

## Zinc Deficiency Amongst Adolescents in Delhi

A cross sectional study was conducted in 260 adolescent schoolchildren (114 males) in the age group of 11-18 years to estimate the prevalence of zinc deficiency in the National Capital Territory of Delhi. Serum zinc was estimated using Inductively coupled plasma mass spectrometer. Overall, 49.4% children (50.8% males, 48.2% females) were found to have a deficient zinc nutriture.

**Key words:** Adolescent, Children, Status, Zinc.

There is limited scientific data on prevalence of zinc deficiency amongst adolescent children in India. We conducted a cross-sectional study in the National Capital Territory of Delhi. All schools were listed. The Government and Municipal Corporation schools were considered to be catering to low income group (LIG) communities, Kendriya Vidyalayas schools to middle income group (MIG) communities, whereas, the private public schools with tuition fees above Rs. 1000 per month were considered to be catering to high income group (HIG) community. A total of 90 schools (30 from each of the three socio-economic groups) were selected by using the probability proportionate to size sampling methodology. The study was approved by the Ethics Committee of All India Institute of Medical Sciences, New Delhi. A prior consent for the study was taken from the school administration. The parents of each student were informed about the study protocol and written consent was obtained for their child's participation in the study. The sample size was calculated assuming the prevalence of zinc deficiency as 50 % as reported by an earlier study in Sri Lanka [1]. Confidence level of 95% and 15% relative precision (absolute 7.5%) were considered. A sample size of 180 adolescent children (11-18 years) was considered adequate for this study.

We are reporting data on prevalence of zinc deficiency amongst adolescent children from a large study [2] which documented the prevalence of obesity and associated disorders amongst adolescent children. A pre-tested, semi structured questionnaire was administered to each subject to elicit information on socio-demographic profile. Anthropometric measurements were recorded utilizing the standard equipments and methodology. Weight was

recorded to nearest 100 grams using SECA electronic weighing scale. Height was recorded using the anthropometric height board to the nearest 0.1 cm. Three reading of height and weight were taken and the mean of the last two readings was considered as final. For the present study, using random number table, 260 blood serum samples were selected of children (11-18 years) covered in the above study. The samples were stored at  $-70$  degree Celsius until analysis. Analysis of serum zinc was carried out using Inductively coupled plasma mass spectrometer (ThermoFisher, X-Series 2) in the NABL accredited laboratory of ICMR. The instrument was calibrated using single element standard of zinc (ICP Grade, Merck) and samples were diluted 50 folds using 1%  $\text{HNO}_3$  (Suprapure Grade, Merck). Gallium was used as an internal standard. Further, two levels of certified reference material-Seronorm Trace element serum (Sero, Norway) was run with every batch of twenty samples to ensure the accuracy of results.

Serum zinc level  $<74$   $\mu\text{g/dL}$  for male children and  $<70$   $\mu\text{g/dL}$  for female children above 10 years of age was considered as zinc deficiency as recommended by International Zinc Consultative Group [3]. A total of 260 children (114 males) were included in the study (mean age 14.4 years). The mean  $\pm$  SD serum zinc levels were  $74.0 \pm 15.49$   $\mu\text{g/dL}$ . Overall, a total of 49.4% (95% CI: 43.0% to 55.5%) children had zinc deficiency. The deficiency amongst adolescent boys and girls was 50.8% (95% CI: 41.3% to 60.3%) and 48.2% (95% CI: 39.6% to 56.3%), respectively.

Although severe zinc deficiency is rare, mild-to-moderate zinc deficiency is quite common throughout the world. Our results are comparable to earlier studies conducted in Sri Lanka [1] and Tehran [5]. A study on 187 adolescent school girls in eastern Sudan reported only 9% girls to be zinc deficient ( $<75$   $\mu\text{g/mL}$ ) [6]. A review of studies published from 2002-2009 conducted amongst several developing countries documented the prevalence of zinc deficiencies in the range of 20% to 30% [7]. Studies carried out in various age groups have reported a widespread prevalence of zinc deficiency in India ranging from 50% to 75% in pregnant women [8,9] and around 40% to 75% in children [10,11]. The findings of the present study revealed a high prevalence of zinc deficiency

amongst adolescent children belonging to high, middle and low economic groups in National Capital Territory of Delhi.

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## Neurodevelopmental Outcome Following Whole Body Cooling for Perinatal Asphyxia

This follow-up study conducted on children who underwent therapeutic cooling for hypoxic ischemic encephalopathy, showed normal neurodevelopmental outcome with normal milestones and normal developmental quotient in a minimum of 60% of children at 18-24 months of age. This study shows comparable neurodevelopmental outcome in infants who underwent cooling in a resource poor setting, when compared with existing literature.

**Key words:** *Cooling, Therapeutic hypothermia, Hypoxic ischemic encephalopathy, Neurodevelopmental outcome.*

Meta-analysis of the various cooling trials from developed countries has shown conclusively that therapeutic

hypothermia reduces death and disability following hypoxic ischemic encephalopathy (HIE) and has now become the standard of care in these countries [1]. There have been doubts raised as to whether cooling should be practiced in developing countries like India due to concerns of availability of alternative cheaper equipment and differences in patient population [2,3]. In a previous study, we demonstrated the safety and feasibility of cooling babies with HIE in India using low cost and easily available material [4]. However, in addition to short term safety and outcome, it is important to look at the long term outcome of these babies. The present study was conducted to evaluate the neurodevelopmental outcome of the 20 babies who underwent whole body cooling for HIE in the neonatal period [4]. We were able to evaluate at 18-24 months, 14 of the 19 (73.7%) babies who were discharged alive. A detailed history was taken from all the parents regarding the age of achievement of important milestones. The Griffith Mental Developmental Scales (GMDS) and Vineland Social Maturity Scales (VSMS) were done on 11 children.