

ENGINEERING TRANSITIONAL DYSPHAGIC FOOD

Name: Satheeshkanth SSM (2019RDZ8400)
Supervisors: Prof. J.K. Sahu & Prof. S.N. Naik

Abstract: Dysphagia, a condition that compromises safe swallowing, leads to complications such as choking, pneumonia, and malnutrition that increase the fatality rate and necessitate comprehensive diagnostic and therapeutic interventions. Majorly, the elderly population suffers from dysphagia. According to the WHO, by 2030, one in six people globally will be aged 60 or older. Therefore, the development of safe, textured foods is essential to address this escalating health concern. This study presents a transformative approach to develop plant-based, bite-sized transitional foods with additive manufacturing technology, precisely engineered to meet International Dysphagia Diet Standardisation Initiative (IDDSI) guidelines, particularly for the elderly vegan population. Key innovations leverage 3D printing to achieve accurate control over food texture, structure, and nutritional content. Innovative formulations combining treated horse gram and defatted chia seed flour, together with optimized printing and post-processing, produced ready-to-eat transitional vegan meat that safely transition from solid to soft, swallow-friendly textures. Integration of biosensor studies facilitated detailed monitoring of texture and swallow safety, strengthening the data on product efficacy and patient compatibility. 3D printing ensures consistent, IDDSI-compliant foods with customizable nutrition and appealing appearance, surpassing the limits of traditional pureed diets. In residential care environments, these ready-to-eat therapeutic foods significantly reduce caregiver workloads, minimize the need for skilled labour in meal preparation, and guarantee high-quality nutrition for residents with swallowing difficulties. This approach addresses major operational challenges in dysphagia food provision while supporting patient safety and acceptance. Comprehensive analytical, sensory, biosensor, and shelf-life evaluations validate the safety, acceptability, and practicality of this approach. Importantly, this research underscores the multidisciplinary and industrial scalability of 3D-printed dysphagia foods enabling broader clinical application, streamlined production, and personalized nutrition at scale. Collectively, the research findings provide a robust scientific foundation for advancing dysphagia management through additive manufacturing technologies, promising improved patient outcomes and reduced healthcare burdens associated with swallowing disorders.

Keywords: *Dysphagia; IDDSI; Food printing; Vegan transitional food*