

Effects of Enteral Insulin on Hypoxic Changes in a Rat Model of Necrotizing Enterocolitis

The aim of this study was to determine if oral administration of insulin would protect intestinal cell damage in a hypoxia-induced experimental NEC model in rats. Rats were subjected to hypoxia-reoxygenation and then were returned to standard conditions, other were treated with insulin. According to our results, oral insulin does not prevent mild intestinal mucosal changes during hypoxic injury in rats.

Key words: *Hypoxia, Insulin, Necrotizing enterocolitis.*

Necrotizing enterocolitis (NEC) in preterm infants is characterized by various degrees of mucosal or transmural necrosis of the intestinal tissue, and is a major cause of morbidity and mortality(1). Experimental studies have suggested that both insulin-like growth factor I (IGF-I) and II (IGF-II) are involved in modulation of growth and differentiation of normal small bowel(2) and protection of intestinal mucosa from hypoxia and apoptosis(3,4). Low serum IGF-I values were also found to be correlated with NEC in preterm infants(5). Beneficial effects of oral insulin on intestinal recovery following ischemia-reperfusion injury have been shown in rat(6). The purpose of this study was to determine whether enteral insulin protects intestinal cells from hypoxia induced NEC in an animal model.

Hypoxia was accomplished by placing the pups in an airtight Plexiglas (Rohm & Haas, Philadelphia, PA) chamber (Vacunit; Echmann, England), which was perfused with 100% CO₂ for five minutes. Following hypoxia, the animals were reoxygenated for five minutes with 100% oxygen. Group 1 (untreated, *n*=9) rats served as untreated control group after hypoxia-reoxygenation. Group 2 (insulin treated, *n*=11) were subjected to hypoxia-reoxygenation (HO), and were treated with enteral

insulin (Humulin, Lilly, Fegersheim, France) beginning 15-20 minutes following HO, and given by orogastric route once a day at a dose of 10 U/kg body weight for five days. Representative 1 cm long specimens were taken for histological study from duodenum, proximal, mid and distal small intestine, proximal and distal colon. All seven histological sites were calculated for each case and a mean result was compared. The specimens were dehydrated and embedded in paraffin wax using standart techniques and sections were stained with hematoxylin and eosin. Samples were taken randomly from each specimen (seven part of one case) and graded microscopically in a blinded fashion on a scale from 0 to 4 according to grading system proposed by Clark, *et al.*(7).

The lesions in the untreated rats had similar histopathologic findings as seen in neonatal NEC, but intestinal damages were not severe. Intestinal injury median score was 0.39 (range 0.33-0.66) in the untreated group. Insulin treated group had a median score of 0.44 (range 0-0.66) (*P*=0.50).

Intestinal ischemia and the effects of hypoxia have been studied by several animal models. Hypoxia is associated with decreased mucosal blood flow and mucosal ischemic changes in neonatal rats(8). In another animal trial, enteral administration of insulin led to a higher lactase activity and less feed intolerance(6).

We conclude that insulin does not reduce hypoxic changes on the intestines in an experimental model of NEC. Further animal studies are needed to clarify protective effect of insulin on more severe intestinal damage during experimental NEC as well as with higher doses of insulin.

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Snack Consumption among Underprivileged Adolescent Girls

We conducted this school based cross-sectional study to assess the snack consumption pattern of 702 adolescent girls (11-14 years) in nine government schools selected from three districts of Delhi. The results indicated high preference for snacks. Parents and teachers were identified as the most influential factors determining their food choices.

Key words: *Adolescent, Girls, Snacks.*

Children and adolescents have reported frequent snacking that can be a significant contributor to the energy content of their diets(1). This affects the consumption of normal nutritious diet. A study among school children in Nepal revealed that fast foods were preferred by more than two-thirds, and

that advertising influenced preferences in 80% of them(2). Habits acquired in adolescence persist into adult life. Therefore behavior developed in young people may have important long-term consequences on health.

We conducted a school based cross-sectional study in nine government girl's schools, randomly selected from three districts of Delhi. Prior written permission was taken from the Directorate of Education (Government of National Capital Territory of Delhi). Informed written consent was obtained from the principals of selected schools, concerned teachers, students and their parents. From each of the selected schools, one section of each grade (VII and VIII) was chosen randomly. All the students present at the time of administration of questionnaire in each section formed the study sample. Thus the study sample comprised 702 adolescent girls (11-14 years). A questionnaire was developed to elicit information regarding the consumption of different type of snacks, purchasing