a slightly lower incidence of recurrent Acute Otitis Media (AOM). This is likely due to better access to healthcare maintenance, leading to improved diagnoses of ear and other diseases. Similar findings are reported by the research conducted by Schilder et al.[11], which explains how socio-economic factors can influence the occurrence of acute

otitis media. This is particularly true in developing countries, where factors like malnutrition, contaminated water, poor hygiene, population density, human immunodeficiency virus infection, tuberculosis, malaria, and poor access to healthcare can increase the risk of chronicity and complications associated with AOM.

Various risk factors can influence the occurrence of Acute Otitis Media (AOM), including age, daycare attendance, breastfeeding, exposure to cigarette smoke, antibiotic use, history of previous ear infections, and the presence of other pathological abnormalities. Recent research also reports that craniofacial abnormalities such as cleft palate and trisomy 21 can increase the risk of middle ear disorders due to disruptions in the Eustachian tube. Additionally, atopic disorders like allergic rhinitis and asthma also serve as strong predictors for AOM. This can further increase the susceptibility to pneumococcal infections. The research also mentions that there is currently no definitive mechanism explaining the relationship between gender and the risk of AOM.

The Relationship between Acute Otitis Media Incidence and Upper Respiratory Tract Infection

Out of the patients with Acute Otitis Media (AOM), 46 individuals were diagnosed with Upper Respiratory Tract Infection (URTI), and 7 individuals were classified as non-URTI. Among the non-AOM patients, 49 individuals were diagnosed with URTI, and 11 individuals were classified as non-URTI. The analysis of the relationship between AOM and URTI in patients at PKU Muhammadiyah Yogyakarta Hospital was conducted by organizing the sample categories results into a 2x2 contingency table. The analysis of the data yielded a p-value of 0.457 (> α 0.05), leadingto the rejection of the alternative hypothesis, indicating that there is no significant relationship between the occurrence of acute otitis media and upper respiratory tract infection in patients at PKU Muhammadiyah Yogyakarta Hospital.

The same results were obtained from a study by Bandangan[12] titled "The Relationship between Acute Respiratory Tract Infection Risk Factors and the Incidence of Acute Otitis Media in Toddlers at PKU Muhammadiyah Yogyakarta Hospital." The similarity can be observed in the research type and design used, which is a descriptive-analytic approach with a cross-sectional design utilizing secondary data. Furthermore, the similarity extends to the research variables employed, with the independent variable being acute respiratory tract infection and the dependent variable being acute otitis media. The data analysis method used is also the same, involving a chi-square test to assess the relationship between acute respiratory tract infection risk factors and the occurrence of acute otitis media in toddlers. In terms of the analysis of the age-

related risk factors for AOM, this study yielded similar results, indicating that females are more prone to AOM compared to males. However, the study suggests that further research with larger sample size is necessary, as the sample size could potentially affect the percentage distribution of AOM occurrences based on gender.

The differing results from the study by Muhammady et.all[6] on "The Relationship between Upper Respiratory Tract Infections and Acute Otitis Media in Toddlers at Mangunreja Community Health Center, Tasikmalaya Regency" can be attributed to differences in population and subjects used in the research. The study focused on a population of toddlers seeking treatment at Mangunreja Community Health Center from March to May, totaling 27 individuals. Additionally, the differing results are evident in the sampling technique employed. In this study, purposive sampling was utilized. Furthermore, the differing results stem from the use of distinct basic data sources. The study utilized primary data obtaineddirectly from observations made by doctors at the health center during the visits of toddler patients to Mangunreja Community Health Center. Differences also emerge in the data analysis section, including the use of different data processing software, namely Statistical Package for Social Sciences (SPSS) version 22.

The differing results from this study are evident in the frequency distribution of toddler data based on age and gender. The highest frequency of respondents based on age falls within the age group < 1 year, comprising 14 individuals (51.9%), and based on gender, females constitute 17 individuals (63.0%). Furthermore, based on the data analysis of the relationship between upper respiratory tract infections (URTI) and acute otitis media (AOM), it was found that out of the toddlers diagnosed as positive for URTI, 13 individuals were also positive for AOM, while 3 individuals were negative for AOM. Moreover, among the toddlers diagnosed as negative for URTI, 10 individuals were also negative for AOM, and only 1 individual was positive for AOM. In the statistical test results using the chi-square test, a p-value of 0.001 (< α 0.05) was obtained. Therefore, the alternative hypothesis is accepted, indicating a relationship between upper respiratory tract infections in toddlers and acute otitis media.

Infants and children are prone to Acute Otitis Media (AOM) due to the characteristics of their Eustachian tubes, which are short, straight, and wide, and share the same mucosa between the middle ear and the upper respiratory tract. Additionally, other risk factors include increased frequency of Upper Respiratory Tract Infections (URTI), hyperplasia of Waldeyer's tonsillar ring, poor air circulation within the ear cavity, and variations in the immune system's general and mucosal reactions determined by genotype and phenotype. All these factors play a role in the risk

of AOM occurrence in infants and children.

Previous research conducted by Tasnee Chonmaitree[13] has indicated that various host and environmental factors significantly influence the risk of Acute Otitis Media (AOM). Host factors that increase the risk of AOM include young age, male gender, race and ethnicity, genetic factors, family history of AOM, craniofacial anomalies such as cleft palate, atopic conditions, immune deficiencies, Upper Respiratory Tract Infections (URTI), adenoid hypertrophy, and laryngopharyngeal reflux. On the other hand, environmental factors that increase the risk of AOM encompass low socioeconomic status, exposure to tobacco smoke, daycare attendance, and the use of pacifiers for infants.

In this study, there was no assessment of other risk factors that could influence the occurrence of Acute Otitis Media (AOM) in patients. According to the researchers' analysis, the multitude of risk factors contributing to AOM, both host-related and environmental factors, raises the possibility that the occurrence of AOM is not solely attributed to a history of Upper Respiratory Tract Infections (URTI). Other risk factors could also act as triggers for the onset of AOM.

CONCLUSION

Based on the results of the research conducted at PKU Muhammadiyah Yogyakarta Hospital in November to December 2022, it can be concluded that there is no significant relationship between the occurrence of Acute Otitis Media (AOM) and upper respiratory tract infection in patients at PKU Muhammadiyah Yogyakarta Hospital. First-level healthcare facilities should optimize promotive and preventive measures for patients and visitors, especially regarding the infectious disease Acute Otitis Media (AOM). Promotive and preventive actions can be carried out through health promotion using media such as posters, leaflets, brochures, and other means disseminated within the healthcare facility's environment. Furthermore, the importance of health screening related to signs and symptoms in patients suspected of having AOM cannot be overstated. This is primarily useful for early prevention of AOM, enabling doctors to make an early diagnosis and optimize comprehensive patient management. This minimizes the occurrence of undesired complications and may reduce the need for referrals to hospitals.

The PKU Muhammadiyah Yogyakarta Hospital is encouraged to enhance the completeness of medical record documentation to facilitate future research endeavors in examining the utilized variables. For medical students and researchers interested in pursuing this study further, it is hoped that they will conduct more in-depth research on other risk factors contributing to the occurrence of Acute Otitis Media (AOM) to reduce AOM prevalence in Indonesia. Furthermore, it

is advised to conduct further studies with a larger sample size, as the sample size can influence the percentage distribution of AOM occurrences based on a history of Upper Respiratory Tract Infections (URTI). To the public, it is encouraged to recognize the early signs and symptoms of URTI and AOM and seek medical attention promptly. This collective effort can contribute to a better understanding of AOM and aid in the development of preventive measures to reduce its impact.

REFERENCES

1. Gaddey HL, Wright MT, Nelson TN. Otitis Media: Rapid Evidence Review. *Am Fam Physician; Vol 100 No 6 Am Fam Physician*. Published online 2019.
2. Nazarudin N. Otitis Media Akut Dengan Komplikasi Mastoiditis Akut Dan Labirintitis Akut Pada Dewasa. *Med Kartika J Kedokt dan Kesehat; Vol 4 No 1 Med Kartika J Kedokt dan Kesehat*. Published online 2020.
3. Harmes KM, Blackwood RA, Burrows HL, Cooke JM, Van Harrison R, Passamani PP. OtitisMedia: Diagnosis and Treatment. *Am Fam Physician; Vol 88 No 7 Am Fam Physician*. Published online 2013.
4. Astuti DI. Profil Penderita Otitis Media Akut Di Rumah Sakit Umum Pusat Haji Adam Malik Medan Tahun 2010-2012. *Fak Kedokteran, Univ Sumatera Utara, Medan, Tahun 2013*. Published online 2014.
5. Yuniarti D, Triola S, Fitriyasti B. Prevalensi Otitis Media Akut Di Rs Islam Siti Rahmah Padang Tahun 2017. *Heal Med J; Vol 1 No 1 Heal Med J*. Published online 2019.
6. Insan Fakhri Muhammady, Endang Suherlan DS. Correlation Between Upper Respiratory Tract Infections and Acute Otitis Media In Toddlers At Mangunreja Primary Health Center Tasikmalaya. *Fak Kedokteran, Univ Islam Bandung; Vol 5 No 22 Fak Kedokteran, Univ Islam Bandung*. Published online 2019.
7. Rizka Dwi Lestari, Zulhafis Mandala M. Distribusi Usia Dan Jenis Kelamin Pada Angka Kejadian Otitis Media Akut Di Rumah Sakit Umum Daerah Abdul Moeloek Bandar Lampung Tahun 2016. *J Ilmu Kedokt dan Kesehat; Vol 5 No 1 JanuariJ Ilmu Kedokt dan Kesehat.* Published online 2018.
8. Utomo BS., Siregar FF. Profil Klinis Otitis Media Akut di Rumah Sakit Umum Universitas Kristen Indonesia. *Maj Kedokt UKI; Vol 34 No 1 Maj Kedokt UKI.* Publishedonline 2018.
9. Syahidi MH, Gayatri D, BantaS K. Faktor-Faktor Yang Mempengaruhi Kejadian Infeksi Saluran Pernapasan Akut (Ispa) Pada Anak Berumur 12-59 Bulan Di Puskesmas Kelurahan Tebet Barat, Kecamatan Tebet, Jakarta Selatan, Tahun 2013. *J Epidemiol Kesehat Indones*; *Vol 1 No 1 J Epidemiol Kesehat Indones*. Publishedonline 2016.
10. Sari MRN, Imanto M. Hubungan Perilaku Hidup Bersih Dan Sehat TerhadapOtitis Media Supuratif Kronik (Omsk). *Pendidik Dokter, Fak Kedokteran, Univ Lampung*; *Vol 9 No 1 Pendidik Dokter, Fak Kedokteran, Univ Lampung*. Published online 2020.
11. Schilder AGM, Chonmaitree T, Cripps AW, et al. Otitis Media. *Nat Rev Dis Prim; Vol 2 Nat Rev Dis Prim*. Published online 2016.
12. Bandangan AA. Hubungan Antara Faktor Risiko Infeksi Saluran Pernapasan Atas Dengan Terjadinya Otitis Media Akut Pada Balita di Rs Pku Muhammadiyah Yogyakarta. Published online 2020.
13. Johanna Nokso-Koivisto, MD, PhD, Tal Marom, MD, Tasnee, Chonmaitree M. Importance Of Viruses In Acute Otitis Media. *Physiol Behav; Vol 176 No 1 Physiol Behav*. Publishedonline 2016.