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Literature Review: The Relationship Of Upper Respiratory Tract Infections With Acute Otitis Media In Children

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ABSTRACT
Upper Respiratory Tract Infection is a common infection that occurs in the upper respiratory tract including the nose, paranasal sinuses, middle ear, pharynx, larynx and proximal part of the trachea. Upper Respiratory Tract Infection is one of the most frequent risk factors for the occurrence of Acute Otitis Media (AOM) in children due to anatomical factors, where in the middle ear development phase at childhood, the eustachian tube does have a horizontal position with minimal drainage compared to older age. This research method was carried out using a literature review by collecting various research journals and obtaining 5 samples of related research literature. This study concludes that there is a relationship between acute respiratory tract infections and acute otitis media in children.

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INTRODUCTION

Acute Respiratory Tract Infection is an infection that attacks the acute respiratory tract such as the nose, throat and lungs and can last up to approximately 14 days. 1 Acute Respiratory Infection is one of the problems that exists in developed and developing countries, this is due to the high number morbidity and mortality in toddlers. Children are a group that is vulnerable to experiencing ISPA, every child is estimated to experience an episode of ISPA every year. 2.3 Toddlers who are vulnerable to getting ISPA according to characteristics aged 12 to 23 months reach 9.4%. 4 Episodes of cough and cold are one of the one of the main causes of medical visits at community health centers and 15-30% of medical visits in outpatient and inpatient departments at hospitals. 2 Based on provincial health worker diagnosis data, the highest rate of ISPA in children under five was in Banten Province reaching 17.7% and the lowest in Maluku province. North reached 6%.

Based on its anatomical location, Acute Respiratory Tract Infections are classified into Upper Respiratory Tract Infections (ARI) and Lower Respiratory Tract Infections. 5,6 Upper respiratory tract infections include several parts of the anatomical structure, namely the nose, paranasal sinuses, middle ear, pharynx, larynx.

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The cause of ARI is viruses or bacteria, but the most common cause of ARI is viruses. These viruses include Rhinovirus, Parainfluenza, Coronavirus, Coxsackie, Adenovirus, Respiratory syncytial virus, and Influenza virus. The most common virus is rhinovirus. Meanwhile, the bacteria that often cause ISPA are Beta-hemolytic streptococci, Corynobacterium diphteriae, Streptococcus pneumonia, Haemophilus influenzae, Bordatella pertussis, Moraxella Catarrhalis. Bacteria can cause around 15% of pharyngitis symptoms that appear suddenly. The most common is S. pyogenes, a Group A streptococcus.5,8

Upper Respiratory Tract Infection is one of the most frequent risk factors for the occurrence of Acute Otitis Media (AOM) in children. Acute Otitis Media (AOM) is a common condition that is often encountered in primary health care and is the most common diagnosis in pediatric patient visits. . Acute otitis media is the second most common pediatric diagnosis in the emergency department, after upper respiratory tract infections. AOM is an acute inflammation of part or all of the middle ear, eustachian tube, mastoid antrum, and mastoid cells. AOM is purulent or suppurative otitis media, as the name suggests AOM is characterized by the presence of fluid in the middle ear area. AOM can be caused by viruses or bacteria. The most common pathogens that cause AOM are Streptococcus pneumoniae, Haemophilus influenza, Moraxella catarrhalis. Acute otitis media occurs when pathogens originating from the nasopharynx meet inflammatory fluid that collects in the middle ear. Proliferation of pathogens in the middle ear will lead to the appearance of signs and symptoms typical of acute middle ear infections.

The risk factor most associated with AOM is age. AOM most often occurs in children. This is caused by anatomical factors, where in the middle ear development phase at childhood, the eustachian tube has a horizontal position with minimal drainage compared to older adults.15 Children are a group that is vulnerable to experiencing ISPA, each child is estimated to experience 3-6 episodes of ISPA every year. The incidence of AOM in ARI cases usually appears on the third to eighth day when the child is exposed to ARI. Repeated ARI episodes are a risk factor for AOM recurrence. Recurrent ISPA is ISPA that occurs at least four times a year.

Symptoms of AOM vary and can depend on the child's age and developmental status. The most specific symptom is ear pain. This pain is usually sudden and severe, sometimes waking babies or young children while sleeping. AOM can occur at any age, but is most often found in babies and children aged three months to three years. The peak incidence occurs in children aged 18 – 20 months. The highest global prevalence occurs in children aged one to four years (60.99%) and children aged less than one year (45.28%). The incidence of AOM decreases in adults but increases by 2.3% after the age of 75 years.

In the world, the highest prevalence of AOM occurs in West and Central Africa (43.37%), South America (4.25%), Eastern Europe (3.75%), and Central Europe (3.64%). In the UK, 30% of children visit a pediatrician every year because of AOM. Indonesia is the fourth country with the highest prevalence of ear disorders in Southeast Asia, namely 4.6%. It is hoped that this literature review can provide useful information regarding the relationship between upper respiratory tract infections and acute otitis media in children.

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METHOD

The type of research used is included in library research or literature review (literature review, literature research). This article was searched via Google Scholar, NCBI and sciencedirect.com. The next researcher screened the articles by referring to the specified criteria, namely publication year between 2019-2024 and having relevance to the relationship between upper respiratory tract infections and acute otitis media in children. Researchers used several keywords to search for articles using the keywords "Upper Respiratory Tract Infection, Acute Otitis Media, Children" The data collected will be analyzed narratively in the results and data analysis section in order to find out the relationship between upper respiratory tract infections and acute otitis media in children.

RESULTS

Table 1. Characteristics of literature review articles

No	Researcher	Research title	Year of publication	Research methods	Number of samples	Research location
1.	Muhammady IF, *et al.*[2]	The Relationship between Upper Respiratory Tract Infections and Acute Otitis Media in Toddlers at the Mangunreja Health Center, Tasikmalaya Regency	2019	*Cross-sectional*	27	Mangunreja Community Health Center, Tasikmalaya, Indonesia
2.	Purba LA *et al.*[5]	Relationship between history of upper respiratory tract infection and acute otitis media in children at the ENT-KL Polyclinic at Abdul Moelek Hospital	2019	*Case control*	94	ENT-KL Polyclinic, Abdul Moelek Regional Hospital, Lampung, Indonesia

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No	Researcher	Research title	Year of publication	Research methods	Number of samples	Research location
3.	Wibowo BAH *et al.*[18]	The Influence of Acute Respiratory Infections (ARI) on Acute Otitis Media (OMA) in Children Aged 0-5 Years	2019	*Cross-sectional*	60	Children's Polyclinic and ENT Polyclinic at Sultan Agung Islamic Hospital, Semarang, Indonesia
4.	Yue Fan *et al.*[19]	Case-control study of relationship of infection by respiratory viruses with acute otitis media in Chinese children	2023	*Logistic regression*	255	China
5.	Meta Aubina S *et al.*[20]	Relationship between Upper Respiratory Tract Infections and the Incidence Rate of Acute Otitis Media (AOM)	2020	*Literature review*	7	Indonesia

Table 2. Results of literature review

Researcher	Research title	Results
Muhammady IF, *et al.* (2019)[2]	The Relationship between Upper Respiratory Tract Infections and Acute Otitis Media in Toddlers at the Mangunreja Health Center, Tasikmalaya Regency	• There is a relationship between upper respiratory tract infections in toddlers and acute otitis media with a p value of 0.001.
Purba LA *et al.*(2019)[5]	Relationship between history of upper respiratory tract infection and acute otitis media in children at the ENT-KL Polyclinic at Abdul Moelek Hospital	• There were 20 subjects (83.3%) suffering from AOM with a history of ARI.

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Researcher	Research title	Results
Wibowo BAH *et al.* (2019)[18]	The Influence of Acute Respiratory Infections (ARI) on Acute Otitis Media (OMA) in Children Aged 0-5 Years	• There is a relationship between a history of ARI and AOM in children with chi square test results of P = 0.000 and an OR of 7.963 (CI 95% = 2.6-36.7).
Yue Fan *et al.*(2022)[19]	Case-control study of relationship of infection by respiratory viruses with acute otitis media in Chinese children	• There is a relationship between acute respiratory tract infection and acute otitis media with p 0.001.
Meta Aubina S *et al.*(2020)[20]	Relationship between Upper Respiratory Tract Infections and the Incidence Rate of Acute Otitis Media (AOM)	• The close relationship between acute respiratory tract infection and acute otitis media is weak (value = 0.397).

Discussion

A study conducted by Insan Muhammady IF et al (2019) at the Mangunreja Community Health Center, Tasikmalaya Regency, entitled The Relationship between Upper Respiratory Tract Infections and Acute Otitis Media in Toddlers at the Mangunreja Community Health Center, Tasikmalaya Regency, with 27 subjects with research results showing the incidence of respiratory tract infections. above in toddlers was 59.3% and the incidence of AOM was 51.9%. From this research, it was concluded that there was a relationship between ISPA and OMA in toddlers at the Mangunreja Community Health Center, Tasilmalaya Regency with a p value of 0.001. According to the researchers' analysis, the more often a child suffers from respiratory tract infections, the greater the possibility of AOM occurring, and this is made easier because the eustachian tube is short, wide and slightly horizontal in location. This is in line with research conducted by Meta Aubina et al (2022) which concluded that there is a relationship between upper respiratory tract infections and acute otitis media.

This is also in line with research by Lidya et al (2019) conducted at the ENT-KL Polyclinic of Abdul Moelek Hospital entitled The Relationship between History of Upper Respiratory Tract Infection and Acute Otitis Media in Children at the ENT-KL Polyclinic of Abdul Moelek Hospital with a case control design showed There is a relationship between a history of ARI and AOM in children at the ENT-KL Polyclinic at Abdul Moeloek Hospital, and pediatric patients with ARI have a 7.9 times greater risk of experiencing AOM compared to patients without ARI. The Chi-square test results obtained P=0.000 and the value The OR obtained was 7.963 (95% CI = 2.6-36.7).

This is also in line with research conducted by Basudewo Agung et al (2018) at the Children's Polyclinic and ENT Polyclinic for children aged 0-5 years at the Agung Islamic Hospital Semarang with subjects as many as 60 outpatients and the research results showed that there was a relationship between acute respiratory tract infection with acute otitis media with a prevalence value of the relationship between acute respiratory tract infection and acute otitis media of 0.001 (< 0.05). Then the results of the contingency

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coefficient test show a result of 0.397 which shows that the close relationship between ISPA and OMA is weak.

A study conducted by Yue Fan (2022) was conducted with the aim of examining children with Upper Respiratory Tract Infections and Acute Otitis Media or Upper Respiratory Tract Infections alone to determine the association of different common respiratory viral infections with AOM using nasopharyngeal swab methods collected from March 2014 until February 2015. 19

From this research, it was found that of 255 children suffering from ISPA, 108 children suffered from ISPA and AOM. A comparison of children suffering from ARI only and children suffering from ARI and AOM showed that the group suffering from ARI and AOM had a significantly higher body temperature (P=0.001), a greater incidence of nasal congestion (P<0.001) and greater use of NSAIDs. large (P<0.001). According to researchers, nasal congestion can indicate hypertrophy of the turbinates and blockage of the pharyngeal opening in the eustachian tube, which causes negative pressure in the middle ear and the production of middle-ear fluid (MEF). The significantly higher rate of NSAID use in the group suffering from ARI and AOM may be related to high body temperature and otalgia.19

Research conducted by Yue Fan (2022) used PCR to identify 10 different respiratory viruses in the Nasopharyngeal specimens (NPSs) in children suffering from ARI and those suffering from ARI and AOM. There was no statistically significant difference in overall viral positivity in the groups with ARI alone and those with ARI and AOM (92 of 147, 62.6% vs. 72 of 108, 66.7%, P = 0.589). However, analysis of individual viruses showed that RSV infection occurred more frequently in the group suffering from ARI and AOM (18 [12.2%] vs. 26 [24.1%], P = 0.013), although there was no difference in rates infections with other groups of viruses. Upper respiratory tract infection with respiratory syncytial virus (RSV) significantly increases the risk of AOM in children.[19]

CONCLUSSIONS

Upper Respiratory Tract Infection is a common infection that occurs in the upper respiratory tract including the nose, paranasal sinuses, middle ear, pharynx, larynx and proximal part of the trachea. Infectious diseases are very susceptible to children under five years old compared to other age groups. Upper Respiratory Tract Infection is one of the most frequent risk factors for the occurrence of Acute Otitis Media (OMA) in children. This is caused by anatomical factors, where in the middle ear development phase at childhood, the eustachian tube has a horizontal position with minimal drainage compared to older adults. The more frequently a child suffers from respiratory tract infections, the greater the chance of AOM occurring. Child patients with ARI are 7.9 times more likely to experience AOM than patients without ARI. Based on the results of the literature review carried out, it can be concluded that there is a relationship between upper respiratory tract infections and acute otitis media in children.

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