NUTRITIONAL STATUS AND DIETARY HABITS OF INTELLECTUALLY DISABLED SCHOOL CHILDREN

PROJECT SUBMITTED

In partial fulfilment of requirement for the award of the degree of

B. Sc. NUTRITION AND DIETETICS

BY

GIFTY JOJO

(Register No: SB22ND022)

DEPARTMENT OF CLINICAL NUTRITION AND DIETETICS

ST. TERESA'S COLLEGE (AUTONOMOUS)

ERNAKULAM

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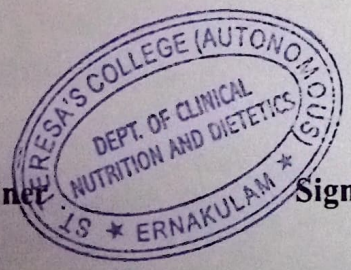
CERTIFIED AS BONAFIDE RESEARCH WORK



Signature of Internal Examiner **Signature of External Examiner**

DECLARATION

I hereby declare that the project entitled **"NUTRITIONAL STATUS AND DIETARY HABITS OF INTELLECTUALLY DISABLED SCHOOL CHILDREN"** submitted in partial fulfilment of the requirement for the award of the degree of B. Sc. Nutrition and Dietetics is a record of original research work done by me under the supervision and guidance of **Ms. NAMITHA PRASTHEENA JOSEPH**, Assistant Professor, Department of Clinical Nutrition and Dietetics, St. Teresa's College (Autonomous), Ernakulam and has not been submitted in part or full of any other degree/diploma/fellowship or the similar titles to any candidate of any other university.

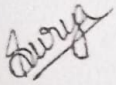
Place: Ernakulam

Date: 02-05-2025

GIFTY JOJO

CERTIFICATE

I hereby certify that the project entitled **"NUTRITIONAL STATUS AND DIETARY HABITS OF INTELLECTUALLY DISABLED SCHOOL CHILDREN"** submitted in partial fulfillment of the requirement for the award of the degree of B. Sc. Nutrition and Dietetics is a record of original work done by **Ms. GIFTY JOJO** during the period of the study under my guidance and supervision.



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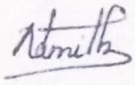

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

CHAPTER-I
INTRODUCTION

Intellectually Disability (ID) is a neurodevelopmental disorder characterized by significant limitations in both Intellectually functioning and adaptive behaviours, which covers a range of everyday social and practical skills. These limitations originate before the age of 18, during the developmental period of life. The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), classifies Intellectually disability into four levels of severity: mild, moderate, severe, and profound. Each level presents a different degree of cognitive and adaptive impairment, which often results in challenges in reasoning, learning, planning, abstract thinking, judgment, academic learning, and experiential learning.

According to the World Health Organization (WHO, 2021), approximately 1% to 3% of the global population is affected by Intellectually disabilities. A significant portion of this population includes children and adolescents of school-going age. This early onset of Intellectually impairment interferes with not only academic and social development but also with health-related behaviours, including dietary practices and physical activity levels. Consequently, children with Intellectually disabilities require comprehensive care and support, including special attention to their nutritional needs and eating behaviours.

Proper nutrition is vital for the physical and mental growth of all children, including those with developmental disabilities. Balanced diets, adequate calorie intake, and appropriate nutrient consumption play a crucial role in supporting cognitive development, immune function, and overall well-being (Rogers et al., 2013). However, children with Intellectually disabilities often experience unique challenges in maintaining a nutritious and balanced diet. These challenges may include sensory sensitivities, food selectivity, motor coordination issues, gastrointestinal disorders, and dependency on caregivers for feeding. Additionally, behavioural factors such as impulsivity or rigidity in food choices, along with environmental influences like the food preferences of caregivers, can further complicate dietary management (Bandini et al., 2010).

One of the most prevalent issues faced by this group is a tendency toward malnutrition and obesity. This dual burden is often the result of several interacting factors such as selective eating, reduced levels of physical activity, altered energy metabolism, and irregular mealtimes. Due to cognitive limitations, children with ID may not be able to recognize hunger and satiety

cues properly or communicate their nutritional needs effectively. This can lead to both undernutrition, where essential nutrients are lacking, and overnutrition, where caloric intake exceeds energy expenditure (Zhou et al., 2019). The risk is further exacerbated by sedentary lifestyles and increased screen time, which are more common in this population due to physical or cognitive limitations in engaging in regular exercise or outdoor activities.

Moreover, certain comorbid conditions often present in children with Intellectually disabilities such as Down syndrome, autism spectrum disorder (ASD), and cerebral palsy can significantly impact their dietary patterns and nutritional status. For example, children with ASD often show extreme food selectivity, favouring specific textures or colours, which leads to an unbalanced intake of nutrients. Those with cerebral palsy may suffer from oral motor dysfunctions or gastrointestinal reflux, which interfere with proper feeding and digestion (Sharp et al., 2013). These complex medical and behaviour comorbidities further complicate nutritional assessment and management, making it essential for health professionals and caregivers to tailor dietary interventions based on individual needs.

Parental or caregiver education and awareness also play a crucial role in shaping the dietary habits of Intellectually disabled children. In many cases, parents may lack adequate knowledge of nutritional requirements or may resort to convenient and palatable food choices to manage feeding difficulties or behaviour resistance from the child. This may result in a diet high in sugars, fats, and processed foods while being low in essential vitamins, minerals, and fibre (Kuschner et al., 2015) Lack of access to specialized dietitians or food-related education programs, particularly in rural or underserved areas, can also contribute to poor dietary practices and health outcomes. Furthermore, growth patterns in children with Intellectually disabilities are influenced by both nutritional and non-nutritional factors. While some children may experience growth delays due to hormonal imbalances, genetic syndromes, or medications, many suffer from growth failure due to poor nutritional intake or nutrient losses.

Inadequate caloric intake, malabsorption, and irregular metabolic demands can severely affect normal growth trajectories, leading to stunting, underweight, or, conversely, overweight and obesity in some cases (Samadi & McConkey, 2014). It is also important to note that nutritional deficiencies during critical periods of growth and brain development can lead to irreversible cognitive and physical impairments, further compounding the challenges these children already face (Georgieff, 2015). In light of these multifaceted issues, it becomes imperative to assess the nutritional status, dietary habits, and caregiver involvement in food-

related decisions for children with Intellectually disabilities. Such an assessment can help identify specific nutritional gaps, behaviour feeding issues, and lifestyle patterns that contribute to poor health outcomes. Moreover, understanding the dietary behaviour of this vulnerable group can aid in formulating targeted interventions and policies aimed at improving their nutritional health and overall quality of life.

The present study seeks to evaluate the nutritional status and dietary habits of Intellectually disabled school children attending Ashanilayam Special School, Vazhoor, Ponkunnam. By focusing on this specific population, the study aims to gain insights into the unique nutritional challenges faced by these children and explore the influence of caregiver practices, food preferences, and daily routines on their health (Kuperminc & Stevenson, 2014). Ultimately, the findings of this research may provide a foundation for developing comprehensive nutrition education programs, tailored dietary plans, and community-based strategies to enhance the well-being of Intellectually disabled children.

In the context of public health, the nutritional well-being of children with Intellectually disabilities is often overlooked. While the general population benefits from various nutrition-focused health campaigns, children with special needs frequently fall outside the scope of such initiatives. Their unique needs, both physical and cognitive, demand more focused and individualized nutritional interventions. (Black, M. M., et al. 2013) However, the lack of sufficient data and research in this area creates a significant gap in both policy development and healthcare planning.

One of the primary barriers to ensuring good nutritional health in children with ID is the difficulty in conducting accurate dietary assessments. Conventional methods such as food frequency questionnaires or 24-hour dietary recalls may not be reliable in this population due to communication difficulties, limited cognitive ability, and dependence on caregivers. Therefore, much of the dietary information must be gathered from parents or teachers, which may not always reflect the child's true eating behaviour. (Sullivan, P. B. 2017). This calls for more innovative, inclusive, and reliable tools for assessing dietary intake and nutritional status among Intellectually disabled children.

Schools play a critical role in shaping the health habits of children, especially those with special needs. Special schools, such as Ashanilayam Special School in Vazhoor, where this study is conducted, serve not just as centres of learning but also as key environments for nutritional care. For many children with ID, a significant portion of daily meals is consumed

at school. This offers an important opportunity to ensure balanced nutrition, teach good eating habits, and monitor growth patterns. The collaboration between school staff, nutritionists, and caregivers is crucial in establishing consistent and health-promoting food routines (Nair et al., 2015)

Furthermore, social and economic factors also play a substantial role in determining nutritional outcomes. Families from lower socioeconomic backgrounds may not be able to afford nutrient-rich foods or may have limited access to health services. In rural settings, such as Ponkunnam, dietary diversity may be limited due to availability and cost constraints. This adds another layer of vulnerability for Intellectually disabled children, who already face numerous health and developmental challenges. (Chandrakant & Arvind, 2016)

Addressing the nutritional health of this population is not merely a clinical concern but a matter of social responsibility. Ensuring that intellectually disabled children receive proper nutrition is key to improving their quality of life, reducing the risk of secondary health issues, and enabling better participation in education and social activities. Nutrition can influence behaviour, cognitive performance, immunity, and even social interaction skills. Thus, investing in nutritional assessments and interventions can have long-term positive outcomes.

The current study is designed to explore the nutritional status and dietary habits of Intellectually disabled school children, with a focus on identifying both strengths and gaps in their current food patterns. The study conducted in a special school setting; the study aims to provide context-specific insights that can inform tailored nutrition strategies. The study will also consider caregiver awareness, meal routines, food preferences, and possible barriers to healthy eating.

In India, there is limited research that focuses specifically on the nutritional status and dietary habits of Intellectually disabled children, particularly in the adolescent age group of 10 to 19 years. This developmental stage is vital because it marks a period of rapid physical and psychological growth. Nutritional deficiencies or imbalances during adolescence can have long-term consequences on health and development. Furthermore, habits formed during these years often persist into adulthood, influencing lifelong well-being.

Given the complexity of factors influencing nutrition in intellectually disabled children, a comprehensive study examining socio-demographic profiles, dietary patterns, anthropometric status, physical activity, and caregiver awareness is warranted. Such a study is

crucial not only to assess current nutritional challenges but also to inform the development of targeted interventions. It provides an opportunity to advocate for inclusive health policies and school-based nutritional programs that address the specific needs of this marginalized population.

Ultimately, this study emphasizes the need for an integrated approach that includes clinical assessments, caregiver education, and school-based interventions to support the nutritional health of Intellectually disabled children. As awareness continues to grow about the importance of inclusive health and education, studies like this become vital in ensuring that no child is left behind in the journey toward holistic development.

RELEVANCE OF THE STUDY

Intellectually disabled children represent a vulnerable population with unique nutritional challenges due to their cognitive and physical limitations. Their dietary habits are influenced by feeding difficulties, sensory sensitivities, caregiver dependency, and socioeconomic factors. Poor nutrition in these children is associated with growth retardation, obesity, micronutrient deficiencies, and increased risk of chronic diseases. Understanding the relationship between nutritional status, dietary habits, and health outcomes in Intellectually disabled children is essential to improve their quality of life. This study aims to identify key dietary patterns and evaluate the role of caregivers in shaping their food choices. By investigating these aspects, this research will contribute to developing targeted nutritional interventions and policies to enhance the overall health and well-being of Intellectually disabled school children. This study is significant as it explores the dietary patterns, food preferences and nutritional status of Intellectually disabled school children is critical due to the high prevalence of malnutrition, micronutrient deficiencies and obesity among them.

AIM

The present study entitled **"Nutritional status and Dietary habits of Intellectually Disabled School Children"** aims to assess the nutritional status nutritional status, dietary pattern, feeding behaviours and challenges as well as physical activity of the Intellectually disabled children. It also evaluates the caregiver's awareness on child nutrition.

OBJECTIVES

The specific objectives of the present study were envisaged as follows:

- To assess the nutritional status of intellectually disabled school children using anthropometric measurements.
- To determine the dietary patterns and food preferences of intellectually disabled school children.
- To examine the physical activity levels and screen time habits of the children with intellectually disability as part of their lifestyle behaviors.
- To assess the eating behaviours and food-related challenges, such as feeding difficulties and food selectivity.
- To examine parental awareness regarding nutrition for children with intellectually disability.

REVIEW OF LITERATURE

CHAPTER-II
REVIEW OF LITERATURE

The review of literature pertaining to the present study titled **"Nutritional Status and Dietary Habits of Intellectually Disabled School Children"** is discussed under the following headings:

2.1 Nutritional Status of Intellectually Disabled Children

2.2 Dietary Habits and Food Consumption Patterns of Intellectually Disabled Children

2.3 Impact of Physical Activity on Nutritional Health of Intellectually Disabled Children

2.4 Role of Caregivers in Nutritional Management of Intellectually Disabled Children

2.5 Global Perspectives on Nutrition and Intellectually Disabled Children

2.1 NUTRITIONAL STATUS OF INTELLECTUALLY DISABLED CHILDREN

Virjini and Mohan (2019) conducted a cross-sectional study on 338 Intellectually disabled children aged 9-16 years attending special schools in urban areas. The study aimed to assess the nutritional status of these children using physical and biochemical parameters. The results showed that a significant proportion of children were underweight (58%), had below-standard height and weight, and suffered from anaemia. Clinical signs of malnutrition, such as dental caries, dermatosis, and pale eyelids, were also prevalent. The study highlights the need for adequate nutritional support to enhance the quality of life of Intellectually disabled children.

Kavitha et al., (2019) conducted a hospital-based study to assess the nutritional status of mentally delayed children aged 3-10 years. The study found high prevalence of malnutrition, with 41.1% underweight, 37.3% stunted, and 23.5% wasted. Insufficient calorie intake, excessive nutrient losses, and abnormal energy metabolism were identified as major contributors to poor nutritional status. The study emphasized the need for nutritional interventions and specialized dietary plans to improve health outcomes.

Sultana and Kabra (2019) assessed the nutritional status and eating habits of 105 Intellectually disabled adults (20-35 years) in Hyderabad, India. The study found that 23.8% were underweight, 45.7% had normal BMI, 18.1% were overweight, and 12.4% were obese. Poor dietary habits, including low fruit and vegetable consumption, and high intake of

processed foods, were also observed. The study emphasized the need for tailored nutritional interventions.

Marconi et al, (2016) conducted a community-based study in rural southern India to investigate the association between nutritional status and Intellectually development among school-aged children. The study employed anthropometric assessments alongside cognitive evaluations to determine the impact of undernutrition on Intellectually functioning. The findings indicated a significant correlation between poor nutritional status—particularly stunting and underweight—and lower cognitive performance. The authors highlighted the importance of early nutritional interventions to support optimal Intellectually development in children from socioeconomically disadvantaged backgrounds.

2.2 DIETARY HABITS AND FOOD CONSUMPTION PATTERNS OF INTELLECTUALLY DISABLED CHILDREN

Gast et al., (2021) assessed diet quality among 151 individuals with Intellectually disabilities or borderline Intellectually functioning living in residential facilities or receiving day care, compared to 169 controls without Intellectually disabilities. The study found significantly lower diet quality among individuals with Intellectually disabilities, with females having better diet quality. Those with borderline Intellectually functioning and mild Intellectually disabilities had poorer diet quality and higher BMI compared to those with severe to profound Intellectually disabilities.

Sayin and Ilik (2017) investigated the dietary patterns and feeding problems among Turkish children with Intellectually disabilities in comparison to typically developing children. The study used structured questionnaires to assess eating habits, food preferences, and feeding difficulties. The findings revealed that children with Intellectually disabilities exhibited more feeding problems, including food selectivity, preference for specific textures, and irregular meal patterns. Additionally, these children had a narrower range of foods in their diet, with a higher incidence of nutritional imbalances. The study emphasized the need for targeted interventions to address feeding issues and promote more diverse, balanced diets for children with Intellectually disabilities.

Kim et al., (2015) examined the eating habits and dietary intakes of Korean adolescents diagnosed with Intellectually disabilities and autism spectrum disorders. The study analysed dietary patterns, nutrient intake levels, and food preferences through caregiver-reported

surveys and dietary assessments. Results revealed that the participants exhibited irregular meal patterns, limited food variety, and inadequate intake of essential nutrients, particularly calcium, iron, and dietary fibre. The findings underscored the need for tailored nutritional education and intervention programs to address the unique dietary challenges faced by adolescents with developmental disorders.

Hinckson et al., (2013) examined the relationship between physical activity, dietary habits, and overall health in overweight and obese children and youth with Intellectually disabilities (ID) or autism spectrum disorders (ASD). The study analysed both physical activity levels and eating behaviours, alongside health outcomes such as weight and general well-being. Findings indicated that children with ID or ASD who were overweight or obese had significantly lower levels of physical activity and poorer dietary habits compared to their typically developing peers. The study highlighted the need for tailored interventions that address both nutrition and physical activity to improve health outcomes and reduce obesity-related risks in children with developmental disabilities.

2.3 IMPACT OF PHYSICAL ACTIVITY ON NUTRITIONAL HEALTH OF INTELLECTUALLY DISABLED CHILDREN

Maicas-Pérez et al., (2024) conducted a systematic review to evaluate the effects of physical activity interventions on health parameters in children and adolescents with Intellectually disabilities. The study reviewed multiple intervention programs that aimed to improve physical fitness, motor skills, and overall health in this population. The findings showed that physical activity interventions significantly improved cardiovascular health, muscle strength, and overall well-being in children and adolescents with Intellectually disabilities. The review also highlighted the importance of customizing physical activity programs to cater to the specific needs and abilities of individuals with Intellectually disabilities to maximize the benefits of these interventions.

Sahin and Nogay (2022) explored the relationship between the severity of Intellectually disability and the nutritional status of children and adolescents with Intellectually disabilities. The study assessed nutritional parameters such as body mass index (BMI), nutrient intake, and prevalence of undernutrition or obesity in relation to the severity of Intellectually disability. The findings revealed that children with more severe Intellectually disabilities were at higher risk for malnutrition, including both undernutrition and obesity. The study concluded that the severity of Intellectually disability should be considered when developing nutritional

interventions and that individualized approaches are essential for improving the nutritional health of children with varying levels of Intellectually disabilities.

Collins and Staples (2017) conducted a comprehensive review to examine the impact of physical activity on the physical fitness of children with Intellectually and developmental disabilities (IDD). Their findings revealed that structured physical activity interventions significantly improved key fitness components, including cardiovascular endurance, muscular strength, flexibility, and motor coordination in children with IDD. The study further highlighted the broader benefits of physical activity, noting improvements in behavioral outcomes, social engagement, and overall quality of life. The authors emphasized the importance of incorporating regular, tailored physical activity programs into the daily routines of children with IDD, particularly within school and home environments, to support both physical and psychosocial development.

Hinckson et al., (2013) investigated the interrelationship between physical activity, dietary habits, and overall health in overweight and obese children and youth with Intellectually disabilities (ID) or autism spectrum disorders (ASD). The study assessed physical activity levels, eating behaviours, and health outcomes such as body weight and general health status. Results showed that children with ID or ASD who were overweight or obese exhibited significantly lower physical activity levels and poorer dietary habits compared to their typically developing counterparts. The study concluded that addressing both physical activity and dietary habits through specialized interventions is crucial for improving health outcomes and preventing obesity-related health issues in this population.

2.4 ROLE OF CAREGIVERS IN NUTRITIONAL MANAGEMENT OF INTELLECTUALLY DISABLED CHILDREN

Lee et al., (2019) conducted an exploratory qualitative study examining the experiences of family caregivers who participated in a weight management program for overweight children and adolescents with Intellectually disabilities. The study highlighted the central role that caregivers play in shaping the dietary and lifestyle behaviours of these children, as well as the challenges they face in maintaining consistent routines, managing behavioural issues, and implementing health advice. Caregivers reported both emotional and practical struggles, but also expressed increased awareness and motivation after program participation. The study

emphasized the importance of designing family-centred interventions that consider caregiver involvement, emotional burden, and the need for accessible, tailored strategies to address obesity in Intellectually disabled populations.

Ptomey et al., (2017) examined the role of caregivers in influencing weight management outcomes among adults with Intellectually and developmental disabilities. The study utilized a randomized controlled trial design to assess the impact of caregiver-supported behavioural interventions on dietary habits, physical activity, and weight outcomes. Results demonstrated that active caregiver involvement significantly improved participants' adherence to healthy lifestyle behaviours, leading to better weight control. The findings underscore the critical role of caregivers in facilitating long-term health behaviour changes, particularly in populations with cognitive limitations who rely on external support for daily decision-making and health maintenance.

Enoch et al., (2017) investigated the role of caregivers and the support systems available to them in the context of caring for children with Intellectually disabilities in Ghana. Through a qualitative study involving in-depth interviews and focus group discussions, the researchers explored caregivers' experiences, challenges, and coping mechanisms. The findings revealed that caregivers often faced emotional, financial, and social burdens, with limited access to formal support services. Community-based rehabilitation programs and informal networks were found to provide some assistance, though these were inconsistent and under-resourced. The study emphasized the need for strengthened institutional support and inclusive policies to enhance caregiver well-being and the quality of care provided to children with Intellectually disabilities.

Blacher et al., (2016) explored strategies for supporting families of children with Intellectually disabilities within the context of clinical psychology practice. The authors reviewed various models of family support, including counselling, parent training programs, and community-based resources. They found that families often face significant stress due to the caregiving demands and the emotional, social, and financial challenges of raising a child with Intellectually disabilities. The study emphasized the importance of offering comprehensive support to families, including providing information, improving coping strategies, and fostering social networks. Effective family support programs were shown to improve both the well-being of caregivers and the development of children with Intellectually disabilities.

2.5 GLOBAL PERSPECTIVES ON NUTRITION AND INTELLECTUALLY DISABLED CHILDREN

Klein et al., (2023) conducted a scoping review to explore the existing evidence on nutritional care practices for children with feeding difficulties and disabilities. The review identified a range of challenges that hinder effective nutritional support, including inadequate caregiver training, lack of interdisciplinary collaboration, and limited access to specialized feeding services—particularly in low-resource settings. The authors emphasized that nutritional care must be integrated within broader disability support frameworks and tailored to individual needs. The review concluded that addressing both clinical and systemic barriers is essential to improve growth outcomes and quality of life for children with disabilities, underscoring the urgent need for inclusive, context-specific nutrition interventions.

Sahin and Nogay (2022) investigated the impact of the severity of Intellectually disability on the nutritional status of children and adolescents with Intellectually disabilities. The study assessed various aspects of nutrition, including body mass index (BMI), dietary patterns, and prevalence of both undernutrition and obesity in relation to the severity of the disability. The findings showed that children with more severe Intellectually disabilities were more likely to experience nutritional issues such as malnutrition and obesity. The study emphasized the need for tailored nutritional interventions that account for the severity of Intellectually disabilities in order to improve the dietary habits and overall health of these children and adolescents.

Ginis et al., (2021) provided a comprehensive global perspective on the participation of individuals with disabilities in physical activity. The study reviewed barriers and facilitators to physical activity for people with various disabilities, including those with Intellectually disabilities. The findings revealed that individuals with disabilities often face significant challenges in engaging in physical activity, such as environmental barriers, lack of accessible programs, and social stigma. However, the study also identified strategies to improve participation, such as inclusive fitness programs, community support, and policy reforms. The authors emphasized the importance of promoting physical activity for people with disabilities, noting its positive effects on health, well-being, and social inclusion. They called for greater investment in creating accessible and inclusive physical activity opportunities globally.

Scharf et al., (2017) examined the global challenges and opportunities for empowering children with disabilities, focusing on those with Intellectually disabilities. The study highlighted the importance of inclusive healthcare, education, and social systems that accommodate children of all abilities. It emphasized the role of global disability policies and the need for collaborative efforts to provide equal opportunities and improve quality of life for children with disabilities. The authors also discussed the significance of family support, community involvement, and early intervention in empowering children with disabilities to reach their full potential. The study called for greater attention to be given to disability-inclusive practices in all sectors of society, including healthcare and education, to ensure children with disabilities can thrive.

METHODOLOGY

CHAPTER-III
METHODOLOGY

The methodology adopted to the present study entitled **"Nutritional Status and Dietary Habits of Intellectually Disabled School Children"** is discussed under the following headings:

3.1 Selection of Area

3.2 Selection of Subjects

3.2.1 Inclusion and Exclusion Criteria

3.2.1.1 Inclusion Criteria

3.2.1.2 Exclusion Criteria

3.3 Selection of Tool

3.4 Collection of Data

3.4.1 General Profile

3.4.2 Anthropometric Measurements

3.4.2.1 Measurement of Height

3.4.2.2 Measurement of Weight

3.4.2.3 Body Mass Index (BMI)

3.4.3 Dietary intake and habits

3.4.4 Physical Activity Pattern

3.4.5 Awareness and Attitude of Caregivers towards Nutrition

3.5 Analysis and Interpretation of data

3.1 SELECTION OF AREA

The present study was carried out at Ashanilayam Special School, Vazhoor, Ponkunnam. This institution was selected as it caters to the educational and developmental

needs of Intellectually disabled children. The school provides an appropriate setting to assess the nutritional status and dietary habits of these children in a structured environment.

3.2 SELECTION OF SUBJECTS

The study focused on 50 adolescents aged between 10-19 years, including both boys and girls. This range encompasses early adolescence to late adolescence, a critical period marked by rapid physical, psychological, and cognitive changes that significantly influence nutritional requirements, dietary habits, and lifestyle patterns.

Subjects were selected for the study using purposive sampling technique. Purposive sampling technique is a form of non-probability sampling technique in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research (Rai et al,2004). The subjects were selected based on the inclusion and exclusion criteria provided below.

3.2.1 Inclusion and Exclusion Criteria

Inclusion and exclusion criteria are essential components of a research study design, as they define the parameters for participant selection and ensure that the study population is appropriate for addressing the research objectives.

3.2.1.1 Inclusion Criteria

- Children enrolled in special schools for Intellectually disabilities.
- Intellectually disabled children aged between10-19 years.
- Children whose parents or caregivers have given consent to participate.

3.2.1.2 Exclusion Criteria

- Intellectually disabled children aged below10 years and above19 years.
- Children whose parents or caregivers did not give consent to participate.

3.3 SELECTION OF TOOL

The tool selected for the study was a structured questionnaire, which served as to collect data on the dietary habits and nutritional awareness of the participants. Since the study involved Intellectually disabled children, responses were provided by caregivers and teachers to ensure accuracy and reliability. Given specific nature of the study population, the responses from the

caregivers and teachers were crucial, as they have direct knowledge of the children's dietary patterns and nutritional needs.

The questionnaire included sections on general profile, anthropometric measurements, dietary intake, and awareness of caregivers on nutritional needs of their child. This approach allowed for a thorough understanding of both the dietary habits and the level of nutritional awareness within the context of Intellectually disabled children. The questionnaire used for present study is provided in the Appendix-I.

3.4 COLLECTION OF DATA

The data was collected by personally interviewing the parents or caregivers of 50 adolescents of both boys and girls, enrolled in Ashanilayam Special School. The details collected from the subjects were:

3.4.1 General Profile

The general profile included basic demographic information, such as age, gender, and type of family, Intellectual disability type, associated co-morbidities and socio-economic status. Socio-economic status was assessed using Kuppuswamy Socio-economic Status Scale 2024 which is provided in Appendix-II.

3.4.2 Anthropometric Measurements

Anthropometric measurements were taken to access the nutritional status of the subjects. Anthropometric measurements like height and weight were recorded used to calculate the BMI.

3.4.2.1 Measurement of Height

Height was measured using a stadiometer, the participants were instructed to stand with their back straight, heels together, and feet flat on the ground within the stadiometer and the head should be positioned so that the line of sight is horizontal, with the eyes looking straight ahead. And then stadiometer's movable headpiece is gently lowered until it rests firmly on the top of the participant's head, ensuring the body is upright and aligned. The measurement is then recorded at eye level, ensuring accuracy. The process is repeated to confirm consistency and reliability of the measurement. The height was recorded in cm.

3.4.2.2 Measurement of Weight

Body weight was recorded using a digital weighing scale, the participant was asked to remove heavy clothing, shoes, and accessories to ensure accuracy. Then they are instructed to stand still in the centre of the weighing platform with feet slightly apart and arms at their sides.

The weight is recorded once the reading stabilizes on the display. It is important to ensure the weighing machine is placed on a flat, hard surface and calibrated properly before each use to maintain accuracy and consistency in measurements. The weight was recorded in Kg.

3.4.2.3 Body Mass Index (BMI)

Body mass index is a method of utilising an adult's height and weight to broadly place them into underweight, normal weight, overweight and obese categories (Zierle-Ghosh& Jan,2023). The BMI was calculated using WHO AntroPlus software from the recorded height and weight of the subjects.

3.4.3 Dietary intake and habits

Dietary patterns were analysed using the 3-day dietary recall method, where caregivers recorded all food and beverage intake on holiday and the interviewer recorded both working days, including portion sizes and meal timings. Additionally, food frequency was included to gather information on the regularity of consumption of various food items, providing a comprehensive understanding of the participant's dietary habits.

3.4.4 Physical Activity Pattern

This section gathered information regarding the type frequency duration of exercise. The attitude of the subjects on physical activity was also observed.

3.4.5 Awareness and Attitude of Caregivers towards Nutrition

The awareness and attitude of caregivers towards nutrition were assessed through the questionnaire, which aimed to understand their knowledge, perceptions, and beliefs regarding the nutritional needs of children with Intellectually disabilities. This assessment provided insight into the caregiver's understanding of healthy eating habits, nutritional requirements, and their role in promoting healthy nutrition for the children in their care.

3.5 ANALYSIS AND INTERPRETATION OF DATA

The data collected from the caregivers and teachers were analysed, tabulated and interpreted. Percentage analysis, coefficient of variation (CV), standard deviation (SD) and mean was used in analysing the data.

RESULTS

AND

DISCUSSION

CHAPTER-IV
RESULTS AND DISCUSSION

The result and discussion of the present study entitled **"Nutritional Status and Dietary Habits of Intellectually Disabled School Children"** is discussed under the following headings:

4.1 Socio-demographic Characteristics of the Subjects

4.2 Anthropometric Measurements of the Subjects

4.3 Dietary Patterns of the Subjects

4.3.1 Food Consumption Pattern of the Subjects

4.3.2 Nutrient Intake of the Subjects

4.4 Physical Activity and Lifestyle of the Subjects

4.5 Caregiver's Knowledge about Nutrition of the Subjects

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SUBJECTS

The socio-demographic characteristics gives the basic information on the age, gender, birth order, type of family, Intellectual disability type, associated comorbidities and socio-economic status of the selected subjects. The socio-demographic and socio-economic characteristics of the selected subjects are presented in table-1.

Table-1: Socio-demographic Characteristics of the Subjects (n=50)

Characteristics	Frequency (n)	Percentage (%)
Age		
10-14 years	13	26
15-19 years	37	74
Gender		
Male	35	70
Female	15	30
Birth order		
First child	20	40

Second child	22	44
Third child	6	12
Fourth child	2	4
Other Children with Special Needs in Household		
Yes	1	2
No	49	98
Type of Family		
Joint Family	11	22
Nuclear Family	39	78
Intellectually Disability Type		
Mild	2	4
Moderate	48	96
Severe	0	0
Profound	0	0
Associated Comorbidities		
Down syndrome	9	18
Autism Spectrum disorder	13	26
Cerebral Palsy	11	22
ADHD	7	14
Developmental Delay	5	10
Others	0	0
Nothing	5	10
Socio-economic Status		
Upper Class	0	0
Upper Middle Class	12	24
Lower Middle Class	8	16
Upper Lower Class	30	60
Lower Class	0	0

From Table-1, it was observed that the majority (74%) of the subjects were in the age group of 15–19 years, while 26% belonged to the 10–14 years category. In terms of gender distribution, the majority (70%) were male and only 30% were female. This result was in line

with the findings of Kapoor et al., (2023). Regarding birth order, 40% of the children were firstborn, 44% were second-born, 12% were third-born, and only 4% were fourth-born. Only 2% of the households had more than one child with special needs, while the remaining 98% had no other children with special needs.

Regarding family type, majority of the participants (78%) came from nuclear families, whereas 22% belonged to joint families. In terms of the degree of Intellectually disability, most children (96%) were classified as having moderate Intellectually disability, and 4% had mild Intellectually disability. This result was in line with the findings of Jain et al., (2013). No cases of severe or profound Intellectually disability was reported among the participants. Associated comorbidities were common. Autism spectrum disorder was observed in 26% of the children, cerebral palsy in 22%, Down syndrome in 18%, ADHD in 14%, and developmental delay in 10%. Additionally, 10% of the children did not have any associated comorbidities. This result was in line with the findings of Spinazzi et al., (2023).

In relation to socio-economic status, majority of the subjects (60%) belonged to the upper-lower class, followed by 24% from the upper-middle class and 16% from the lower-middle class.

4.2 ANTHROPOMETRIC MEASUREMENTS OF THE SUBJECTS

Anthropometry studies the measurements of the human body totally or partially. The anthropometric measures are useful to understand the nutritional status of the subjects. The anthropometric measurements of the subjects such as height and weight were recorded and it was then used for calculating the subject's Body Mass Index (BMI). The anthropometric measurements of the subjects are presented in table-2.

Table 2: Anthropometric Measurements of the Subjects (n=50)

Anthropometric parameters	Mean	Standard Deviation	CV %
Height (cm)	159.24	23.24	14.6
Weight (Kg)	88.2	27.62	31.3
BMI (Kg/m^2)	39.16	10.47	26.7

From table 2, it was observed that the mean height of the subjects was 159.24 cm with a standard deviation of 23.24 cm and CV of 14.6% which indicates that there is a moderate variability among the subjects. The mean body weight was 88.2 kg with a standard deviation

of 27.62 kg and CV of 31.3%, pointing out a very high variability among the selected subjects. This data indicates notable variability in the physical growth patterns of Intellectually disabled children within the age group of 10 to 19 years.

The mean BMI of the subjects was 39.16 kg/m², which categorizes the majority of the subjects as obese (>30 Kg/m²) according to the World Health Organization's BMI classification. The standard deviation of 10.47 kg/m² and CV of 26.7% further indicates a wide variability in BMI values, suggesting that while obesity is predominant, individual differences in growth and nutritional status exist among Intellectually disabled children.

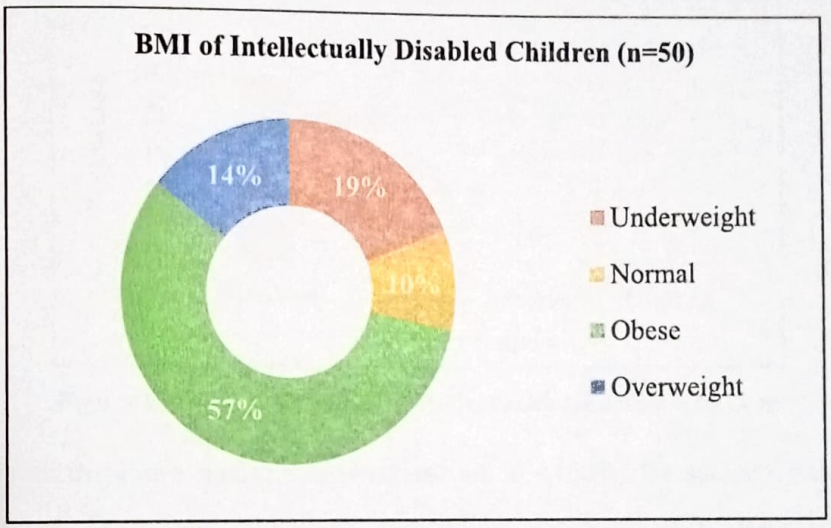

Figure 1: BMI of Intellectually Disabled Children

From the above figure, the Body Mass Index (BMI) of the Intellectually disabled children was assessed using their height and weight measurements. It was found that the majority (57%) of the subjects were classified as obese according to the World Health Organization (WHO) BMI classification. About 14% of the children were overweight, while only 10% were within the normal weight range. It was also noted that 19% were underweight.

These findings highlight a serious concern regarding the nutritional status of Intellectually disabled children, with a significant proportion falling into the obese category. The high prevalence of overweight and obesity could be due to factors such as sedentary lifestyles, poor dietary practices, dependence on caregivers for food choices, and limited opportunities for physical activities. The study conducted by Prabha el. at (2016) showed similar results that more than 50% of the Intellectually disabled children were either overweight or obese.

4.3 DIETARY PATTERNS OF THE SUBJECTS

Dietary pattern refers to the regular food consumption habits of individuals, including the number and types of meals consumed, the tendency to skip meals and snacking behaviours. In the present study, the dietary patterns of Intellectually disabled children were assessed to evaluate their nutritional intake and dietary behaviours. This result in this line of findings of Naoum et al., (2016). Information regarding the number of meals consumed per day, commonly skipped meals, occurrence of food allergies, and the habit of consuming snacks between meals were recorded. Dietary patterns of the subjects are presented in figure 2.

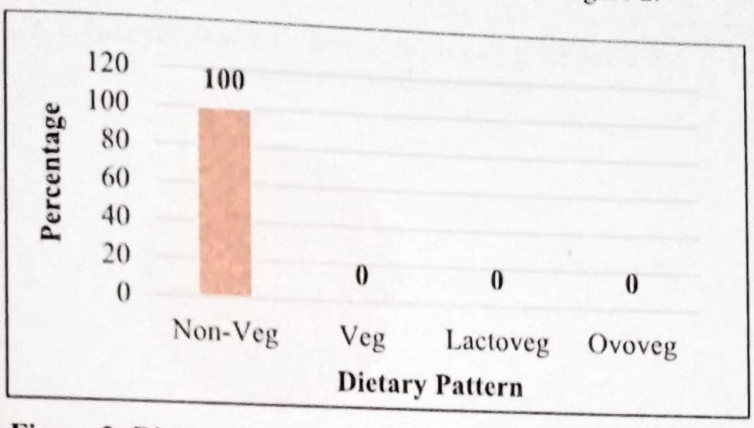

Figure 2: Dietary Pattern of Intellectually Disabled Children

From the above figure, it is observed that all (100%) the subjects follow a non-vegetarian diet. There were no children who follow vegetarian, lacto-vegetarian, or ovo-vegetarian diet, indicating a uniform dietary pattern among the subjects. This result is in line with the findings of Smith et al., (2019) where most (75%) of the Intellectually disabled children were non-vegetarian.

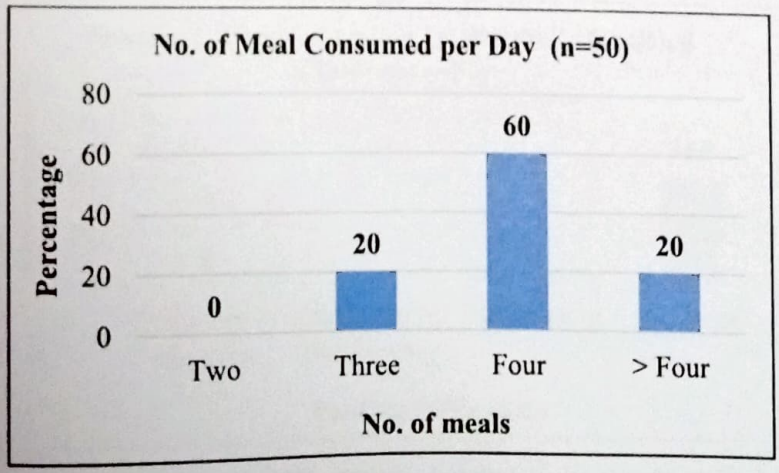

Figure 3: Number of Meals Consumed per Day by the Intellectually Disabled Children

As shown in Figure 3, majority (60%) of the Intellectually disabled children consumed four meals per day. Additionally, 20% of the children were reported to consume three meals per day, while another 20% consumed more than four meals daily. Notably, none of the children reported consuming only two meals per day, indicating that most of them followed a well-distributed meal pattern. These findings were in line with the observations made by Farias Júnior et al., (2015), who also noted a structured meal frequency among children with similar profiles.

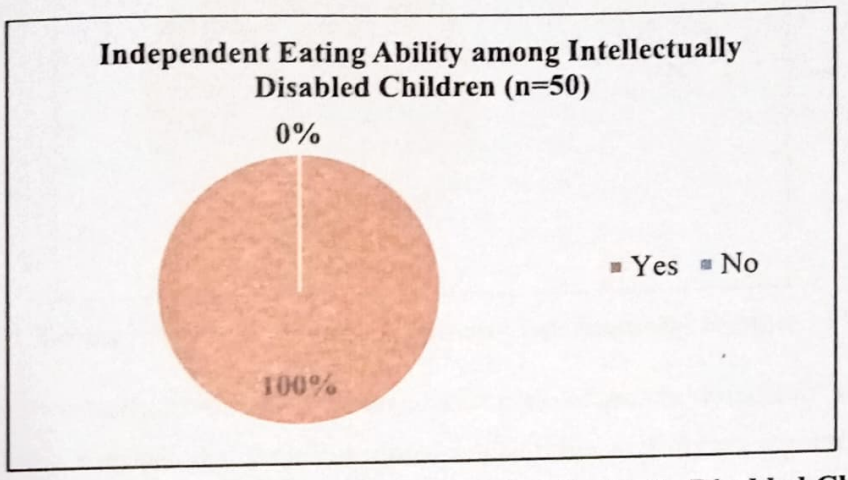

Figure 4: Independent Eating Ability among Intellectually Disabled Children

As shown in Figure 4, all the children (100%) in the study were able to eat independently without assistance. This indicated a good level of self-feeding ability among the Intellectually disabled children in the sample. This result was in line with the findings of Handayani *et al.*, (2023), who reported that most of the children were able to feed themselves.

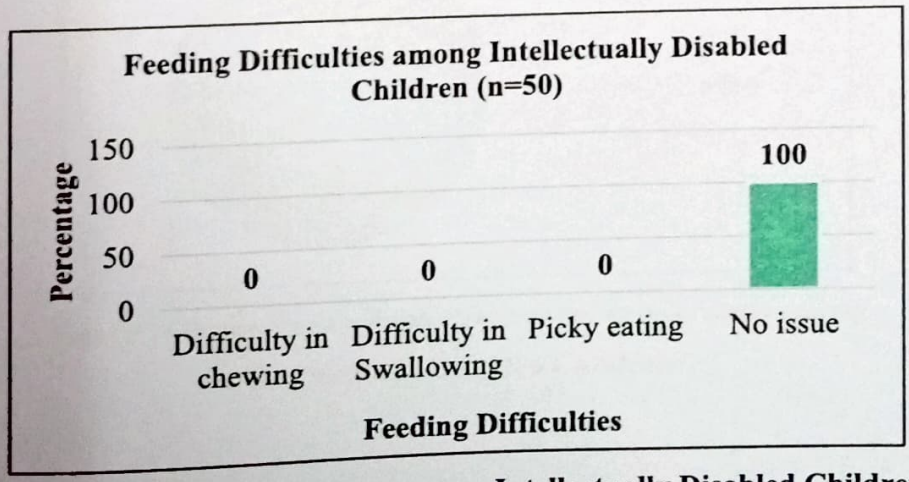

Figure 5: Feeding Difficulties among Intellectually Disabled Children

From the figure 5, it was observed that none of the participants reported feeding difficulties such as chewing, swallowing, or picky eating. On the other hand, all the children (100%) had no issues related to feeding, indicating a smooth and manageable eating process.

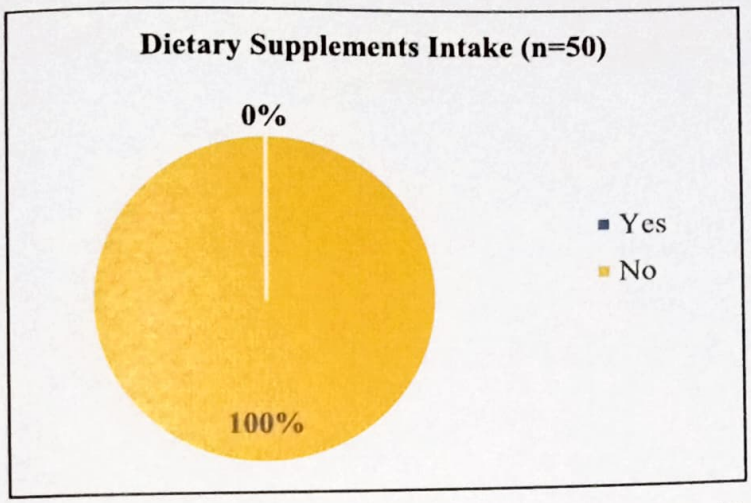

Figure 6: Dietary Supplements Intake among Intellectually Disabled Children

As shown in figure 6, it was observed that none of the children (100%) take dietary supplements. This suggests that their nutritional intake relies entirely on regular meals rather than additional supplementation.

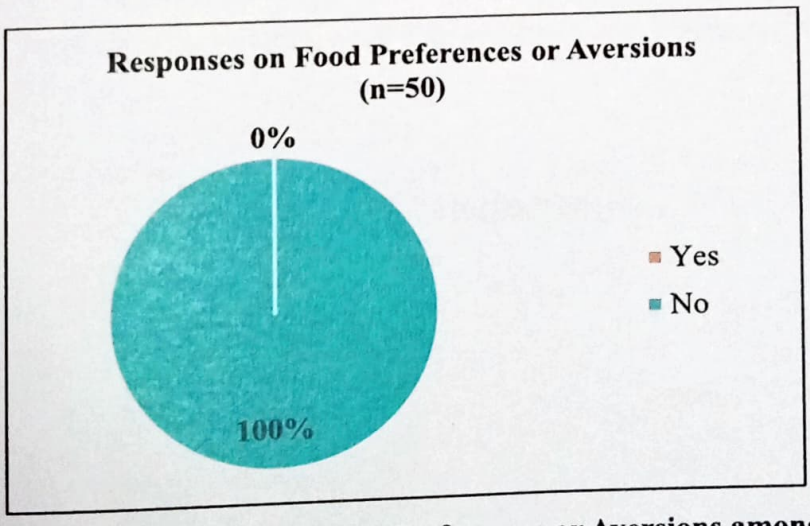

Figure 7: Responses on Food Preferences or Aversions among Intellectually Disabled Children

From the above figure, it is observed that there were no food preferences or aversions reported among the children. All children (100%) showed acceptance of the provided meals without any specific likes or dislikes.

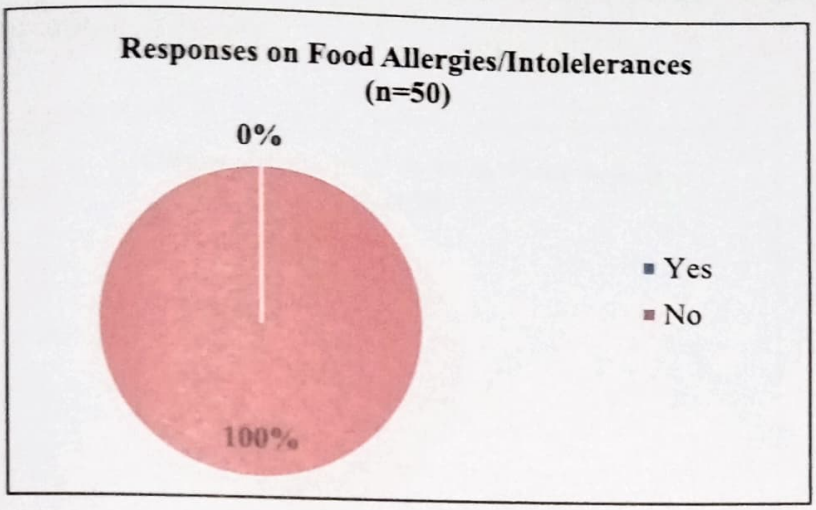

Figure 8: Food allergies or Intolerance among Intellectually Disabled Children

As illustrated in Figure 8, none of the children (100%) reported having any food allergies or intolerances. This indicated that all the subjects in the study could consume a regular diet without dietary restrictions related to allergic reactions or intolerance. The absence of food allergies among the Intellectually disabled children in this sample may reflect either a genuinely low prevalence or a lack of formal diagnosis and awareness regarding such conditions.

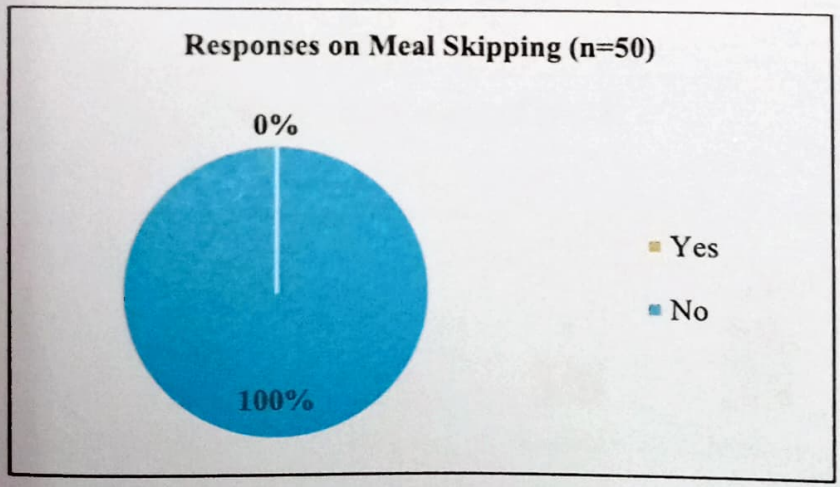

Figure 9: Meal Skipping Habit among Intellectually Disabled Children

As shown in Figure 9, none of the children in the study reported skipping meals. All participants (100%) consistently consumed their daily meals without omission. This finding suggested that meal skipping was not a concern among the Intellectually disabled children in this sample, indicating a stable meal routine, which is an important factor in maintaining nutritional status and overall health.

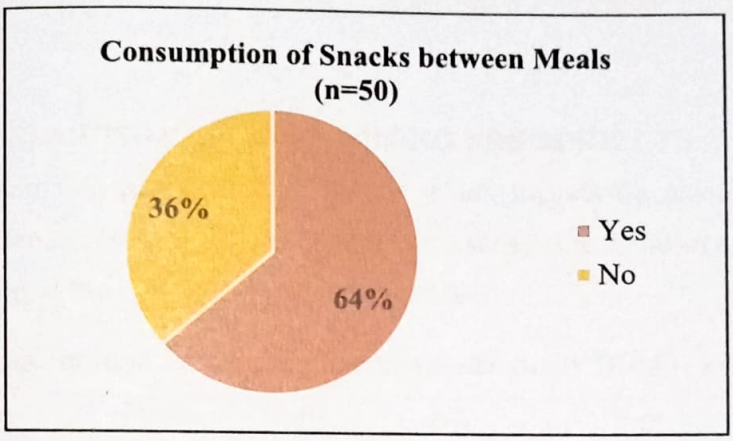

Figure 10: Consumption of Snacks between Meals

From the above figure, majority (64%) of the Intellectually disabled children consumed snacks between meals, while 36% did not engage in snacking. This indicates that more than half of the children had a tendency to consume snacks such as chips, biscuits, cookies, or cakes between regular meals. Frequent snacking, especially on energy-dense and low-nutrient foods, can contribute to excess calorie intake and may be a contributing factor to the high rates of overweight and obesity observed in this population.

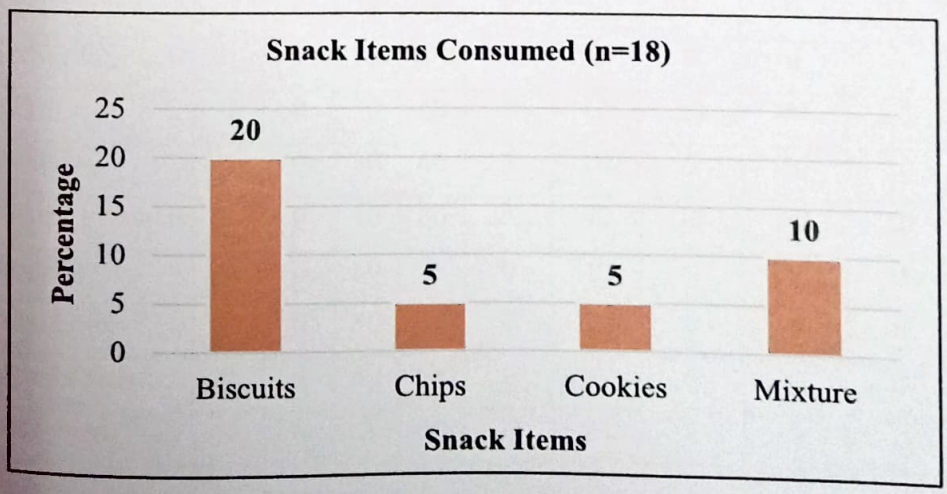

Figure 11: Snack Items Consumed among Intellectually Disabled Children

As shown in Figure 11, among the 18 Intellectually disabled children who consumed snacks between meals, biscuits were the most frequently consumed snack, accounting for 50% of the snack choices. This was followed by mixture (25%), while chips and cookies were each consumed by 12.5% of the snacking children. The preference for biscuits and mixtures may be due to their easy availability, affordability, and palatability. These findings highlight the need for nutritional guidance to ensure healthier snacking habits among this group.

4.3.1 FOOD CONSUMPTION PATTERN AMONG THE SUBJECTS

Food consumption pattern is the analysis which focuses on meal frequency, food preferences, nutritional adequacy, and challenges in maintaining a balanced diet. The food consumption pattern of the subjects is presented in table 3.

Table 3: Food Consumption Pattern among the Intellectually Disabled Children (n=50)

Food Items	Never		Daily		1-2 times/week		3-4 times/week		5-6 times/week	
	n	%	n	%	n	%	n	%	n	%
Cereals	0	0	50	100	0	0	0	0	0	0
Millets	50	100	0	0	0	0	0	0	0	0
Pulses and legumes	0	0	23	46	2	4	20	40	5	10
Fruits	0	0	20	40	10	20	10	20	10	20
Green leafy vegetables	0	0	0	0	34	68	10	20	6	12
Roots and Tubers	0	0	27	54	3	6	5	10	15	30
Other vegetables	0	0	50	100	0	0	0	0	0	0
Milk and Milk Products	0	0	50	100	0	0	0	0	0	0
Fish	0	0	15	30	5	10	20	40	10	20
Poultry	0	0	30	60	5	10	5	10	10	20
Meat and Meat Products	0	0	10	20	20	40	10	40	10	20
Sugars	0	0	50	100	0	0	0	0	0	0
Fats and oils	0	0	50	100	0	0	0	0	0	0
Processed foods	0	0	50	100	0	0	0	0	0	0
Canned foods	0	0	2	4	47	94	1	2	2	4

Table 3 provided insights into the frequency of consumption of various food items among 50 individuals. It was reported that cereals, other vegetables, milk and milk products, sugars, fats and oils as well as processed food were consumed daily by all the children (100%). In contrast, millets were completely absent from the diet of the children. Foods like pulses and legumes, fruits, green leafy vegetables, and roots and tubers were consumed with varying frequency throughout the week, indicating moderate dietary diversity. Animal-based foods such as fish, poultry, and meat products were not consumed daily but were included in the diet multiple times per week by a significant portion of individuals. Canned foods were rarely consumed daily, with most participants eating them 1–2 times per week. Overall, the table highlighted a pattern of high reliance on certain food items and limited intake of others, like millets and canned foods.

4.3.2 NUTRIENT INTAKE AMONG THE SUBJECTS

Nutrient intake of the subjects refers to the amount of essential dietary components such as macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals) consumed by an individual or group over a specific period. The following table-4 and table-5 presents the average nutrient intake of the intellectually disabled children in comparison with the Recommended Dietary Allowances (RDA).

Table 4: Nutritive Intake among Intellectually Disabled Girls (n=15)

Nutrients	Mean Intake	Mean RDA	RDA Met (%)
Energy (Kcal)	1250	2,320	54
Carbohydrates(g)	161	290	55
Protein (g)	35	41	85
Fat(g)	52	30	173
Calcium(mg)	550	1000	55
Iron (mg)	10	27	37
Vitamin D(mcg)	4	10	40

Table 4 shows the nutrient intake among Intellectually disabled girls. It was found that their average intake of energy, carbohydrates, calcium, iron, and vitamin D was significantly below the recommended dietary allowance (RDA). Protein intake was relatively adequate at 85% of the RDA. However, fat intake was considerably higher, exceeding the RDA

by 73%, indicating an imbalanced nutrient intake that may have affected their overall nutritional status.

Table 5: Nutritive Intake among Intellectually Disabled Boys (n=35)

Nutrients	Mean Intake	Mean RDA	RDA Met %
Energy (Kcal)	1800	2800	64
Carbohydrates (g)	200	350	57
Protein (g)	42	54	77
Fat (g)	65	30	216
Calcium(mg)	650	1000	65
Iron (mg)	12	32	38
Vitamin D (mcg)	4	10	40

The nutrient intake among Intellectually disabled boys revealed that their intake of energy, carbohydrates, protein, calcium, iron, and vitamin D was below the recommended dietary allowances (RDA). Protein met 77% and calcium met 65% of the RDA, while iron and vitamin D intake were particularly low. In contrast, fat intake was excessively high, reaching 216% of the RDA. These results suggested that the boys had an imbalanced diet, with excessive fat consumption and inadequate intake of essential nutrients.

4.4 PHYSICAL ACTIVITY AND LIFESTYLE OF THE SUBJECTS

Physical activity refers to any movement of the body that requires energy expenditure, while lifestyle encompasses the habits, behaviours, and practices that characterize an individual's way of living (World Health Organization, 2020). The physical activity and lifestyle of the subjects is presented in following figures and table.

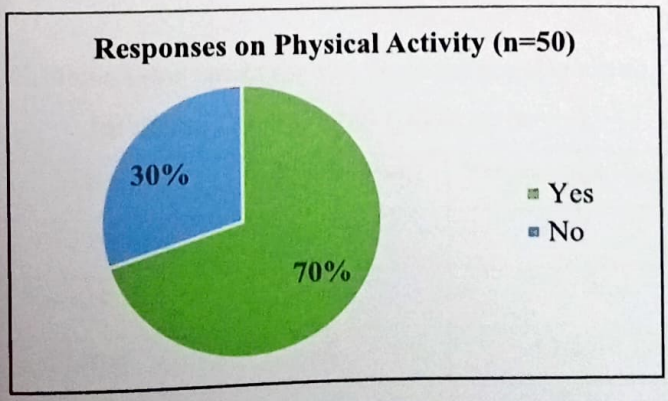

Figure 12: Engagement of Intellectually Disabled Children in Physical Activity

From figure 12, it was observed that majority (70%) of the Intellectually disabled children in the study are engaged in physical activities, while 30% are not involved in any such activities. This indicates that a significant proportion of the participants maintain some level of physical activity, which is important for maintaining physical health, supporting motor skills development, and potentially enhancing cognitive and emotional well-being. The 30% of children who are not physically active may be at higher risk for sedentary lifestyle-related health issues and may require targeted interventions to encourage participation in suitable physical exercises.

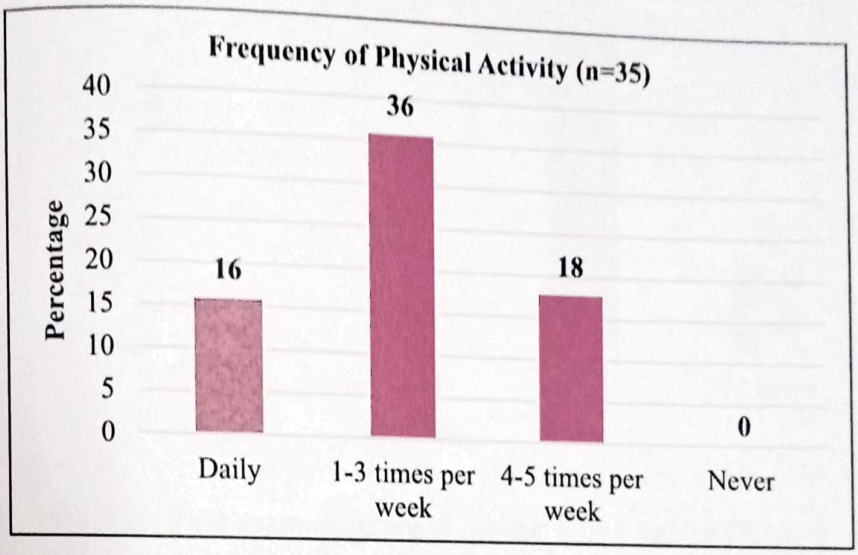

Figure 13: Frequency of Physical Activity among Intellectually Disabled Children

From the above figure, it was found that out of 35 children who engaged in physical activity, majority (36%) of them involved in physical activity for 1-3 times per week and 18% performed physical activity 4-5 times per week. However, only 16% engaged in daily physical activity.

Table 6: Time spent for the Physical activity among Intellectually Disabled Children (n=35)

Time	Frequency (n)	Percentage (%)
<15 min	3	8.57
15-30 min	27	77.15
30 min	5	14.28
1 hour	0	0

From table-6, it was observed that out of 35 children who engaged in physical activity, majority (77.15%) reported spending 15-30 minutes per session on physical activities whereas 8.57% of the children engaged in physical activity for less than 15 minutes, and only 14.28% spent 30 minutes for physical activity. Notably, none of the participants engaged in physical activity for as long as 1 hour.

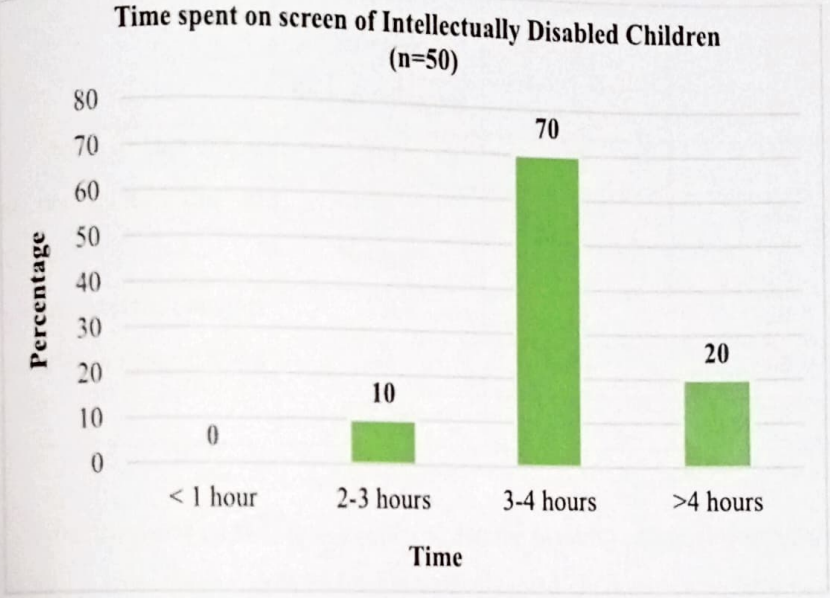

Figure 14: Time spent on screen of Intellectually Disabled Children

From the figure14, it was observed that majority of the subjects (70%) reported spending less than 3-4 hours on screens while 20% spent more than 40 hours daily, and only 10% spent less than 1 hour. This suggested that most subjects had relatively high levels of screen time.

4.5 CAREGIVER'S KNOWLEDGE ABOUT NUTRITION OF THE SUBJECTS

Caregiver's knowledge about nutrition refers to their understanding of dietary needs and healthy eating practices essential for the growth and development of children" (Aguayo & Menon, 2016). Caregiver's knowledge about nutrition includes their knowledge of healthy dietary practices, the nutritional needs of Intellectually disabled children. Caregiver's knowledge about nutrition of the subject is present in table-7.

Table-7: Caregiver's Knowledge about Nutrition of the Intellectually Disabled Children

Questions	Options	Frequency (n)	Percentage (%)
Are you aware of specific dietary needs of these children?	Yes	40	80
	No	10	20
Do you think proper nutrition can influence development in child?	Agree	25	50
	Neutral	20	40
	Disagree	5	10
	Strongly disagree	0	0
Do you believe that these children are more prone to deficiencies?	Yes	35	70
	No	10	20
	Not sure	5	10
Do you know essential nutrients in managing your child's condition?	Yes	10	20
	No	30	60
	Not sure	10	20

From the above table-7, it was observed that the majority of caregivers (80%) were aware of the specific dietary needs of Intellectually disabled children, while 20% were not. Half of the caregivers (50%) agreed that proper nutrition can influence a child's development, whereas 40% remained neutral and 10% disagreed. When asked if these children are more prone to nutritional deficiencies, 70% of caregivers responded affirmatively, 20% said no, and 10% were unsure. However, when it came to knowledge about essential nutrients required to manage their child's condition, only 20% of caregivers reported knowing them, while 60% admitted not knowing, and 20% were unsure.

The study conducted by Baliga et al., (2013) showed similar results that 75% of caregivers believed nutrition plays an important role in the management of disabilities, only 30% could correctly identify the essential nutrients required for their child's condition. About 60% of caregivers lacked knowledge about the specific dietary modifications needed, and 10% were unsure.

SUMMARY

AND

CONCLUSION

CHAPTER-V
SUMMARY AND CONCLUSION

The purpose of the present study entitled **"Nutritional Status and Dietary Habits of Intellectually Disabled School Children"**, was to determine the purpose to sought to comprehensively evaluate the health and nutrition profile of children with Intellectually disabilities.

Among 50 children between the ages of 10 and 19 were chosen for the study through purposive sampling. A well-structured questionnaire was generated to gather information from the selected subjects to analysis encompassed their socio-demographic background, anthropometric parameters, dietary practices, physical activity patterns, and the level of nutritional awareness among their caregivers.

The important points are summarized below:

- The socio-demographic profile indicated that:
  - Majority (74%) of the study participants belonged to the age group of 15–19 years whereas 26% belong to 10-14 age group.
  - A marked gender disparity was evident, as majority (70%) of the subjects were male and only 30% female.
  - Regarding birth order, majority (44%) were second-born whereas 40% of the children were firstborn, 12% were third-born, and only 4% were fourth-born.
  - Only 2% of the households had more than one child with special needs, while the remaining 98% had no other children with special needs.
  - The family structure data indicated that majority (78%) of the children resided in nuclear families, with only 22% belonging to joint family systems.
  - In terms of the degree of Intellectually disability, most children (96%) were classified as having moderate Intellectually disability, and 4% had mild Intellectually disability.
  - A significant proportion (96%) of the children were identified with moderate Intellectually disability, and notable comorbidities included autism spectrum disorder (26%), cerebral palsy (22%), Down syndrome (18%), and attention-deficit hyperactivity disorder (14%).

- Socio-economically, a majority (60%) of the subjects were categorized within the upper-lower class, followed by 24% in the upper-middle class and 16% in the lower-middle class.

➢ The anthropometric measurements indicated that:

- The mean height of the subjects was 159.24 cm with a standard deviation of 23.24 cm and CV of 14.6% which indicates that there is a moderate variability among the subjects.
- The mean body weight was 88.2 kg with a standard deviation of 27.62 kg and CV of 31.3%, pointing out a very high variability among the selected subjects.
- The mean BMI of the subjects was 39.16 kg/m^2, which categorizes the majority of the subjects as obese (>30 Kg/m^2) according to the World Health Organization's BMI classification. The considerable standard deviation of 10.47 kg/m^2 in the present study further indicates wide variability in BMI values, suggesting that while obesity is predominant, individual differences in growth and nutritional status exist among Intellectually disabled children.
- The mean BMI of the subjects was 39.16 kg/m^2 with standard deviation of 10.47 kg/m^2 and CV of 26.7% further indicates a wide variability in BMI values, suggests a prevailing issue of overnutrition, potentially exacerbated by sedentary lifestyles, excessive caloric intake, and limited physical activity.

➢ The dietary patterns of the subjects indicated that:

- All participants were non-vegetarians, and none reported adherence to vegetarian or other restrictive dietary patterns.
- Majority (60%) consumed four meals per day, while 20% had three meals, and only 20% exceeded four meals per day. Significantly, no children reported consuming fewer than three meals daily, indicating a generally consistent meal routine.
- All children exhibited independent feeding abilities and no reported feeding difficulties such as chewing or swallowing problems.
- Despite the absence of food allergies or intolerances, a concerning trend was observed in snack consumption.
- 64% of the children reported consuming snacks between meals, the majority of these snacks were processed and calorie-dense items such as biscuits, mixtures, chips, and cookies, with biscuits accounting for 50% of snack choices.

- Moreover, none of the participants used dietary supplements, and no children reported food aversions or selective eating behaviours.
- The data on food frequency revealed that while children consistently consumed certain staples such as cereals, milk and milk products, sugars, fats and oils, and processed foods on a daily basis, there was limited dietary variety overall. Millets were entirely absent from their diets, and the intake of nutrient-dense foods like green leafy vegetables, fruits, pulses, and animal-based proteins occurred less frequently, typically between one to four times per week. This pattern indicates a dependence on a narrow range of food items and suggests a need for improved dietary diversity to support balanced nutrition.
- Nutrient intake data gathered from a 3-day 24-hour dietary recall showed significant deviations from Recommended Dietary Allowances (RDA).
- Among girls, energy, carbohydrate, calcium, iron, and vitamin D intakes were below RDA levels, whereas fat intake was excessively high (173% of RDA), and protein intake approached adequacy (85% of RDA).
- Similarly, boys also demonstrated insufficient intake of energy, protein, calcium, iron, and vitamin D, while fat consumption far exceeded recommendations (216% of RDA). These findings highlight imbalanced diets characterized by high fat and low micronutrient intake, which may be contributing to the observed trends in obesity and nutritional deficiencies.

➢ Physical activities and Lifestyle of the subjects indicated that:

- Majority (70%) of the children participated in some form of physical exercise, though the intensity and duration were limited with a majority (56%) engaged in physical activity 1–3 times per day.
- Out of 35 children who engaged in physical activity, majority (36%) of them involved in physical activity for 1-3 times per week and 18% performed physical activity 4-5 times per week. However, only 16% engaged in daily physical activity.
- Regarding duration of physical activity, most children (77.15%) spent 15–30 minutes per session, 8.57% spent less than 15 minutes, and 14.28% for exactly 30 minutes. Notably, none of the children engaged in physical activity sessions lasting up to 1 hour.
- Regarding screen time, majority of the subjects (70%) reported spending less than 3-4 hours on screens while 20% spent more than 40 hours daily, and only 10% spent less than 1 hour. The results indicate a high level of screen exposure among the children.

- Caregiver's knowledge about nutrition of the subject indicated that:
  - Majority (80%) of the caregivers acknowledged being aware of their children's specific dietary needs but only 20% demonstrated knowledge of the essential nutrients required to manage their child's condition.
  - A majority (70%) believed these children were more prone to nutritional deficiencies, yet 60% admitted to lacking knowledge about the nutrients necessary to address such risks.
  - These findings reflect a critical gap in caregiver education and suggest the urgent need for structured nutrition education programs to enhance caregiving practices and promote better dietary management for Intellectually disabled children.

CONCLUSION

From the present study concludes that the anthropometric assessment of intellectually disabled school children revealed a significant prevalence of overnutrition, with the mean BMI of 39.16 kg/m² classifying the majority of participants as obese according to WHO standards. The dietary patterns of the intellectually disabled school children indicated a consistent intake of foods such as cereals, fats, and processed foods, which lacked diversity, particularly lack in intake of micronutrient-rich foods and predominantly involving calorie-dense foods items lead to weight gain and nutritional deficiencies of these children. The intellectually disabled school children didn't exhibit any feeding difficulties such as chewing, swallowing, or picky eating, and all were capable of independent eating. Most of the children participated in physical activity but the frequency and duration were limited and high screen time exposure was prevalent among these children. While a majority of caregivers were aware of the specific dietary needs of intellectually disabled children and recognized the importance of nutrition in their development, and most believed that these children are more prone to nutritional deficiencies. Enhancing parental awareness through targeted nutritional guidance is crucial to support healthier dietary practices and improve the overall nutritional outcomes of intellectually disabled children.

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APPENDIX

APPENDIX-I

QUESTIONNAIRE TO ELICIT INFORMATION ON NUTRITIONAL STATUS AND DIETARY HABITS OF INTELLECTUALLY DISABLED SCHOOL STUDENTS

I. Socio-demographic Characteristics

A) Child Details

1. Name of the child (in initials like ABC):
2. Age:
3. Gender:

a) Male b) Female

4. Birth order:

a) First child b) Second child

c)Third child d) Fourth child

5. Type of Family:

a) Joint family b) Nuclear family

6. Intellectual disability type:

a) Mild b) Moderate

c) Severe d) Profound

7. Associated comorbidities:

a) Down syndrome b) Autism spectrum disorder

c) Cerebral Palsy d) ADHD

e) Developmental delay f) Others

g) Nothing

h) If others, please specify:

B) Parent/ Guardians Details

8. Name of the parent/guardian (in initials like ABC):
9. Relationship with the child: _____
10. Are there other children with special needs in household:

a) Yes b) No

11. Socioeconomic status:

Education of head of family	
Profession or honours	

Graduate	
Intermediate or diploma	
High school certification	
Middle school certification	
Primary school certification	
Illiterate	
Occupation of head of family	
Legislators, senior officials and managers	
Professionals	
Technicians and associate professionals	
Clerks	
Skilled workers and shop and market sales workers	
Skilled agricultural and fishery workers	
Craft and related trade workers	
Plant and machine operators and assemblers	
Elementary occupation	
Unemployed	
Monthly family income (Amount in ₹)	
₹ >2,13,814	
₹ 1,06,850 - ₹ 2,13,813	
₹ 80,110 - ₹ 1,06,849	
₹ 53,361 - ₹ 80,109	
₹ 31,978 - ₹ 53,360	
₹ 10,703 - ₹ 31,977	
₹ <10,702	

II. Anthropometric Measurements

12. Current height (in cm):

13. Current weight (in Kg):

14. Body mass index (in Kg/m^2):

III. Dietary Pattern

15. Dietary pattern followed by the child:

a) Vegetarian

b) Lactovegetarian

c) Non-vegetarian

d) Ovo-vegetarian

16. How many meals does the child consume per day?

a) Two b) Three c) Four d) More than four

17. Does the child consume snacks between meals?

a) Yes b) No

18. If yes; please specify:

19. Does the child skip meals?

a) Yes b) No

20. If yes, which meal is commonly skipped by the child?

a) Breakfast b) Lunch c) Dinner

21. Does the child have any food allergies or intolerance?

a) No b) Yes

22. If yes, please specify:_____

23. **Food Frequency Questionnaire**

FOOD GROUPS	**Never**	**Daily**	**1-2 times/week**	**3-4 times/week**	**5-6 times/week**
Cereals					
Millets					
Pulses and legumes					
Fruits					
Green leafy vegetables					
Roots and Tubers					
Other vegetables					
Milk and milk products					
Fish					
Poultry					
Meat and meat products					
Sugars					
Fats and oils					
Processed foods					
Carbonated beverages					

24. 24-Hour Diet Recall

DAY-1 (Working day)

Meal Timing	Menu	Quantity	Ingredients (g/ml)
Breakfast __am			
Mid-morning Snack __am			
Lunch __ pm			
Mid evening Snack __ pm			
Dinner __ pm			

DAY-2 (Working day)

Meal Timing	Menu	Quantity	Ingredients (g/ml)
Breakfast __am			
Mid-morning Snack ____am			
Lunch __ pm			
Mid evening Snack __pm			
Dinner __ pm			

DAY-3 (Holiday)

Meal Timing	Menu	Quantity	Ingredients (g/ml)
Breakfast __am			
Mid-morning Snack __am			
Lunch __ pm			
Mid evening Snack __ pm			
Dinner __ pm			

IV. Feeding Challenges and Preferences

25. Does the child have any feeding difficulties?

a) Difficulty chewing
c) Difficulty swallowing
b) Picky eating
d) No issues

26. Does the child take any dietary supplements (e.g., multivitamins, iron, calcium)?

a) Yes b) No

27. Does the child eat independently?

a) Yes b) No

28. Does the child have any food preferences or aversions?

a) Yes b) No

29. If yes, please specify:_____

V. Physical Activity & Lifestyle

30. Does the child engage in physical activity?

a) Yes b) No

31. If yes, how often does the child engage in physical activities (e.g., walking, playing, yoga, sports)?

a) Daily b) 4-6 times a week c) 1-3 times a week d) Never

32. How much time is spent by the child for the physical activity?

a) > 15 minutes b) 15-30 minutes c) 30 minutes d) 1 hour

33. How much time does the child spent on screen per day?

a) > 1 hour b) 1-2 hours c) 3-4 hours d) >4 hours

VI. Caregivers' knowledge about nutrition

34. Are you aware of the specific dietary needs of children with intellectual disabilities?

a) Yes b) No

35. Do you think proper nutrition can influence your child's overall growth and development?

a) Agree b) Neutral c) Disagree d) Strongly disagree

36. Do you believe that children with intellectual disabilities are more prone to nutritional deficiencies?

a) Yes b) No c) Not sure

37. Do you know about the role of essential nutrients in managing your child's condition?

a) Yes b) No c) Not sure

APPENDIX-II

KUPPUSWAMY SOCIOECONOMIC STATUS SCALE 2024

Education of head of family	**Score**
Profession or honours	7
Graduate	6
Intermediate or diploma	5
High school certification	4
Middle school certification	3
Primary school certification	2
Illiterate	1
Occupation of head of family	
Legislators, senior officials and managers	10
Professionals	9
Technicians and associate professionals	8
Clerks	7
Skilled workers and shop and market sales workers	6
Skilled agricultural and fishery workers	5
Craft and related trade workers	4
Plant and machine operators and assemblers	3
Elementary occupation	2
Unemployed	1
Monthly family income (₹)	
₹ >2,13,814	12
₹ 1,06,850 - ₹ 2,13,813	10
₹ 80,110 - ₹ 1,06,849	6
₹ 53,361 - ₹ 80,109	4
₹ 31,978 - ₹ 53,360	3
₹ 10,703 - ₹ 31,977	2
₹ <10,702	1