



# A Two Years Study to Determine the Etiology and Risk Factor of Discharging Ear Below One Year of Age in a Tertiary Paediatric Health Care Teaching Hospital in India

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## ABSTRACT

**Introduction:** Ear discharge in infancy is a major health problem and may lead to hearing impairment, delayed speech and language development, and poor academic performance. The most common cause of ear discharge in infants is ASOM which is due to swelling and infection in the middle ear. CSOM with or without cholesteatoma and otitis externa can affect a child's ability to learn and consequently may have a lifelong impact on his/her quality of life and overall development.

**Aim of the Study:** To find out the etiology and risk factors of neonatal and infant ear discharge.

**Study Design:** Retrospective, observational, analytical study.

**Method:** 2405 children (age group 0 – 1 years) attending the out-patient department from June, 2017 – June, 2019 were examined. Detailed history, clinical examination, and assessment were done after grouping the children in three age group (0-1 month, 1-6 months, 6-12 months). Associated etiology and risk factors were also looked for at each stage of study.

**Results:** Out of 2405 children under 1 year of age 1077 were seen in age group of 6 months 1 day to 12 months of age. In second group 745 patients were noted from 1 month 1 day to 6 months of age. Minimum patients were noted in 0-1 month age group and they were 583 in number. Most common etiology was noted to be A.S.O.M. Most common risk factor noted to be was Respiratory infection (both upper and lower).

**Conclusion:** This present study have a robust result showing the current etiological causes of ear discharge in children below 1 year of age which would guide us for proper diagnosis and empirical treatment of ear infections in them. Most common aetiology is noted to be Upper respiratory tract infection (URTI) leading to otitis media (OM). The most common bacteriologic cause of the discharging ear was pseudomonas species.

**Key Words:** Otitis, Media, Infancy, Speech, Health, Infection

## INTRODUCTION

Ear discharge in infancy is a major health problem and may lead to hearing impairment; delayed speech and language development; and poor academic performance. Most common cause of ear discharge in infants is A.S.O.M which is due to swelling and infection in the middle ear. Chronic ear infection mostly C.S.O.M with or without cholesteatoma and otitis

externa can affect a child's ability to learn and consequently may have a lifelong impact on his/her quality of life and overall development. It is estimated that almost all children will have had an ear infection by the age of five years. 50% of the children aged 2 to 3 years have had at least one ear infection since birth and 13% of children had frequent (four or more) ear infections below the age of 2 years. There is no existing Indian study which shown the risk factors of otorrhoea.

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Colours of the ear discharge indicates the cause of the otorrhoea. A purulent discharge indicates the presence of infection, while a bloody discharge may occur due to trauma or occur with granulation tissue associated with chronic infection. The presence of a mucoid discharge indicates a perforation of the tympanic membrane, there are no mucous glands in the external ear canal; the fluid must therefore arise from the middle ear. Clear, watery fluid, especially when associated with a history of trauma or skull base surgery, is likely to be CSF.

Recurrent episodes of purulent otorrhoea suggest CSOM, while purulent otorrhoea of acute onset suggests acute otitis media with perforation of the tympanic membrane, or acute otitis externa. In acute otitis media, the pain characteristically improves when the tympanic membrane ruptures and otorrhoea starts. In otitis externa the pain is persistent. Otitis externa is characterised by a scanty, thin, watery discharge, usually preceded by itching or discomfort in the ear canal. A foul-smelling discharge is usually associated with cholesteatoma.

In general, ear infections are mild and resolve by themselves over a short period of time; however, if left untreated, this infection could lead to hearing loss, some point in the future. Current recommendations for acute otitis media are to observe and treat with antibiotics only if the condition does not resolve in a few days, thus clinical assessment is important in managing the condition.

The bacteriologic spectrum of ear discharge is highly variable specially in children. This study thus carry immense importance for accurate diagnosis and management of ear discharge in first year of life.

The current study was carried out to determine the current risk factors of ear discharge in children below 1 year of age. As this study surveyed a large number of rural and urban children under 1 year allowing robust results. This data can guide empirical treatment of ear infections in neonates and infants and also form a basis for further research to improve quality of care.

## AIM OF THE STUDY

To find out the risk factors of neonatal and infant ear discharge.

## STUDY DESIGN

Retrospective, observational, analytical study

## MATERIALS AND METHODS

**Study area:** Department of ENT, Dr.B.C.ROY, PGIPS Department of ENT, Tertiary Pediatric Health Care Center, Kolkata

(W.B.).

**Study period:** June, 2017 – June, 2019.

**Study sample:** Two thousand four hundred and FIVE (2405) children (age group 0 – 1 years) attending the out-patient department. Children are subdivided in four age groups

- Group A – 0 to 1 month(583 Patients)
- Group B- 1 month 1 day to 6 months (745 Patients)
- Group C – 6 months 1 day to 12 months(1077 Patients)

## INCLUSION CRITERIA

All children were screened for deafness before the study and they underwent BERA test. Only the children who normal report on BERA were included in this study.

- i. Neonates with ear discharge
- ii. Infants with complaints discharge or decreased hearing or decreased response to sound stimuli.

## EXCLUSION CRITERIA

- i. Children with congenital anomaly
- ii. Children with syndromes.
- iii. Children with mental retardation and cerebral Palsy
- iv. Children with chronic medical problems or anatomical or physiological defect of the ear or nasopharynx were excluded.

## ETHICAL CLEARANCE

We have taken institutional ethics committee clearance prior to the commencement of the study.

## STUDY METHOD

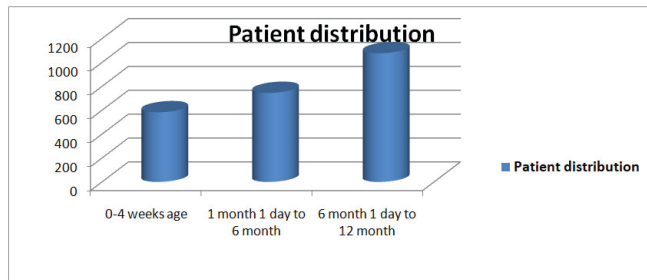
Clinical history was obtained from each patient consisting of 10 preformed questionnaire of prenatal, perinatal and post natal period. Specified history obtained from each mother regarding gestational drug intake, smoking, diabetes, hypertension or any other illness. Then all risk factors of infant hearing loss and progressive or late onset hearing loss were screened. All children had normal hearing at birth. Standard ENT examination with was done in all children. otoscopy and examination under microscope (EUM) were done in all children to ascertain the nature of discharge as well as the disease.

Patients who presented with purulent discharge, ear swabs were taken maintaining all standard complete aseptic precautions and sent to Department of Microbiology for examination. All specimens were taken using dry sterile cotton and were cultured on blood, chocolate and Macconkey agar and incubated aerobically at 37 degree Centigrade for 24 hours. Isolated organisms were identified using standard biochemical tests, including urease and indole production, citrate utilization, hydrogen sulphide gas production and fermentation of sugars. The biochemical media used included Simon's Citrate medium, Urea and Triple Sugar Iron agar (TSI).

Patients with clear water like discharge from ear with clinical suspicion of cerebrospinal fluid(C.S.F) , were subjected sample collection in a sterile syringe without needle, sent to Department of Biochemistry for Beta 2 transferrin for confirmation of diagnosis.

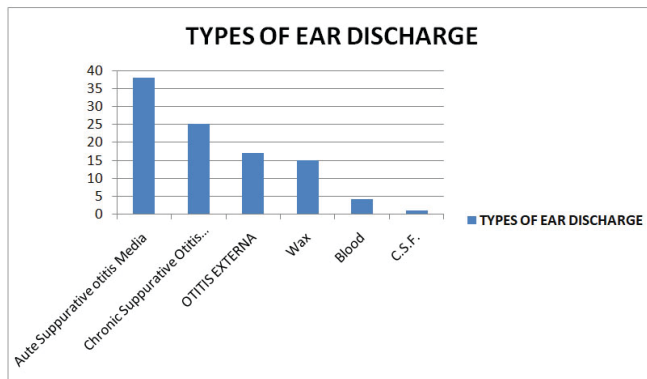
## RESULT AND ANALYSIS

**DIAGRAM-1**



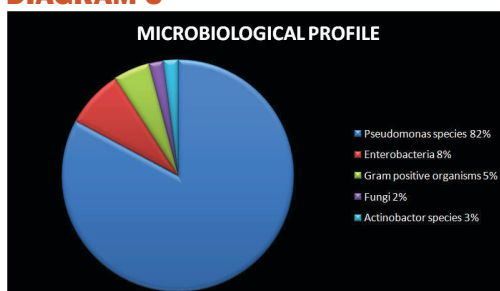
Out of 2405 children under 1 year of age maximum patients, 1077, were seen in age group of 6 months 1 day to 12 months of age. In second group 745 patients were noted from 1 month 1 day to 6 months of age. Minimum patients were noted in 0-1 month age group and they were 583 in number.

**DIAGRAM-2**



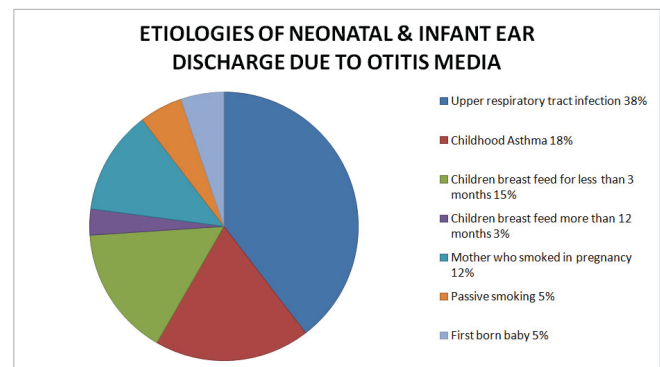
38% (most common) type of patients presented with purulent discharge with ASOM(A.S.O.M), 25% presented with C.S.O.M, 17% presented with otitis externa ,15 % patients presented with wax with brown discharge in external auditory canal , 4 % patients presented with blood in external auditory canal mostly because of trauma and at last 1% patients even presented with CSF in the external auditory canal

**DIAGRAM-3**



1515 ear swabs were received by the Microbiology Department for processing over the two year period. Of these 1380 had microorganisms being isolated from the discharge. Most common organism(82%) to isolate was Pseudomonas species. 8% Enterobacteria , 5% Gram positive organisms mostly staph aureus , 2 % Fungi mostly candida species and 3% Actinobacter species were isolated from the ear swabs. 135 isolates were deemed contaminants.

**DIAGRAM-4**



Most common etiology of ear discharge in neonatal period and infancy is upper respiratory tract infection(35%). In our study we have seen that 18% patients who were suffering from childhood Asthma, also had ear discharge due to both A.S.O.M and C.S.O.M. It was noted that 15% children below 1 year of age who were breast feed for less than 3 months had active ear discharge, whereas children who were breast feed for first 6 months of their life had significantly lower incidence (3%) of ear discharge. Mothers who smoked in their pregnancy were found to have neonates and infants with active discharge in 12% cases while 5% babies of this study had ear discharge who were subjected to passive smoking. In 5% cases, first born children were affected.

## DISCUSSION

- Worldwide Otitis media (OM) or middle ear infection is a very common ear disease among children under the age of 6 years. According to Kong and Coates, ear infections were common in two age groups: between 6 and 24 months of age and 4-5 years of age. The current study enlightens the specific factors leading to ear discharge due to OM in neonatal period and infancy. OM complicating URI is considered when OM occurs within 28 days of the URI, AOM(acute otitis media) was defined by acute onset of symptoms (fever, irritability, or earache), signs of tympanic membrane inflammation and presence of fluid as documented by otoscopy . Most URIs are self-limiting, their complications are more important than the infections. In developing countries like India with inadequate medical care, it mostly lead to perforated eardrums and chronic

ear discharge in later childhood and ultimately to hearing impairment or deafness. Two viruses most commonly detected during URI were rhinovirus and adenovirus. While adenovirus was associated with high rate of AOM complicating URI, rhinovirus was associated with lower rate than that of corona virus, RSV and adenovirus. Correlations between virus concentrations and elevated levels of cytokines/inflammatory mediators (IL-6, TNF  $\alpha$ , IFN- $\gamma$ , IL-1, IL-8 MIP-1 $\alpha$ ), and disease severity have been shown previously in respiratory virus infections.

- Many studies showed that breastfeeding has a protective effect on the development of otitis media. This could be due to presence of the immunoglobulin of breast milk, which contains specific antibodies against respiratory viruses. The period of breastfeeding had a significant impact on the occurrence of otitis media. Salah et al. found that breastfeeding for less than three months was associated with an increased risk of developing otitis media compared with infants who were breastfed more than three months. Similar to these studies, this present study also supports the fact.
- Baraibar reported that these positive relationships between ear infection and having siblings could be due to both environmental and genetic factors. Similar to these earlier studies, this study showed that first born children had a significantly higher prevalence of ear infections. In this study too it is noted that in 5% cases first born children were affected more than their younger siblings.
- Significant relationship between childhood obesity below 1 year and ear infection was observed in this study in 5 % cases.
- Maternal smoking during pregnancy was a significant risk factor for ear infection and ear discharge and seen in 12 % case. Two studies have found that parental smoking increases the risk of otitis media and one did not. In the present study, maternal smoking during pregnancy was risk factor in 5% cases.

## CONCLUSION

The ear discharge is a common presentation in medical practice affecting all age groups but primarily children. Most of the studies were done in children under the age of five years. This present study have a robust result showing the current etiological causes of ear discharge in children below 1 year of age which would guide us for proper diagnosis and empirical treatment of ear infection. The most common etiology is noted to be Upper respiratory tract infection (URTI) leading to otitis media (OM). The most common bacteriologic cause of the discharging ear was *Pseudomonas* species. In India no such study was carried out in recent years so the present data would not only guide us towards empirical treatment of ear infections in neonates and infants, will also help

to identify other aetiologies of ear discharge in them. Thus it can form a basis for further research to improve quality of care extended to neonates and infants.

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**Conflict of Interest:** There is no conflict of interest from our side for this study.

## ABBREVIATION

1. OM = Otitis media.
2. ASOM = Acute suppurative otitis media.
3. CSOM = Chronic suppurative otitis media.
4. C.S.F = Cerebro spinal fluid.
5. EUM = Examination under microscope.
6. TSI = Tripple sugar agar medium.
7. BMI = Body mass index.
8. URI = Upper respiratory tract infection.
9. RSV = Respiratory syncytial virus.
10. IT = Interleukin.
11. TNF = Tumour necrosis factor.
12. IFN = Interferon.
13. MIP= Major Intrinsic Protein.
14. BERA= Brain evoked response audiometry.

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