Childhood nutrition, stimulation, sanitation and hygiene education on development, gut microbiota and growth among children in rural Uganda: A cluster randomized controlled trial

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Abstract (300 word limit)

Statement of the Problem: Undernutrition and its consequences among children in developing countries is a major health challenge. About 200 million children below five years worldwide not meeting their development potential are undernourished. Global cost of undernutrition is manifested as low productivity in adulthood of undernourished children with impaired central nervous system (CNS) Nutrition, sanitation, hygiene, and various living environments of the children are linked to changes in gut microbiota composition and stability. To this end, a healthy microbiota is regarded as necessary for adequate child development. Recently, research has provided new insights on how the CNS and thus cognitive development may be influenced by the microbiota "gut-brain axis. Current study examined development and growth among the children at three years. In addition we assessed the gut microbiota and its possible association with growth and development among these children at 20-24 and at 36 months. Methodology & Theoretical Orientation: Cluster randomized controlled trial (511 dyads) of mothers and infants aged 6-8 months recruited in 2013 A subsample of 155 mother-child pairs (30% of the original cohort) was re-enrolled in 2015 when children were 20-24 months for assessment at 36 months. The children were randomised into two groups of intervention: nutrition, stimulation, sanitation and hygiene (n= 263) and control: routine health care (n= 248) originally. Data collectors were masked to group allocation. The primary outcome was cognitive development assessed by Bayley Scales of Infant and Toddler Development-III (BSID-III). Findings: The intervention group had significantly higher BSID-III cognitive mean differences language and motor scores as well as Length-for-Age-Z-scores at 36 months.
No differences were found in gut microbiota diversity between the two groups. Conclusion & Significance: The education intervention delivered by trained professionals improved child development. Lack of effect on the gut microbiota diversity requires more research on factors affecting gut microbiota diversity.

Image

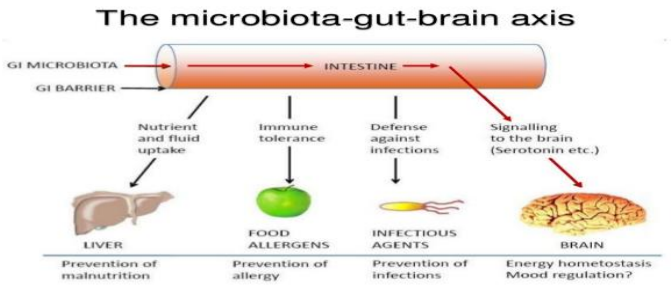


Figure 1: Gut microbiota strongly impacts the brain function. Moreover the gut microbiota stability is profoundly affected by nutrition. Source : Nature reviews.

Recent Publications (minimum 5)

1. Black RE, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J(2008)
   Maternal and child under nutrition: global and regional exposures and health consequences. Lancet 371:243–60.
2. Grantham-McGregor SCY, Cueto S, Glewwe P, Richter L, et al (2007) Developmental potential in the first 5 years for children in developing countries. Lancet 369:60–70.
3. Nurliyana AR, Mohd Shariff Z, Mohd Taib MN, Gan WY, Tan KA (2016) Early nutrition, growth and cognitive development of infants from birth to 2 years in Malaysia: a study protocol. BMC Pediatr 16(1):160.
4. Hill CJ, Lynch DB, Murphy K, Ulaszewska M, Jeffery IB, O'Shea CA, et al (2017) Evolution of gut microbiota composition from birth to 24 weeks in the INFANTMET Cohort. Microbiome 5(1):4.
5. Kane AV, Dinh DM, Ward HD. Childhood malnutrition and the intestinal microbiome (2015). Pediatric research 77(1-2):256-62.
6. Noble EE, Hsu TM, Kanoski SE (2017) Gut to Brain Dysbiosis: Mechanisms Linking Western Diet Consumption, the Microbiome, and Cognitive Impairment. Frontiers in behavioral neuroscience11:9.



Biography (150 word limit)

PRUDENCE ATUKUNDA has her expertise in neuropsychological assessments, clinical psychology, public health and passion in working with children and their caregivers living in impoverished communities with the aim of improving their health and wellbeing. She has been engaged in a clinical trial focusing on nutrition, stimulation, and hygiene and sanitation education in rural communities of South Western Uganda in East Africa. Together with her research team, they have established mother groups in rural communities and empowered them with nutrition, child stimulation, sanitation, and hygiene skills aimed at improving child development and growth since 2013 to date. Our research foundation has aimed at reaching out to the least privileged and hard to reach communities using low cost interventions aimed at achieving long term scientifically proven goals. This has driven us to be part of the recent investigators of the Gut-Brain Axis which is strongly linked to child development and growth.

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