

Section: General Nursing

The use of Zinc-rich Nutrition to accelerate recovery in toddlers with acute respiratory infections

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Abstract

Acute Respiratory Infection (ARI) is a disease that affects the upper respiratory tract, lasting for 14 days or more, and is caused by microorganisms attacking one or more parts of the respiratory system. This condition is a leading cause of morbidity and mortality in children under five, accounting for 28%. ARI remains the most prevalent illness among toddlers, with its incidence increasing each year. This is due to the fact that toddlers belong to an age group that is still vulnerable to health and nutritional issues. Nutritional status is believed to influence a person's immune system, especially in toddlers. Poor nutritional status can damage the mucosa, which serves as the primary immune barrier, thus increasing the risk of ARI progressing to pneumonia. A high incidence of infectious diseases may also indicate zinc deficiency, as zinc plays a crucial role in immune function. Adequate nutrition is essential for the healing process, with protein accelerating recovery. Zinc and iron are micronutrients that significantly contribute to immune status. Zinc is the second most abundant essential element in the body, required for cell division, differentiation, and growth, and it is involved in over 300 biological functions. The case study aimed at implementing the provision of high-zinc nutrition to reduce the duration of ARI recovery in toddlers in 'Aisyah Room 3, PKU Muhammadiyah Wonosobo. This study is descriptive research with a case study design involving one patient. Data were collected using both subjective and objective assessments and observation sheets. The administration of high-zinc nutrition for 4 days in a toddler patient with ARI proved to be effective in shortening the recovery duration.

Keywords: Acute respiratory infection, complementary therapy, infection, nursing care, symptoms management

Introduction

Acute Respiratory Infection (ARI) is a disease that affects the upper respiratory tract and lasts for 14 days or more, caused by microorganisms that attack one or more parts of the respiratory system (Rogan, 2017). ARI remains the leading cause of morbidity and mortality among children. ARI refers to infections that affect the sinuses, throat, airways, or lungs, and are most commonly caused by viruses (Petat et al., 2025). Transmission generally occurs through droplets, though some pathogens may spread via contact with contaminated hands or surfaces. Risk factors contributing to the incidence of ARI include lack of exclusive breastfeeding, undernutrition, indoor air pollution, low birth weight (LBW), overcrowding, and insufficient measles immunization. The prevalence of ARI in toddlers has nearly doubled compared to the 2023 Riskesdas report, increasing from 34.2% to 41%. According to Ministry of Health (2020), the number of ARI cases in Semarang reached 311,692 in 2020. Meanwhile, data from the Semarang Health Office (July 2023) recorded 9,197 cases in males and 11,970 in females. In Wonosobo Regency, ARI ranks first among the top 10 diseases, with 6,137 reported cases. In Aisyah Room 3 at PKU Muhammadiyah Wonosobo, ARI ranks in the top five most common illnesses among pediatric patients in 2024, with 529 ARI cases out of a total of 2,182 pediatric patients.

The high incidence of infectious diseases may also indicate zinc deficiency, as zinc plays a crucial role in supporting immune function (Maywald & Rink, 2022). Zinc (Zn) is found in various food sources, with animal-based sources being more efficiently absorbed than plant-based sources (Song & Shim, 2023). The body's zinc needs can be met through diverse food items or supplements. Fish protein, in addition to being a nutritional source, also possesses functional properties beneficial to health. Adequate nutrition is an essential aspect of the healing process, where protein plays a vital role in accelerating recovery. One of the accessible and relatively affordable sources of protein is fish. The nutritional content in fish includes protein, albumin, fat, glucose, minerals, zinc, copper (Cu), and iron (Fe). Regular consumption of snakehead fish (*Channa striata*) has shown beneficial effects on wound healing and can serve as a complementary treatment in patients with other medical diagnoses. Nutrient intake is closely linked to infectious diseases. Inadequate intake can lead to decreased immune status, increasing the risk of infections such as ARI. Zinc and iron are micronutrients that play a key role in supporting immunity. Zinc is the second most abundant essential element in the body, required for cell division, differentiation, and growth, and is involved in over 300 biological functions. Zinc deficiency can lead to thymic atrophy and decreased T-lymphocyte levels. The biological activity of thymulin—a hormone produced by the thymus—depends heavily on zinc. Thymulin functions as an anti-inflammatory

agent and synergizes with zinc to suppress pro-inflammatory cytokines such as TNF- α , IL-1 β , and IL-6, which contribute to lung damage in pneumonia.

In Aisyah Room 3 at PKU Muhammadiyah Hospital Wonosobo, during the year 2024, there were 529 recorded cases of ARI out of 2,182 total pediatric patients. In December 2024 alone, 26 out of 54 ARI cases were recurrent. Preliminary studies in this unit showed a monthly increase in ARI among toddlers. Interviews with mothers revealed a lack of awareness regarding the importance of high-zinc nutrition in strengthening the immune system and promoting recovery. To date, no research has been conducted on the application of high-zinc nutrition to accelerate ARI recovery among toddlers in this setting. Therefore, this study is considered important to enhance mothers' knowledge of zinc-rich nutrition, improve child immunity, and disseminate the information for broader community benefit.

Case Description

This is the result of the nursing care report for patient G, diagnosed with ARI, based on the actual case findings. Nursing care for patient G was carried out over a period of 3 days, from June 5 to June 7, 2025, in the Aisyah 3 Ward at PKU Muhammadiyah Wonosobo Hospital. From the assessment, the patient appeared weak and feverish with a temperature of 38.6°C, had a productive cough, runny nose, and decreased appetite. The patient has a history of prior hospitalization at PKU Muhammadiyah Hospital and is currently undergoing a second admission for the same diagnosis. Given these findings during the assessment, the prioritized nursing diagnoses identified by the writer were: Hyperthermia related to disease process (infection), as evidenced by elevated body temperature, Ineffective airway clearance related to airway hypersecretion, as evidenced by excessive sputum, risk for nutritional deficit related to psychological factors (reluctance to eat), as evidenced by decreased appetite. The intervention focused primarily on the third diagnosis, Risk for nutritional deficit, with interventions aimed at fulfilling nutritional needs.

Vital signs obtained during assessment were: Temperature: 38.6°C, Pulse: 140 bpm, Respiratory rate: 28 breaths per minute, Oxygen saturation: 99%. Anthropometric data were: Weight: 13.4 kg, Height: 96 cm, Head circumference: 48 cm, Arm circumference: 16 cm. The patient appeared pale and weak, with compos mentis level of consciousness. Laboratory results showed: Leukocytes: 13.6×10^3 , Hematocrit: 34.1%, Platelets: 236,000/ μ L, Hemoglobin: 11.0 g/dL, Chest X-ray results indicated inhomogeneous opacity with a positive air bronchogram sign. The treatment administered included: IV infusion: Kaen 3B at 10 drops/min, Injections: Paracetamol 125 mg (3x/day), Ampicillin-sulbactam 250 mg (3x/day), Dexamethasone 2.5 mg (3x/day), Oral medications: Triamcinolone 1 mg (3x/day), Lapifed $\frac{1}{4}$ tablet (3x/day), Cetirizine 2 mg (3x/day), Zinc 20 mg (1x/day), Nebulizer: Pulmicort 2 mg (3x/day), Ventasal 2 mg (3x/day).

The recommended daily energy intake ranges from 1250 to 1800 kcal, while the daily zinc requirement for children is approximately 4 mg. In addition, supplementation with vitamins A and C, as well as essential amino acids, can accelerate the recovery process. The rationale behind the implementation of a soft food diet is to ensure adequate nutritional intake. Encouraging the child to consume small, frequent meals while the food is still warm also supports optimal nutrient absorption. Overall, the implementation of nutritional therapy in the form of soft foods rich in zinc—such as boiled eggs, milk, meat, and fruits like avocado and banana—is aligned with the principles of therapeutic nutrition in ARI recovery. Zinc can be used both as prophylaxis and treatment for acute and persistent ARI. To compensate for zinc loss, children can be given zinc supplements, which aid in healing and help maintain overall health. A high-zinc diet and oral zinc supplementation can reduce the duration and severity of ARI symptoms in children. In the treatment of ARI, zinc has been shown to shorten the duration of episodes. Several studies have reported that zinc supplementation reduces the length of treatment and lowers the severity of symptoms. When given regularly—whether in the short or long term—zinc has demonstrated effectiveness in preventing ARI in children. The effectiveness of zinc in treating ARI has been supported by various studies.

Zinc deficiency can have various adverse effects on health due to the essential functions of zinc in the body and its close association with infectious diseases. Zinc is classified as a micro-mineral that is vital to human health. It is absorbed in the small intestine, particularly in the proximal jejunum. During ARI, zinc plays multiple roles: it acts as an antioxidant, enhances the metabolism of vitamin A, prevents disaccharidase enzyme deficiency, strengthens the immune system, and serves as a co-factor for numerous enzymes. Inadequate zinc intake can increase the risk of ARI threefold compared to individuals with sufficient zinc intake. Adequate zinc intake in toddlers can enhance immune function, thereby helping to prevent infectious diseases such as ARI. Zinc's role during ARI includes functioning as an antioxidant, supporting vitamin A metabolism, preventing enzyme deficiencies, enhancing immune response, and serving as an enzymatic co-factor. Additional nutritional support to promote recovery includes zinc-rich foods such as boiled eggs, meat, and fruits like bananas, as well as zinc-fortified juices. During inpatient care, zinc intake was supported through meals including potato patties (bergedel), red bean and green pea soup, boiled eggs, chicken, milk, and cereal. An evaluation of zinc-rich nutritional interventions over a consecutive 3-day period showed positive outcomes in the recovery process of patients with ARI. Improvements were observed in vital signs such as body temperature, respiratory rate, pulse, oxygen saturation (SpO₂), reduced rhonchi, and overall improvement in the patient's general condition.

Discussion

Nursing care for patient was provided over a period of three days, from June 5 to June 7, 2025, in the Aisyah 3 Ward of PKU Muhammadiyah Wonosobo Hospital. Assessment serves as the foundational element of the nursing process, aimed at gathering information or data about the patient to identify physical, psychological, social, and environmental issues, as well as the patient's health and care needs. Based on the assessment conducted by the author on Saturday, June 5, 2025, at 09:30 AM WIB, patient G was diagnosed with ARI. Supporting data for this medical diagnosis included a fever with a temperature of 38.6°C, productive cough, runny nose, fatigue, and decreased appetite. In this study, the author provided nursing care for 3 consecutive days (3 x 24 hours), prioritizing the administration of a high-zinc diet. This was carried out in collaboration with a nutritionist to ensure the provision of zinc-rich nutrition, and with medical personnel for zinc supplementation.

The nutritional intake included foods such as potatoes, green peas, red beans, chicken meat, boiled eggs, guava juice, bananas, oranges, cereals, and milk. In addition, a 20 mg zinc supplement was administered once daily to further increase zinc intake in the patient's body. The evaluation of this high-zinc nutritional intervention, implemented by preparing meal plans consisting of various zinc-containing food ingredients over three consecutive days, showed positive results in supporting the recovery process of the ARI patient. This finding aligns with a study by Destania et al. (2020), which found that zinc deficiency, particularly in children, leads to a decreased immune response, thus reducing the body's ability to defend against infections. This makes children more vulnerable to infectious diseases such as ARI. Zinc can be used both as a preventive and therapeutic measure for acute and persistent ARI. To replace lost zinc, children may be given supplements that aid in the healing process and help maintain overall health. The provision of a high-zinc diet and oral zinc supplementation can reduce the duration and severity of ARI in children. In the management of ARI treatment, zinc has been shown to shorten the duration of ARI episodes. Zinc is an essential micronutrient, a component of many metalloenzymes, and acts as a coenzyme in various enzymatic systems. More than 80 enzymes and proteins containing zinc have been identified. Zinc belongs to the group of micronutrients that are absolutely necessary in very small amounts to maintain optimal life functions. Sukmawati (2020), in her study titled *Zinc Supplementation Accelerates the Recovery and Prevention of ARI in Children Aged 2–5 Years*, reported that out of 40 toddlers studied, 28 showed improvements in ARI symptoms. The incidence of ARI is not solely a nutritional issue related to zinc, but is also significantly influenced by parenting practices, access to public healthcare services, and parental knowledge—all of which affect the recurrence rate of ARI7.

Conclusion

Based on the results of the study, it can be concluded that high zinc intake in toddlers with ARI at PKU Muhammadiyah Wonosobo proved to be beneficial. The intervention focused on the provision of zinc-rich nutrition (including boiled eggs, milk, meat, bananas, guava, oranges, green peas, red beans, and potatoes) and education for the patient's family. Consistent administration of zinc-rich nutrition has been shown to accelerate the recovery process from ARI. The combination of nutritional intervention and collaboration with medical personnel in providing zinc supplementation significantly contributes to faster recovery and enhanced immune function. The benefits of this study include its potential use as a reference for future research, a foundation for subsequent academic writing, and a basis for educational development and collaborative actions in delivering nursing care to ARI patients. It is expected that future researchers can utilize the findings of this study as a foundation for developing further research, particularly those employing different research methodologies.

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