



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203




Human Journals

Case Report

December 2020 Vol.:20, Issue:1

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Pyomelanin Producing Strain of *Pseudomonas aeruginosa* Causing Acute Suppurative Otitis Media (ASOM) Following Oil Installation in An Indian Infant



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INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203



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Submitted: 12 November 2020
Revised: 02 December 2020
Accepted: 22 December 2020

Keywords: Mustard oil, ASOM, *Pseudomonas aeruginosa*, pyomelanin.

ABSTRACT

Acute Otitis Media is one of the most common infections in childhood preceded by upper respiratory tract infection. *P. aeruginosa* does not usually inhabit the upper respiratory tract. Its presence in the middle ear cannot be ascribed to an invasion through the Eustachian tube (ET), and it should be considered as a secondary invader gaining access to the middle ear through a defect in the tympanic membrane. Further pyomelanin producing *P. aeruginosa* is a notorious bacterium associated with antibiotic resistance. In our isolate, the resistance to ciprofloxacin and ceftazidime was seen. The use of unsterile/contaminated oils, ear drops, and honey in-ear along with poor hygiene significantly contributes to the development of ear infections.



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INTRODUCTION

Pseudomonas aeruginosa is a ubiquitous organism prevalent in diverse environmental sources. As an established nosocomial pathogen, it can be isolated from a variety of hospital sources. The representative colonization rates for specific sites in humans are 0 to 2% for skin, 0 to 3.3% for the nasal mucosa, 0 to 6.6% for the throat, and 2.6 to 24% for fecal samples. However, colonization rates may exceed 50% during hospitalization^[1]. The well-being of the external ear is decided by the interplay of various protective barriers like moisture, canal pH, cerumen which acts as a micro-environment. When these protective barriers are breached, infections occur. The common practice of putting oil in-ear in India is for either cleaning purposes or for promoting healthy tissue of the external ear^[2]. Otitis media (OM) is a group of complex infective and inflammatory conditions affecting the middle ear and is a leading cause of health care visits worldwide. Any infection of the middle ear can spread to surrounding structures such as the brain and meninges superiorly and the sigmoid sinus posteriorly, with fatal results. A subtype of Acute Otitis Media (AOM) is acute suppurative OM (ASOM), which is characterized by the presence of pus in the middle ear even after the eardrum perforates and heals spontaneously, which occurs in approximately 5% of the children^[3].

Case Report: Here we present a case of a 7 months old baby with brownish ear discharge after instilling mustard oil into the ears. The child was apparently well two months back when he developed fever, sore throat, became irritable with continuous crying, and unable to sleep. The parents took him to a local doctor, and the treatment was continued for about 10 days with relief in fever only. The mother of the child started putting warm mustard oil in the child's ears for relief from any irritation or infection. On the tenth day, the child started with ear discharge and he was then referred to the E.N.T. department of our medical college & hospital. While examining, the doctor noticed that the left ear was full of discharge which was non-foul smelling and brownish in color. On palpation, there was tenderness over the pre-auricular region with no regional lymphadenopathy. Pus was aseptically collected for culture & sensitivity and rest was suctioned. But as the child was not cooperative discharge couldn't be cleaned completely hence tympanic membrane could not be visualized (Figure1).



Figure No. 1: Unilateral brown colored ear discharge in an infant

A diagnosis of ASOM perforated stage was made. The right ear was dry and the tympanic membrane was intact. Mother was asked about the hearing loss which she denied. The mother was advised ear toilet and precautions for keeping the ear dry and local antibiotic drops in the form of ciprofloxacin were given. The discharge was processed for microbiological diagnosis which was performed as per standard protocol. For culture, the sample was plated on Blood agar, MacConkey agar, and incubated at 37 °C for 24 h for isolate recovery. The strain produced lactose non-fermenting colonies with a metallic sheen on MacConkey agar and characteristic brown colored diffusible pigment which turned the entire plate coffee brown. The isolate was identified as a pyomelanin producing strain of *Pseudomonas aeruginosa* by standard biochemical tests. It was confirmed by MALDI-TOF MS (Bruker Daltonics, Germany) as *Pseudomonas aeruginosa* with a high score of 2.1. The isolate was resistant to ciprofloxacin, ceftazidime, and susceptible to amikacin, piperacillin-tazobactam, imipenem, and aztreonam. The organism was re-isolated from the pus discharge before starting the antibiotics. As the child was not having any symptoms & signs of complications so regular suction & ear cleaning was done along with symptomatic therapy. The discharge kept on over days and the ear was dry after two weeks with a small pinhole perforation in the pars tensa on follow up. Mother was told to continue with the precautions and was explained the danger signs. To check for the survival of *P. aeruginosa* in mustard oil, we inoculated few colonies of *Pseudomonas aeruginosa* ATCC 27853 in 5 ml of commercially available fresh mustard oil. Subsequently, subcultures were done after 24 hrs, after 2 days, 5 days, and every week thereafter. It was observed that *P. aeruginosa* is capable of surviving in mustard oil.

DISCUSSION:

P. aeruginosa is responsible for various life-threatening infections. It produces a large number of pigments that allow it to effectively counter the action of the host defense system. The brown pigment (pyomelanin) is water-soluble, uncommon, and accounts for less than 1% of strains and is formed from either tyrosine or phenylalanine through the accumulation of homogentisic acid. This pigment-producing bacterium was first isolated during 1897 by Cassin from a gummatous leg ulcer of a French cavalryman and thereafter the new term, "pyomelanin," was proposed [4]. The presence of *P. aeruginosa* in the middle ear cannot be ascribed to an invasion through the Eustachian tube (ET), and it should be considered as a secondary invader gaining access to the middle ear through a defect in the tympanic membrane. The literature suggests that the mustard oil exhibited more than 93% inhibition rate against the selected bacterial strains except for *P. aeruginosa* which survived in it [5]. We have observed the survival of *P. aeruginosa* for up to three months in mustard oil. Normally the outer layer of the eardrum is lined by stratified squamous epithelium which is quite resistant. In our case, as the child was having acute otitis media hence, the tympanic membrane was not healthy or there might have been small perforation which was not visualized as the ear canal could not be cleaned completely. Hence, the instillation of mustard oil contaminated with *Pseudomonas* might have caused this infection.

CONCLUSION:

In the present case, the uncommon pyomelanin-producing strain of *P. aeruginosa* was isolated from unilateral ear discharge which was successfully treated by timely intervention and is being discussed to increase awareness amongst the physicians. We discourage instillation of mustard oil into ears due to the ability of *P. aeruginosa* to survive in oils for long periods.

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