ORIGINAL ARTICLE

ROLE OF ZINC SUPPLEMENTATION IN RECOVERY OF CHILDREN WITH MEASLES AND THE DURATION OF HOSPITAL STAY: AN INTERVENTIONAL STUDY IN A TERTIARY CARE HOSPITAL

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Background: Measles contribute to considerable childhood morbidity and mortality. Emerging research suggests zinc supplementation may enhance immune function and play a role in reducing hospital stay in children with measles by shortening recovery time. Objective of this study was to determine the role of zinc supplementation in recovery of children with measles in terms of duration of hospital stay. **Methods:** This study was conducted in Department of Paediatrics, Ayub Teaching Hospital, Abbottabad from Oct 2021 to Apr 2022. A total of 117 children of either gender with signs and symptoms of measles were enrolled in this study using convenient sampling technique, after taking an informed consent from the parents or patients. All patients received zinc supplement on admission to hospital. A specially designed proforma was used for data collection. Demographic data, duration of disease, hospital stay, and vaccination status were recorded. Data was analysed on SPSS-19. **Results:** Among the 117 children, 34% were females. Age varied from 5 months to 12 years (Mean age=21.95 months), and weight varied from 4 to 30 Kg (Mean weight=9.31 Kg). Majority of the patients (56.4%) were unvaccinated while 21.4% were partially vaccinated, and 11% were fully vaccinated. Duration of hospital stay varied between 1 to 13 days (Mean stay=3.15 days). **Conclusion:** The role of zinc in reducing the duration of hospital stay in children with measles is inconclusive. Children who had history of vaccination against measles had better recovery.

Keywords: Measles, Maculopapular rash, Hospital stay, Childhood Respiratory Tract Infection, Conjunctivitis

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INTRODUCTION

Measles is caused by single-stranded RNA virus in the genus Morbilli-virus. It is highly contagious and is a notifiable childhood infectious disease.[1–3] Measles spreads through droplets infection in prodromal phase. Measles is an important cause of childhood morbidity and mortality, despite increasing vaccine coverage. The World Health Organization (WHO) estimates that before the introduction of measles vaccine in 1963 and widespread vaccination, major epidemics occurred approximately every two to three years and caused around 2.6 million deaths annually. According to WHO, 535,000 children died of measles in 2000.[2]

Global measles vaccination has significantly reduced deaths due to measles. Between 2000 and 2022, estimated measles related deaths reduced from 800,000 to approximately 107,500 (87% reduction).[2] In 2020, measles cases in Pakistan were 2,747. Cases reported from Pakistan fluctuated substantially in recent years, increasing through 2001–2020 to an estimated 2,747 in 2020.[4] Vaccination rates remain low. Zinc plays a significant role in the maintenance of normal immunological functions. Zinc is said to be crucial for effective innate and acquired immunity.[5] In children, zinc supplementation is reported to reduce morbidity, mortality, and recovery time from acute infectious diseases.[6,7] About 107,500 people died of measles in 2023 most being children younger than 5 years of age.[8] Children with measles and associated complications pose a significant health threat, as vaccination rates remain low in our province. It is important to examine the potential role of zinc supplementation in controlling the symptoms and mortality from measles in children.

MATERIAL AND METHODS

This study was carried out at the Department of Paediatrics, Ayub Teaching Hospital, Abbottabad from Oct 2021 to Apr 2022. Ethical approval was obtained from the Institutional Review Board of Ayub Medical College and Teaching Hospital, Abbottabad, Pakistan. Sampling technique applied was convenient sampling. Data regarding demographic as well as other variables was collected on a proforma. Diagnosis was made on history and physical examination. Age, gender, duration of symptoms and weight were recorded. All measles patients included in our study received zinc supplementation in dose of 1 mg/Kg/day. Duration of symptoms and hospital stay was recorded. Parents were interviewed for history of contact and vaccination. The data were input and analysed using SPSS-19. Frequency and percentage were computed for qualitative variables. Mean±SD was presented for quantitative variables like age, weight, duration of symptoms and hospital stay.

Post stratification Chi-square test was applied and $p \leq 0.05$ was considered statistically significant.

RESULTS

Of the 117 patients, 66% were males. Mean age was 21.95 months (5 months–12 years). Mean weight was 9.31 Kg. Patients presented between day 4 and 26 of appearance of clinical symptoms with mean time of presentation at day 9. Mean hospital stay was 3.15 days and varied between 1 to 13 days (Table-1).

Among them, 77 (66%) patients had a positive contact history and 28 (24%) patients had no history of exposure (exposure unknown in 12). Majority (56%) of the patients were unvaccinated, 21% were partially vaccinated and 11% were fully vaccinated. (Table-2).

A Pearson product-moment correlation coefficient was computed to assess the relationship between vaccination status & duration of hospital stay. There was a weak negative correlation between the two variables, r= -0.20, n=117, however the relationship was significant. (p<0.05) Children who had received measles vaccination had shorter recovery time (Table 3).

Fever was the most common presentation (100% patients) followed by with cough and body rash (80.34% and 86.32% respectively) (Table-4).

Table-1: Descriptive statistics (n=117)

Parameters	Mean±SD	Minimum	Maximum
Age (Months)	21.95±22.31	5	144
Weight (Kg)	9.31±4.27	4	30
Duration of signs/symptoms	9.15±3.49	4	26
Duration of hospital stay	3.15±1.93	1	13

Table-2: Frequency distribution of exposure, vaccination status and mean hospital stay (n=117)

Patients status	Frequency (%)	Mean hospital stay (days)
Positive history of exposure	77 (66)	3.11
No history of exposure	28 (24)	3.29
Unknown exposure	12 (10)	3.15
Unvaccinated	65 (56)	3.55
Partially vaccinated	25 (21)	2.62
Fully vaccinated	13 (11)	2.60
Unknown vaccination status	14 (12)	2.79

Table-3: Correlation of vaccination status and duration of hospital stay (n=117)

Correlations	Pearson Correlation Coefficient *r*	*p*
Vaccination status	-0.201	0.030*
Duration of hospital stay		

*Significant

Table-4: Clinical presentation of the patients

Clinical presentation	Number	Percentage
Fever	117	100
Cough	94	80.34
Body rash	101	86.32
Diarrhoea	59	50.43
Oral ulcer	55	47.00
Conjunctivitis	71	60.68

DISCUSSION

Because measles is so contagious, it can easily cross borders. Globally, a 20% surge in measles cases is reported in 2023 (10.3 million people infected) attributed to a decline in measles vaccination rates and low vaccinations during the COVID-19 pandemic. Pakistan is on top of list in countries with measles out breaks.[2,9]

The contagious nature of measles was evident from our study group as 77 (66%) patients had a positive contact history. Vaccination rates were low. Mean hospital stay was 3.15 days. A retrospective cohort study of 267 children with measles from Uganda reported a median length of hospital stay as 4.0 days and less than 7 days for majority.[10] A study from Turkey reported 38 children hospitalized with measles with a mean duration of hospital stay 5.13±2.67 days.[11]

A Cochrane review found only one randomized controlled trial from India, involving 85 children with measles and pneumonia. Their study showed no significant differences in mortality or time to fever resolution between the zinc and placebo groups. Evidence to support or reject the impact of zinc supplementation in children with measles wasn't enough. Due to the very low quality of the available evidence, no definitive conclusions could be made regarding the effects of zinc supplementation on clinical outcomes in children with measles.[12]

Mahalanabis D *et al*[13] found that children with severe measles and pneumonia treated with antibiotics and vitamin A did not show any additional benefit from receiving a zinc supplement. Their study concluded that zinc supplementation did not provide a clinically significant benefit when added to the standard treatment of antibiotics and vitamin A.

Naseer A *et al*[14] aimed at role of zinc supplementation in treating measles pneumonia in children, the average duration of illness was reported as 132.81±8.36 hours. Their conclusion was that duration of illness with zinc supplementation was similar to that observed in previous studies and highlighted the need for additional trials to confirm their findings.

In our study a coincidental finding was that clinical outcome was related to the vaccination status of patients. Data showed that vaccinated patients had a shorter duration of hospital stay. A higher mortality among unvaccinated children with measles was also reported in one study from Uganda.[10] Burström B *et al*[15] from rural Kenya Africa noted same.[15] They emphasized the importance of raising the measles vaccination coverage considerably to reduce mortality rates, as well as alternative ways to protect infants. Children who have not been previously vaccinated against measles infection and are infected with it experience a significantly higher mortality rate as

compared to those who were vaccinated. Rather than being a natural selection process that eliminates the weakest children, measles seems to worsen the health of many, leading to increased mortality later on. In regions with high case fatality rates, measles vaccination should be an essential component of primary healthcare.[16]

The role of zinc in measles remains uncertain. The available overall quality of evidence on this topic is considered low. The Cochrane review[12] highlighted the need for more robust research to conclusively determine the benefits of zinc supplementation in treating measles in children.

CONCLUSION

The role of zinc in reducing the duration of hospital stay in children with measles remains inconclusive. Children vaccinated for measles were found to have faster recovery as evident from shorter duration of stay.

SUGGESTIONS

Further large scale studies are required to ascertain the role of zinc in reducing the hospital stay, improving symptoms, and reducing mortality in children with measles. Studies may be done to ascertain the outcome of measles in vaccinated versus unvaccinated children.

REFERENCES

1. Minta AA, Ferrari M, Antoni S, Lambert B, Sayi TS, Hsu CH, *et al.* Progress toward measles elimination —Worldwide, 2000–2023. MMWR Morb Mortal Wkly Rep 2024;73:1036–42.
2. World Health Organization. Global measles and rubella strategic plan: 2012–2020. Geneva: World Health Organization; 2012.
3. Kliegman RM, St. Geme JW, Blum NJ, Shah SS, Tasker RC, Mason WH. Measles. In: Kliegman RM, Stanton BF, Schor NF, (Eds). Nelson Textbook of Pediatrics. 1st South Asia ed. Philadelphia: Elsevier; 2016. p. 1542–8.
4. World Data Atlas. Knoema data appliance. (Accessed 20-2-2025) Acceded from: https://opendataforafrica.org/Communicable-Diseases/Pakistan/Measles-cases/1949-2024.
5. Prasad AS. Clinical, immunological, anti-inflammatory and antioxidant roles of zinc. Exp Gerontol 2008;43(5):370–7.
6. Savarino G, Corsello A, Corsello G. Macronutrient balance and micronutrient amounts through growth and development. Ital J Pediatr 2021;47(1):109.
7. Cuevas LE, Koyanagi A. Zinc and infection: a review. Ann Trop Paediatr 2005;25(3):149–60.
8. Seither R, Yusuf OB, Dramann D, Calhoun K, Mugerwa-Kasujja A, Knighton CL, *et al.* Coverage with selected vaccines and exemption rates among children in kindergarten—United States, 2023-24 school year. MMWR Morb Mortal Wkly Rep 2024;73(41):925–32.
9. Mere MO, Goodson JL, Chandio AK, Rana MS, Hasan Q, Teleb N, *et al.* Progress toward measles elimination —Pakistan, 2000–2018. MMWR Morb Mortal Wkly Rep 2019;68(22):505–10.
10. Namugga B, Malande O, Kitonsa J, Manirakiza L, Banura C, Mupere E. The immediate treatment outcomes and cost estimate for managing clinical measles in children admitted at Mulago Hospital: A retrospective cohort study. PLOS Glob Public Health 2023;3(7):e0001523.
11. Celiloğlu C, Tolunay O, Çelik Ü. Evaluation of pediatric measles cases hospitalized in 2019. Turk Arch Pediatr 2021;56(4):328–31.
12. Awotiwon AA, Oduwole O, Sinha A, Okwundu CI. Zinc supplementation for the treatment of measles in children. Cochrane Database Syst Rev 2017;6(6):CD011177.
13. Mahalanabis D, Chowdhury A, Jana S, Bhattacharya MK, Chakrabarti MK, Wahed MA, *et al.* Zinc supplementation as adjunct therapy in children with measles accompanied by pneumonia: a double-blind, randomized controlled trial. Am J Clin Nutr 2002;76(3):604–7.
14. Naseer A, Saeed F, Aamer F. Role of Zinc Supplementation in Treating Measles Pneumonia in Children. Esculapio JSIMS 2017;13(2):61–4.
15. Burström B, Aaby P, Mutie DM. Child mortality impact of a measles outbreak in a partially vaccinated rural African community. Scand J Infect Dis 1993;25(6):763–9.
16. Aaby P, Bukh J, Lisse IM, Smits AJ. Measles vaccination and reduction in child mortality: a community study from Guinea-Bissau. J Infect 1984;8(1):13–21.

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