

## **THE EFFECT OF TACTILE–KINESTHETIC STIMULATION ON BONE MINERALIZATION AND LENGTH AMONG STUNTING CHILDREN**

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Stunting is growth faltering caused by poor nutrition, recurrent infections, and a lack of psychosocial stimulation, indicated by length for age z-score more than two standard deviations below the WHO Child Growth Standard. Growth faltering is associated with impaired osteocalcin production, a biomarker that plays a role in bone mineralization and growth processes. To prevent and overcome stunting, nutrition and adequate stimulation, such as tactile and kinesthetic stimulation (TKS), are needed.

This study investigated the effects of TKS on bone mineralization and body length among stunting children.

Eighty stunting children (mean of age  $8 \pm 1,71$ ) were randomly assigned into two groups (n = 40 for each group). TKS was administered by trained parents twice daily for three months in the intervention group. The control group was given a routine care stunting program from the government. The bone mineralization through osteocalcin examination and body length in both groups were measured pre-and post-intervention.

During the twelve-week TKS period, the intervention group had a significant increment in length and osteocalcin compared to the control group ( $p < 0.005$ ) at 3.17 cm and 11.5 ng/ml, respectively. Moreover, this study also showed that TKS demonstrated a strong positive correlation between osteocalcin levels on improving length ( $p < 0.05$ ). The TKS treatment could increase the length of stunting children by 86.5%.

TKS significantly promoted bone mineralization, particularly osteocalcin levels and length among stunting children. There was also a strong correlation that TKS could elevate the length by 0.865 times.

**Keywords** : Tactile – Kinesthetic, Bone Mineralization, Osteocalcin, Length, Stunting