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SMART PEDI UPDATE

Pedismart Newsletter
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Dear Doctor,
Greetings from Micro Labs Limited. We are happy to bring you **"PEDI SMART NEWSLETTER"** which contain latest and interesting news in the field of Paediatrics.

This issue contains:

1. **Evaluation of Effect of Nasal High Flow for infants with Bronchiolitis**
2. **Impact of Telemedicine and Home Spirometry in Cystic Fibrosis disease progression and care**
3. **Impact of Screen time on Parent Child Communication in Children's aged 12 to 36 months**
4. **Case report on Macrophagic Activation Syndrome Revealing Tuberculosis**

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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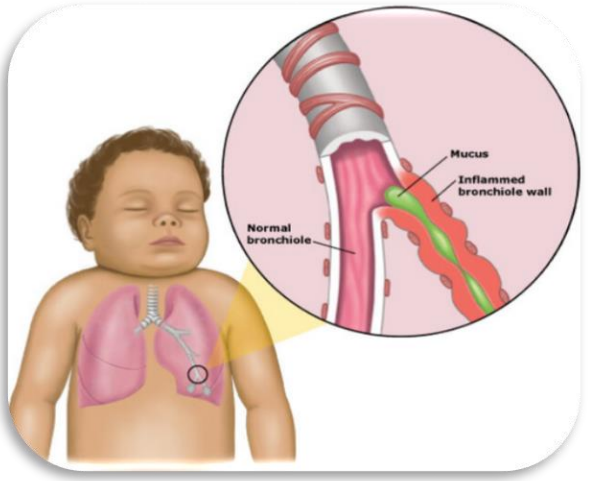
SMART PEDI UPDATE

Evaluation of Effect of Nasal High Flow for infants with Bronchiolitis

Introduction



Bronchiolitis, an acute lower airway pulmonary disease caused by respiratory viruses, is the leading reason for infant hospital admissions globally. Despite extensive research over three decades, no medications have definitively improved outcomes, reduced healthcare burdens, or lowered Paediatric Intensive Care Unit (PICU) admissions.[1] As Bronchiolitis is a self-limiting disease, it lacks specific etiological treatment, therefore management should be based on supportive care, based on oxygen therapy and fluid supplementation.[2] Nasal high-flow (NHF) therapy has recently emerged as a potential method to provide respiratory support and reduce PICU admissions. The Paediatric Respiratory Intervention Study (PARIS I) demonstrated NHF's ability to reduce therapy escalation without significantly reducing PICU admissions. In addition, bronchiolitis guidelines also recommend to use nasal high-flow if standard oxygen therapy fails.[1] This study investigated the uptake of PARIS I trial results and the differences in disease severity, length of hospitalization, and PICU admissions between infants on NHF and standard oxygen therapy (SOT).

Methods

This prospective observational study was conducted over 6 months. Infants under 12 months of age with viral bronchiolitis and oxygen requirements (SpO2 <92%) were included, excluding those critically ill or with specific medical conditions. NHF was administered at weight specific flows via age-appropriate OptiflowTM Junior 2 Nasal Interfaces, OptiflowTM Junior 2+ Nasal Interfaces and a high-flow delivery system, AirvoTM 2 System (Fisher & Paykel Healthcare; Auckland, New Zealand). Data on demographics, clinical presentation, and escalation of care were collected. The primary outcome was disease severity before oxygen therapy, with secondary outcomes including length of oxygen therapy, length of hospitalization, and PICU transfers.

Results

A total of 235 infants with bronchiolitis requiring oxygen were analysed. Infants on NHF had higher respiratory and heart rates, EWT scores, and more severe work of breathing than those

on SOT during admission to hospital. They also had a higher proportion of previous PICU admissions and family history of asthma. NHF therapy did not reduce the length of oxygen therapy but resulted in a longer hospital stay (0.6 days) and higher PICU admission rates (23.3% vs. 10.4%) compared to patients on SOT (Figure 1). Hospitals with on-site PICU had a threefold higher PICU admission rate than hospitals without onsite PICU. The time to care escalation and clinical criteria for escalation were similar between NHF and SOT groups. In comparison to hospitals without an on-site PICU, the duration of oxygen therapy was significantly longer in hospitals with onsite PICUs, although the length of hospital stay was similar.

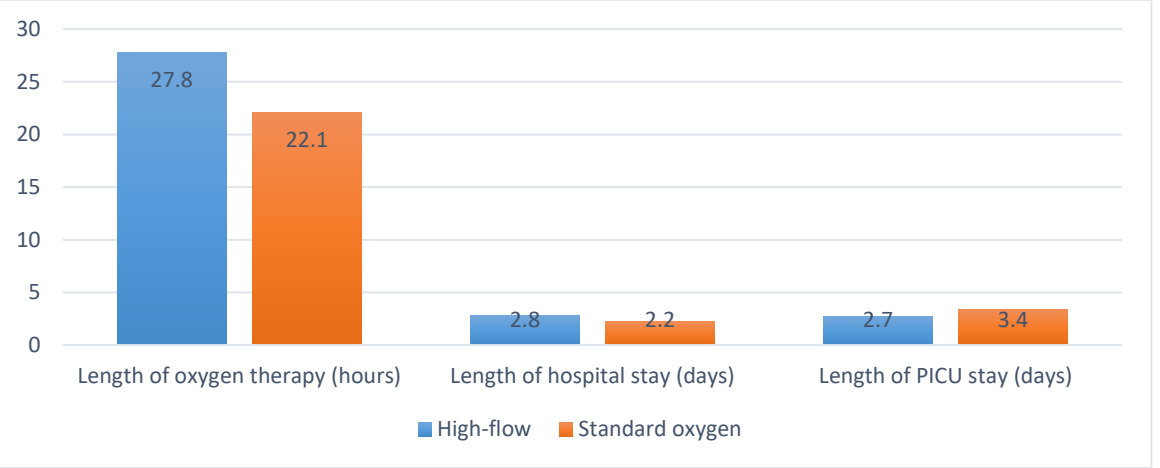


Figure 1. Results of Nasal high flow and standard oxygen therapy

Discussion

The study found that NHF was used as the first-line therapy for more severe cases, influenced by previous PICU admissions and family history of asthma.[1] In this study, results showed that 44.4% of infants in the NHF group and 18.4% in the SOT were admitted if an onsite PICU was available whereas in PARIS I trial only 14% and 10% respectively were admitted to PICU.[3] The education package from the previous trial did not affect clinical decisions. The increased PICU admissions for NHF patients were likely due to automatic triggers for care escalation, while infants on SOT had a chance to remain in general wards. NHF therapy did not significantly alter the length of oxygen therapy, aligning with recent RCTs. The higher PICU admissions in hospitals with on-site PICU suggest institutional practice influences more than disease severity. The study's findings indicate a potential Hawthorn effect in the PARIS I trial, which might have influenced lower PICU admissions. The study highlights the need for cost-effective use of NHF and cautious PICU admissions.[1]

Conclusion

The study revealed an increased use of PICU services, especially in hospitals with on-site PICU, for infants on NHF therapy. Efforts should be made to keep infants with bronchiolitis in general wards and avoid unnecessary PICU admissions. The findings suggested that SOT

should be the initial therapy, with escalation to NHF only if necessary based on clinical observations within the first 5-6 hours.

Infants with bronchiolitis presenting with greater disease severity are more likely to receive high-flow therapy.

References

1. Franklin D, Miller L, Pham TM, Frampton C, Moloney S, Waugh J, Fairless S, Hobbins S, Grew S, George S, Fahy R, Morel D, Schibler A. Nasal High Flow Therapy for Bronchiolitis. J Paediatr Child Health. 2024 May 22. PMID: 38775344.
2. Barbieri E, Cantarutti A, Cavagnis S, Cantarutti L, Baraldi E, Giaquinto C, Donà D. Impact of bronchiolitis guidelines publication on primary care prescriptions in the Italian pediatric population. NPJ Primary Care Respiratory Medicine. 2021 Mar 19;31(1):15.
3. Franklin D, Babl FE, Schlapbach LJ et al. A randomized trial of high-flow oxygen therapy in infants with bronchiolitis. N Engl J Med. 2018; 378: 1121–31.

Impact of Telemedicine and Home Spirometry in Cystic Fibrosis disease progression and care

Introduction

Introduction of telemedicine and home spirometry in combination with in-person visits may be tolerable and effective in a pediatric cystic fibrosis setting.

Cystic fibrosis (CF) is a genetic disorder defined by variants in the cystic fibrosis transmembrane conductance regulator *(CFTR)* gene, which affects more than 30,000 individuals in the US and approximately 89,000 worldwide.[1] Children with cystic fibrosis and their care givers are often facing problems to access specialised multidisciplinary CF team. The COVID-19 pandemic disrupted traditional healthcare delivery, prompting a shift to telehealth and home monitoring methods to maintain patient care while minimizing infection risk.[2] Further, there was no sufficient evidence to support that home spirometry in combination with telehealth and physical visits could provide CF care as effectively as exclusively physical visits. So, this study aimed to investigate the effectiveness of telehealth and home spirometry in managing pediatric CF, comparing health outcomes during the COVID-19 pandemic on the progression of CF related disease.

Methods

This was a prospective, interventional, multicenter study involving pediatric CF patients who used home spirometry and participated in telehealth visits over one year. Key health indicators, including lung function, airway pathogens, and nutritional status, were monitored. Data were collected from home spirometry and compared with traditional hospital-based spirometry. The

primary outcome was to measure FEV1 with lung clearance index serving as a secondary endpoint. Nutritional status including weight, height, and BMI, was evaluated during all in-person visits. Using Cystic Fibrosis Questionnaire-Revised (CFQ-R), health related quality of life was evaluated at the start and end of the study.

Results

A total of 59 children aged between 6 to 17 years were included for final analysis. FEV_1% assessed during the pre-pandemic period and intervention period were –0.6% and -0.9% whereas Lung Clearance Index (LCI) were 0.1 and 0.2. Hospital-based spirometry showed a difference of −0.4 during pre-pandemic period and the study period. Incidence of Haemophilus influenza was reduced by 60% in study period compared to pre pandemic period. The mean difference between the hospital and home spirometry was 3.9. Participants and the caregivers appreciated both telehealth and in person visit. Around 93% of the participants and 96% of the caregivers expressed desire to continue with home spirometry and telemedicine.

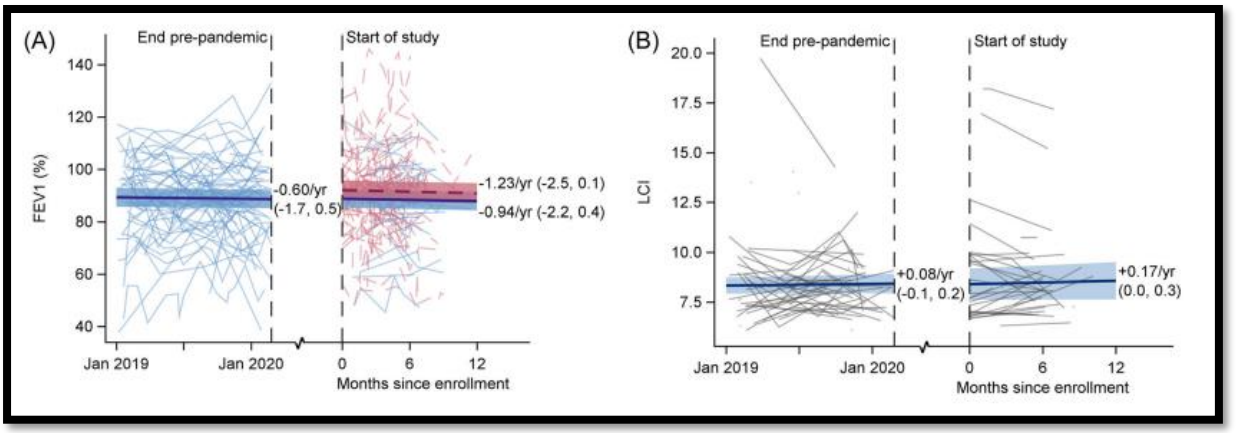


Figure 1. (A) Lung function measured by FEV_1 (%), (B) Lung Clearance Index (LCI) assessed during the pre-pandemic period and intervention period. Hospital spirometry (blue lines) and a Home spirometry (red lines).

Discussion

The study found that telehealth and home spirometry were as effective as traditional in-person care for managing pediatric CF. Both participants and their care takers benefited from the use of home spirometry, which improved their understanding of how to monitor CF lung disease without affecting their anxiety levels. Positive impact on daily lives of participants and their caregivers were seen with telehealth visits.[2] This study results align with the previous retrospective study which confirmed the safety and feasibility of telemedicine as a compliment to in-person outpatient clinic visits.[3] Patients and caregivers appreciated the convenience and reduced burden of telehealth visits. Home spirometry, despite some variability, effectively tracked lung function trends. Challenges included improving adherence to home spirometry.[2]

Conclusion

Telehealth and home spirometry offer a viable, effective alternative to traditional in-person CF care, maintaining health indicators and being well-received by patients and caregivers. The study supported the continued use of these methods, with a focus on improving adherence and exploring long-term outcomes.

References

1. Ong T, Ramsey BW. Cystic Fibrosis: A Review. JAMA. 2023 Jun 6;329(21):1859-1871.
2. Medbo J, Imberg H, Hansen C, Krantz C, de Monestrol I, Svedberg M. Telemedicine and home spirometry in cystic fibrosis: A prospective multicenter study. Pediatr Pulmonol. 2024 Jul 4. PMID: 38963304.
3. Somerville LAL, List RP, Compton MH, et al. Real-world outcomes in cystic fibrosis telemedicine clinical care in a time of a global pandemic. Chest. 2022;161(5):1167-1179.

Effect of Screen time on Parent Child Communication in Children's aged 12 to 36 months

Introduction

Increases in screen time were associated with decreases in measures of parent-child talk.

The early years of a child's life are critical for development. Being in a language-rich home helps with language skills, emotional growth, IQ, and brain development. Programs that encourage parents to talk more with their children have shown positive results. One major issue is screen time, which leads to "technoference" where technology interrupts family interactions. Excessive screen time was increasingly recognized as a factor that could potentially disrupt these essential interactions, leading to adverse developmental outcomes. When parents use smartphones, they often pay less attention to their children, engage less, respond more harshly, and talk less.[1] Recent studies have shown that while digital devices can offer educational benefits when used appropriately, unsupervised or excessive use can interfere with the parent-child bond and subsequent child development.[2] This study aimed to evaluate the association between long-term effects of children's screen time and parent-child conversations such as adult words, child vocalizations and parent child interactions during the first three years of life.

Methods

The Language in Little Ones (LiLO) study was a prospective cohort study followed 302 families from when their children were 6 months old to about 5 years old, collecting data every six months. The goal was to measure how much parents and children talk at home using the Language Environment Analysis (LENA) technology. The Electronic Use in Little Ones (EUiLO) study, part of LiLO, specifically measured how much screen time the children were exposed to. Inclusion criteria were children had to be born in 2017, live in homes where English is mainly spoken, be full-term single births, and have no language impairments. The

outcomes were measured in three ways: conversational turns, adult words, and child vocalizations. For each of the three outcomes, separate models were run with adjustments for child sex, child age, mother education level, number of children at home, number of activities at home, and psychological distress of the primary caregiver.

Results

A total of 220 families were included for final analysis. At the age of 12 months, the children experienced an average of 87.8 (107.6) minutes of screen time, 14 997.8 (6873.4) adult words heard, 1394.7 (522.7) vocalisations produced, and an average of 369.4 (167.4) conversational turns per day. As the children got older screen time, child vocalization, and conversational turn counts increased but number of adult words remained relatively stable across time, only increasing slightly as children grew up. When the children were 36 months old, they had experienced an average of 172.1 (134.7) minutes of screen time, heard 16,302.6 (6654.7) adult words, produced 3306.7 (1612.8) vocalisations, and had 734.4 (404.2) conversational turns on average each day (Figure 1). Unadjusted mixed-effect models showed an overall negative association between the amount of screen time children were exposed to and the number of adult words children heard at all ages. Adjusted models showed that increases in screen time were associated with decreases in parent-child talk in all variables and ages, the only exception was screen time at 12 months, which had no correlation with any of the three parent-child talk outcomes. At 36 month's results showed largest association when an additional minute of screen time was associated with a reduction of 6.6 adult words, 4.9 child vocalizations, and 1.1 conversational turns.

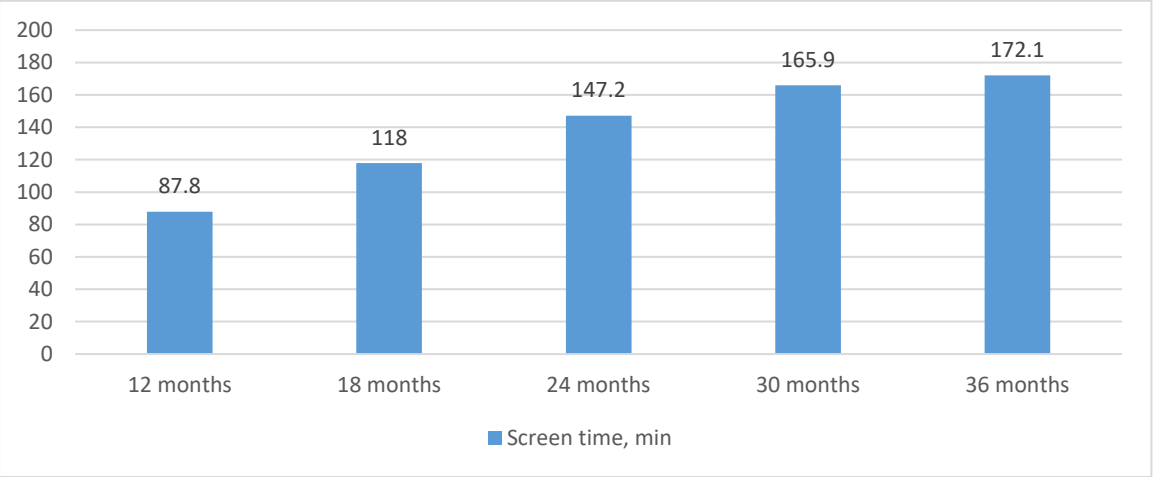


Figure 1. Screen Time usage and Parent-Child Talk Variables at Each Time Point for 220 Families

Discussion

This study finding showed that screen time can significantly reduce the amount of talk between parents and children. With the growing use of technology in homes, it was important for parents to be aware of its potential negative effects. Reducing screen time might help improve communication and the overall development of children. Mixed-effects models showed that

for every additional minute of screen exposure, parents and children were generally talking or vocalizing less and were engaging in fewer back-and-forth interactions.[1] This results aligned with the previous study results which showed that increases in screen time decrease parent-child interactions.[3]

Conclusion

Increases in screen time were associated with decreases in adult words, child vocalizations, and back-and-forth interactions for children aged between 18 and 36 months, after controlling for known confounders. Parents should be mindful of their technology use and try to limit screen time to promote better communication and development for their children.

References

1. Brushe ME, Haag DG, Melhuish EC, Reilly S, Gregory T. Screen Time and Parent-Child Talk When Children Are Aged 12 to 36 Months. JAMA Pediatr. 2024 Apr 1;178(4):369-375.
2. Panjeti-Madan VN, Ranganathan P. Impact of screen time on children's development: cognitive, language, physical, and social and emotional domains. Multimodal Technologies and Interaction. 2023 May 16;7(5):52.
3. Knitter B, Zemp M. Digital family life: a systematic review of the impact of parental smartphone use on parent-child interactions. Digital Psychol. 2020;1(1):29-43.

Case report on Macrophagic Activation Syndrome Revealing Tuberculosis

Introduction

Early initiation of anti-bacillary treatment in Macrophagic activation syndrome complicating tuberculosis provides better management

Macrophage activation syndrome (MAS) is a condition of severe hyper-inflammatory reaction, which can be idiopathic or triggered by auto immune illness or infection that frequently leads to abnormal hemophagocytic macrophages with associated hypercytokinemia, also known as a "cytokine storm."[1] MAS is characterized by fever and hepatosplenomegaly. Pancytopenia, hypertriglyceridemia, and hyperferritinemia were the common abnormal laboratory findings in this condition. Although MAS is rare, it has found associated with tuberculosis.[2] This report described a case of an immunocompetent infant diagnosed with miliary tuberculosis complicated by macrophage activation syndrome.

Case presentation

A 22-month old infant was admitted to hospital with the complaint of prolonged fever lasting for 15 days and had a history of consuming unpasteurized milk. Fever was accompanied by anorexia and weight loss. Initial laboratory investigations were normal which includes

cerebrospinal fluid and urine tests, sterile blood cultures, anemia with hemoglobin levels of 8g/l, and a C-reactive protein (CRP) level of 200 mg/l. Treatment was initiated with cephalosporin for 7 days which showed no improvement. On day 21 of fever, patient appeared pale, with a skin rash corresponding to the fever peak. Infant was hypotonic, experiencing polypnea and tachycardia, and was irritable. Patient was hemodynamically stable but exhibited hepatomegaly, with a liver span of 12 cm. Para-clinical work-up revealed hypo-fibrinogenemia (1.4 g/l), hyperferritinemia (926 ng/ml), hypertriglyceridemia (2.70 g/l, reference range: 0.6-1.50 g/l), hypo-proteinemia (48 g/l), and anemia (8 g/dl). Tuberculin skin test (TST) and gastric tube test for BK were negative, while Quantiferon testing showed positive results. Chest X-ray diagnosis showed an interstitial syndrome consistent with a tubercular miliary appearance (Figure 1), while thoraco-abdominal computerized tomography (CT) scan showed bilateral micronodular infiltration of symmetrical and homogeneous distribution throughout the parenchyma, indicative of an interstitial syndrome. Homogeneous hepatomegaly was noted and medullogram revealed evidence of haemophagocytosis (Figure 2). Finally, patient was started with anti-bacillary treatment, which resulting in a favourable outcome.

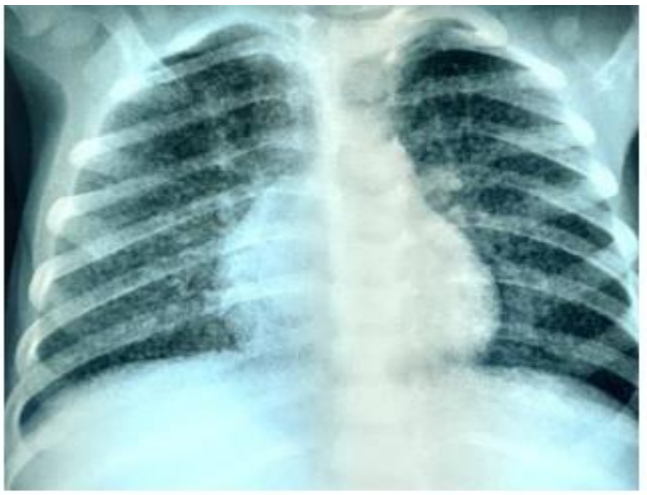


Figure 1. Chest X-ray showing a tubercular miliary pattern

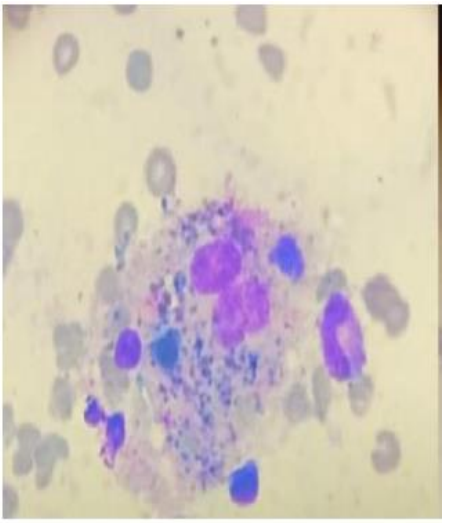


Figure 2. Presence of numerous images showing haemophagocytosis

Discussion

This study report was diagnosed as a MAS also known as hemophagocytic lymphohistiocytosis (HLH) which was characterized by inadequate immune response, marked by the proliferation and activation of macrophages, leading to excessive phagocytosis of hematological precursors such as erythrocytes, platelets.[2] According to histocytes society protocol HLH cab be diagnosed if five of the eight criteria were met i.e., (i) fever (27 days), (ii) splenomegaly, (iii) cytopenia (≥2 lines) anaemia (haemoglobin <9.0 g/dl), thrombocytopenia (<100,000 cells) and

neutropenia (ANC <1000), (iv) hyper-triglyceridaemia (≥265 mg/dL) and/or hypo-fibrinogenaemia (<1.5 g/l), (v) haemophagocytosis (bone marrow, spleen, lymph node), (vi) low/absent NK cell activity, (vii) hyperferritinaemia (2500 mcg/L) and (viii) increase in soluble CD25 >2400 units/mL.[3] Over 6 out of 8 criteria were met by present case report. Treatment for MAS was usually done with anti-tuberculosis and immunotherapies.[2]

Conclusion

Macrophagic activation syndrome is a critical, often unrecognised, life-threatening condition which can complicate different infectious diseases. When treating AMS-complicating tuberculosis, early anti-bacillary treatment without the use of immunosuppressive medications improves management and the vital prognosis.

References

1. Crayne C, Cron RQ. Pediatric macrophage activation syndrome, recognizing the tip of the Iceberg. Eur J Rheumatol. 2020 Feb;7(Suppl_1):S13-S20.
2. Majd R, Radi A, Laarej A, Hassani A, Abilkassem R. Macrophagic Activation Syndrome Revealing Tuberculosis: A Case Report. Asian Journal of Pediatric Research. 2024 May 1;14(6):1-4.
3. Henter JI, Horne A, Aricó M, Egeler RM, Filipovich AH, Imashuku S, Ladisch S, McClain K, Webb D, Winiarski J, Janka G. HLH-2004: Diagnostic and therapeutic guidelines for hemophagocytic lymphohistiocytosis. Pediatr Blood Cancer. 2007 Feb;48(2):124-31.