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Increased weight, height seen in picky eaters given a nutritional supplement

Alarcon et al. Effect of oral supplementation on catch-up growth in picky eaters. Clin Pediatr 2003;42:209-17.

Picky eaters who were given a nutritional supplement for 90 days plus nutrition counselling experienced significantly greater increases in weight and height than those who received nutrition counselling alone, according to a joint Taiwan/Philippines study. The incidence of upper respiratory tract infections was also significantly lower in the supplemented group than in controls.

Dr. Pedro Alarcon of Illinois and multicentre colleagues investigated whether physician-directed nutritional counselling, with and without nutritional supplementation, improved the growth of children who had picky-eating behaviours and evidence of growth faltering. Growth faltering was defined as failure to gain, or actual loss of weight, or a weight gain less than a specified value over a given period.

A total of 104 children between 36 and 60 months of age were randomized to receive nutritional counselling alone or nutritional counselling plus an oral supplement designed to provide complete balanced nutrition for children between the ages of 1 and 6. There were no significant differences between groups at baseline for weight, height, height-for-age percentile, weight-for-height percentile or activity level, although weight-for-age percentile was significantly greater in the supplemented group compared with controls.

At 60 and 90 days, children in the supplemented group showed greater increases in weight-for-height percentiles than control infants. More specifically, “subjects in the study [supplemented] group had significantly greater increases in weight, weight-for-age percentile, height, and height-for-age percentiles compared to those in the control group,” the authors stated, “and these differences were significant ($P < 0.05$) at all time points with the exception of height-for-age at day 30.” In contrast, no significant differences were seen in either activity or appetite levels between treatment groups, nor were any significant differences seen in GI symptom scores. Intriguingly, only 28% of children receiving the oral supplement developed an upper respiratory tract infection over the study interval vs. 51% of control children.

As the authors pointed out, children enrolled in this study had poor eating behaviours and were below the 25th percentile in weight-for-height at study outset. “Fortunately, children who experience poor weight gain or growth faltering can experience catch-up growth, during which the child grows more rapidly

than usual so that he/she catches up to or toward his/her original growth curve,” investigators observed. The supplement used in the study was well accepted by the children (over 82% of the children consumed >40 mL/kg/day for over 60 days), for an average of 540 additional calories per day in addition to protein, vitamins and minerals.

“Results from the present study suggest that a nutritionally balanced supplement with nutrition counselling promotes catch-up growth, can play an important role in the dietary management of picky eaters, and may contribute to lower rates of infectious disease,” the authors concluded.

Boys and girls, teens and small children can be equally picky eaters

Jacob C, Schnitz G, Agras S. Is picky eating an eating disorder? Int J Eat Disord 2008;41:626-34.

According to a German study, picky eating is as prevalent in preadolescent children as it is in younger children, nor are there any noticeable differences between boys and girls.

Prof. Corinna Jacobi, Institute for Clinical Psychology and Psychotherapy, Dresden, and multicentre colleagues examined the relationship between picky eating, eating-related correlates of picky eating confirmed by previous studies, other child eating and behavioural problems and maternal eating problems. “Participants were 426 third- to fifth-grade children (age range, 7.7 to 12.7 years) enrolled in six schools and 23 classes in a small town community in Germany,” the authors noted.

Children were classified as picky eaters based on the question, “Is your child a picky eater,” and answers were rated on a 5-point scale. Additional child attitudes and behaviours of disturbed eating were obtained from the McKnight Risk Factor Survey, while children’s food preferences and avoidances as reported by the child’s mother were assessed by a slightly modified food preference list. Behavioural problems were also assessed using the Child Behavior Checklist and maternal measures of eating disturbances were similarly assessed via multiple questionnaires.

“Overall, 19% of girls and 18% of boys were picky eaters,” investigators reported.

They indicated that previous studies had demonstrated that picky eating is a relatively frequent phenomenon in children up to seven years of age. Body mass index (BMI) did not differ significantly between picky and non-picky eaters: the mean BMI

was 17.16 and 17.67 for picky and non-picky eaters, respectively. However, picky and non-picky eaters did differ significantly on all the child eating behaviours previously found to be correlates of picky eating. Specifically, picky eaters were reported to eat a more limited number of foods, to require special preparation of foods more often, to show a lower acceptance of new foods, to be more inhibited about food and to express special food preferences more often than non-picky eaters.

Results from the Food Preference Questionnaire also indicated that picky eaters avoid more dairy products, fruits, vegetables, meat, fish, fast food, noodles/potatoes/rice and beverages than non-picky eaters. “Mothers of picky eaters also reported more struggles around food, reported to prepare separate meals for their child more often and to be worried more often that their child’s weight was too low,” the authors added. Mothers of picky eaters also seemed to be more concerned about being thin than mothers of non-picky eaters.

“Our study does not support the notion that picky eating in 8- to 12-year-old children is related to specific symptoms of disturbed eating such as dieting, binge eating, feeling too fat or weight control behaviours which may be precursors of subsequent adolescent eating disorders,” investigators observed. Results did support a link between picky eating and a wide range of behavioural problems, including more symptoms of withdrawal, more somatic complaints, more symptoms of anxiety and depression and higher levels of aggressive or delinquent behaviours compared with non-picky eaters.

Oral supplementation can improve nutritional status of underweight preschool children

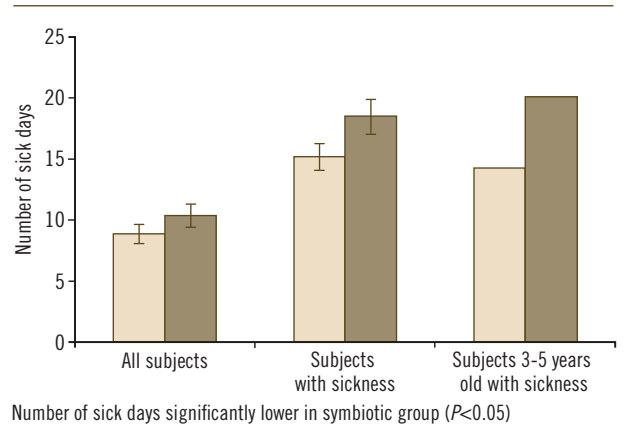
Fisberg et al. Effect of oral nutritional supplementation with or without synbiotics on sickness and catch-up growth in preschool children. Int Pediatr 2002;17(4):216-22.

Oral supplementation with a nutritionally complete product at an average intake of 40 mL/kg/day can improve the nutritional status of underweight preschool children, as demonstrated by both catch-up growth rates and a decrease in the average number of sick days per month seen in both groups.

Dr. Mauro Fisberg, São Marcos University, São Paulo, Brazil, and multicentre colleagues sought to determine the efficacy and tolerability of two pediatric nutritional products, one of which was fortified with synbiotics, in reducing morbidity in mildly to moderately malnourished young children. Subjects were randomized to receive either an oral supplement with synbiotics (experimental group) or without synbiotics (control group). A total of 626 children received one of the two supplements in roughly equal numbers. Children were enrolled if they were 1 to 3 standard deviations (SDs) below the median weight/height.

At the end of the four-month study, the number of sick days per month decreased significantly in both feeding groups, although the rate of the decrease in sick days was more pronounced in younger children as children between 1 and 2 years of age had

Figure. Mean (SEM) Number of Sick Days



a higher incidence of sick days during the first three months of the study. “In a pooled analysis of all subjects, there were no significant differences between feeding groups for the incidence of illness, number of sick days, or number of sick episodes... or for the number of sick episodes requiring antibiotics,” investigators added. However, the number of days of constipation was, significantly lower in the experimental group who received the synbiotic-fortified supplement.

Investigators also found that the percentile of weight for height increased in both groups over the four-month treatment interval, from a mean of 8.1st to 17.6th percentile for the experimental group, and from a mean of 8.3rd to 19.1st percentile for the control group. As the authors observed, the lack of a significant difference in sick days between groups might be attributed to the benefit of supplementation overshadowing the benefit of the synbiotics in this underweight population, even though children between the ages of 3 and 5 in the experimental group had fewer sick days than those in the control group.

After study completion, 46% of children were within 1 SD below the median weight for height percentile, while for those who were malnourished at baseline (more than 2 SDs below the median), 77% were no longer malnourished at study end point.

“This suggests that the beneficial impact of the dietary treatment was more pronounced in those children that were in a more severe growth faltering status (malnourished children),” the authors indicated, “and this increase in percentiles is consistent with catch-up growth.”

Exclusive breast-feeding best for atopic disease prevention in high-risk infants

Bhatia J, Greer F; American Academy of Pediatrics Committee on Nutrition. Use of soy protein-based formulas in infant feeding. Pediatrics 2008 May;121(5):1062-8.

Expert consensus continues to support exclusive breast-feeding for the first 4 to 6 months of age—plus a delay of solid foods during the same interval—as the single most effective strategy in helping prevent infants at risk for atopic disease from developing future allergies.

As the American Academy of Pediatrics (AAP) note in their 2008 recommendations, an infant is considered to be at high risk for food allergies if either one parent or one sibling has a history of allergic disease including hay fever, asthma or food allergies.

Other key recommendations in the AAP 2008 guidelines to minimize the risk of food and other allergies include the following:

- ▶ There is no convincing evidence that maternal dietary restrictions during either pregnancy or lactation prevents atopic disease.
- ▶ There is modest evidence that atopic dermatitis may be delayed or prevented by the use of extensively or partially hydrolyzed formulas compared with infants fed cow's milk formula in early childhood (i.e. infants who are not breast-fed exclusively for 4 to 6 months or infants who are formula-fed). However, extensively hydrolyzed formula may be more effective than partially hydrolyzed formulas in the prevention of atopic disease. Thus if a mother cannot breast-feed, an extensively hydrolyzed infant formula such as Alimentum or Nutramigen may reduce the risk of high-risk infants from becoming allergic to food or other allergens.
- ▶ Solid foods should not be introduced before the infant is 4 to 6 months of age and one at a time. On the other hand, there does not appear to be any further protective effect against the development of atopic disease by delaying the introduction of food beyond this age range. Foods considered to be most allergenic are eggs, fish and peanuts.
- ▶ Even fruits and vegetables which are not likely to cause allergies should be introduced one at a time to make sure infants tolerate the food and they should be introduced cooked, not raw.

Nucleotides in human milk may account for clinical performance of breast-fed infants

Carver JD. Dietary nucleotides: effects on the immune and gastrointestinal systems. *Acta Paediatr* 1999;430(Suppl):83-8.

Dietary nucleotides (NTs) in human milk may contribute to the superior clinical performance of breast-fed infants because infants fed NT-supplemented formula have a lower incidence of diarrhea, higher antibody titres following certain vaccinations and higher natural killer-cell activity than infants fed non-supplemented formula.

Dr. Jane D. Carver, University of South Florida College of Medicine, Tampa, reviewed the effects of dietary NTs on both the GI and immune systems in animal studies and in studies involving infants. For example, in the GI tract, the NTs are reported to play a role in growth and differentiation of the GI tract. "Dietary NTs may also be beneficial following intestinal injury," she observed. Most of the studies evaluating the function of the NTs in the gut have been carried out in animal models but in one study, Bruser et al. (*Acta Paediatr* 1994;883:188-91) reported that infants living in a relatively contaminated environment who received a NT-supplemented formula had fewer first episodes of diarrhea than infants who did not.

As Dr. Carver also reviewed, dietary NTs also help maintain the immune system. While many of the studies have been carried out in animals, one in particular investigated responses to immunization in infants fed a milk-based formula with or without supplemental NTs. Another group of infants were fed human milk exclusively for two months, then human milk or the non-supplemented control formula up to 12 months of age.

Results showed that infants fed the supplemented formula had significant higher serum levels of *Haemophilus influenzae* type b and diphtheria antibody concentrations one month after the third immunization compared to control formula infants, and that this response persisted at 12 months. Increased natural killer-cell activity and IL-2 production were also observed by Carver et al. (*Pediatrics* 1991;88;359-63) in infants fed NT-supplemented formula or human milk compared with infants fed non-supplemented formula. As Dr. Carver observed, human milk contains significantly higher levels of nucleotides and nucleotide derivatives compared with unsupplemented cow's milk-based infant formula.

Thus, "an exogenous supply of NT may be important during infancy, when growth is rapid and NT requirements are increased to provide for nucleic acid synthesis," Dr. Carver suggested, adding that this may be "especially important" for premature infants, since preterm birth is associated with limitations of many metabolic functions and limited opportunity to breast-feed. Today's formulation of Similac Advance contains the same amount of nucleotides as human breast milk, namely at least 72 mg/L.

BMC, BMD lower in infants fed palm olein-containing formula

Koo et al. Reduced bone mineralization in infants fed palm olein-containing formula: A randomized, double-blinded, prospective trial. *Pediatrics* 2003;111:1017-23.

Healthy term infants fed a formula containing palm olein (PO) as its predominant fat had significantly lower bone mineral content (BMC) and bone mineral density (BMD) at the end of six months than infants fed a formula that did not contain PO, according to a US-based study.

Dr. Winston Koo, Hutzel Women's Hospital, Wayne State University, Detroit, Michigan, and multicentre colleagues carried out a randomized, double-blind, prospective trial to determine if PO as used in commercially available infant formulas resulted

in decreased bone mineralization compared with a PO-free formula. "The two study formulas were cow milk protein-based, one with PO as the predominant oil ... and the other without PO," Dr. Koo and colleagues recorded. Both formulas met or exceeded the minimum levels of nutrients recommended by the American Academy of Pediatrics Committee on Nutrition. A total of 128 infants were randomized into the study, 102 of whom completed the study through six months. The primary analyses were carried out on an intent-to-treat (ITT) basis but analyses were also done on an evaluable subject basis (EVS), which included subjects who received the assigned study formula throughout the six-month trial.

"There were no significant differences in the daily frequency of feeding between the two feeding groups for either the ITT or the EVS analyses," the authors reported. Nor were there any differences between feeding groups in average daily formula intake. In general, growth was similar in both study groups, the authors added, and there were no significant differences in weight, length or head circumference between infants in either study group over the six-month trial course.

However, infants fed the PO-containing formula had significantly lower overall BMC than infants fed the PO-free formula and this was true at both three and six months of age. Specifically, gain in BMC over the six-month feeding interval averaged 9.5% lower in PO formula-fed infants compared with a gain in BMC in infants fed the formula without PO. Gains in BMD over the same six months averaged 11.1% lower in the PO formula group compared with the PO-free formula group, Enfamil with iron vs. Similac with iron. "The current study extends clinical observation that the use of PO in infant formula decreases calcium absorption," Dr. Koo and colleagues stated.

Whether these differences would persist beyond six months is not known, since no study has observed total body bone mass accretion in infants fed the same formula for the first year of life. However, "since human milk or infant formula remains the dominant source of calcium throughout infancy, it is conceivable that the lower rate of bone mass accretion would persist as long as the same formula is being fed," the authors observed, "and the practical implication [of this study] is that the goal of osteoporosis prevention through optimizing bone growth and thus peak bone mass can begin during fetal life and infancy."

Managing feeding resistance and other priorities

World renowned paediatric gastroenterologist visits South Africa. S Afr J Clin Nutr 2008;21(1):45.

Parents need to feed their children well but avoid being fanatical about eating, according to prominent pediatric gastroenterologist Dr. Benny Kerzner, Professor of Paediatrics, George Washington University School of Medicine, Washington, DC, who noted that there are other things in the life of a child that are just as important as nutrition.

Dr. Kernzer delivered a series of recent lectures on oral feeding resistance in young children to medical and nutritional professionals during a recent invited visit to South Africa. Among his suggestions for feeding principles that parents could use to encourage proper nutrition and healthy eating habits among young children were the following:

- ▶ Avoid distractions while eating—food should be eaten in a calm environment.
- ▶ Adopt a neutral attitude to eating behaviour—avoid excess praise, criticism, stimulation and coercion.
- ▶ Feed at specific intervals and avoid snacking to encourage appetite—feed three to four hours apart and nothing in between.
- ▶ Limit the duration of meals—meals should last between 20 and 30 minutes, or 15 minutes if the child is not eating.
- ▶ Use age-appropriate foods—teeth come in at five months and so should solids.
- ▶ Introduce novel foods one at a time and expose the child to the food up to 15 times before assuming it will not be taken.
- ▶ Encourage independent feeding.
- ▶ Tolerate age-appropriate messiness when eating.

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