

Understanding failure to thrive

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Abstract

Failure to thrive is encountered in general practice and across all disciplines of paediatrics. It is most commonly diagnosed in children less than 2 years of age, but can also affect those older. There is no consensus regarding a definition, but is understood to reflect sub-optimal growth. The causes are often multi-factorial with a wide spectrum of aetiologies, including a combination of both organic and non-organic factors. Most cases are due to poor nutrition, but neglect as the sole cause or contributing factor should always be remembered. Common age-related aetiologies are described and we aim to provide a practical approach to diagnosis. The importance of taking a comprehensive history, elucidating relevant physical signs and proceeding to a logical method of relevant investigation is described. Treatment is dictated by the underlying pathology, but general therapeutic measures and a multidisciplinary team approach are vital in treatment. The prognosis will vary according to aetiology, and is good in those with unintentional poor calorie intake who recover without any long term physical or developmental problems.

Keywords failure to thrive; faltering growth; growth failure; malnutrition; under-nutrition

Introduction

Failure to thrive (FTT) represents a common clinical problem encountered regularly by all child health practitioners across the entire paediatric age spectrum. The term is widely used to describe inadequate growth in early childhood. Concerns are often first raised by poor weight gain, less frequently by weight loss or short stature. Over the last century, many descriptions of growth problems are found throughout the medical literature. In the 1960's the term 'maternal deprivation syndrome' was used, implying that inadequate parenting was causative and that children suffered from associated emotional problems. The perception that links FTT with emotional deprivation and neglect still persists despite the knowledge that poor nutrition is the primary causative factor in many cases. Many clinicians now prefer to use the alternative terminology of 'faltering growth' as this avoids the perceived negative connotation of parental 'failure', with resulting anxiety and loss of confidence by carers in their own parenting

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ability. FTT is an important marker for possible physical, psychological or cognitive defects. Early research focussed on a select group of children admitted to hospital but further studies over the last 25 years have given us a much better understanding of the multi-factorial nature and prognosis of this condition.

Defining FTT

FTT describes a clinical condition rather than a diagnosis, and is a label given to children exhibiting inadequate growth or weight gain. Practically it should be seen as growth less than normal for gestation, corrected age, sex, genetic potential or underlying medical condition, and for many practitioners is considered when a baby or child is growing at a rate well below that seen in their peer group. There is no international agreement upon which specific anthropometrical criteria the diagnosis should be defined with. Individual health professionals have differing ideas, depending on their field of expertise, personal experience, training and cultural setting. Traditionally measuring weight, height and head circumferences are the most commonly used objective data in tracking growth. In most countries this important task is undertaken by health visitors and primary care physicians. Parents may not notice faltering growth, as it can be subtle and gradual in onset.

The following parameters in identifying FTT are most commonly used in daily clinical practice:

- weight less than 0.4 centile to weight less than 5th centile (various studies)
- weight less than 80% normal weight for age
- weight decline across more than major 2 centiles (5, 10, 25, 50, 75, 90, 95 centiles respectively).

Other anthropometrical criteria by Gomez, Waterlow or the Thrive Index have also been used and applying multiple parameters may be helpful. Weight for length is useful in identifying acute malnutrition requiring urgent treatment. Up to 5% of healthy, normal children may fulfil some of the above criteria by not following expected growth trajectories. The maximum weight centile achieved by 4–8 weeks of age is a better predictor of the 1 year centile than the birth centile, as the latter is influenced less by the baby's genotype but more by maternal factors such as nutrition, smoking, alcohol consumption, parity or age.

Faltering weight or crossing centiles are common triggers for concern, and one should distinguish poor weight gain from loss. A single measurement provides a 'snapshot' recording but serial measurements over a few weeks or months provide a better overview. Parent and health worker records will provide additional growth information. Inadequate calorie intake shows a 'stunted' growth pattern, observed as sequential reduction in weight, height and finally head growth. An initial reduction in head circumference only is seen in neurological diseases. In constitutional short stature weight and height are reduced in the first 2 years of life, followed by a normal growth velocity thereafter with a backdrop of reduced parental heights. Physiologically normal 'catch-down' growth is observed in the first months of life and reflects a return to the genetically predestined extra-uterine growth rate. Around 5% of normal infants may show a wide degree of both upward and downward inter-centile growth within the first 2 months of life and only 1% will cross three inter-centile spaces by 1 year of age.

Growth in low-birth weight infants should be measured against the revised 2009 WHO growth charts, where breastfeeding is taken as the norm and international comparative data has shown equal growth rates for healthy infants. Neonatal weight loss in the first 2 weeks of life is accounted for and fewer infants plot on the lower centiles or have faltering weight. IUGR babies who show appropriate weight for length ratios and growth velocities should not be misdiagnosed with faltering growth. Standardized growth charts should be used for certain genetic conditions such as Down's or Turner's syndromes. Major psychological trauma may lead to short stature out of proportion to reduced weight. This may respond to a physically and emotionally nurturing environment where the associated pituitary-hypothalamic defect may regress.

Epidemiology

The incidence of FTT varies worldwide due to differing definitions used and is affected by unique but also common factors when comparing developed to developing countries. In the latter, low levels of maternal education, poverty and associated malnutrition and burden of chronic infections such as HIV or TB are cofactors. In wealthier nations socioeconomic deprivation is less common. Between 1 and 5% of hospital admissions under the age of 2 are due to growth concerns and an estimated 5–10% of children seen in the primary care setting are growing sub-optimally. In some inner city USA emergency departments, 15–30% of children attending have been noted to show growth deficits. Analysis of referrals to a paediatric endocrinology service has shown that up to 10% of these are for FTT. Some believe that half of all children with some faltering growth may not be identified by current health screening.

Children with FTT may be exposed to certain higher risk factors which can be divided in parental, societal or individual factors. Disordered home circumstances including poor parenting, low parental intelligence, poverty, substance misuse, domestic violence, neglect and maternal isolation are observed. Children with underlying medical conditions such as prematurity, congenital abnormalities, neurodevelopmental disorders and other chronic systemic disorders are at higher risk, especially if the above psychosocial risks co-exist.

Pathogenesis

Despite many pathophysiological defects (Table 1) causing FTT, the common pathway is insufficient usable nutrition to meet the demands for childhood growth and may be categorized as follows:

Insufficient calorie intake: seen in the first few weeks of life is observed in poor breastfeeding technique, mechanical or structural feeding problems. The peak incidence occurs when maximum calories are required for growth as nutrition is the main growth driver during the first 2 years of life. A late progression to solid foods, reduced appetite, erroneous formula preparation or a limited variety of foods offered or taken are not uncommon. Worldwide, poverty is still the greatest single risk factor. In older children psychological causes must be considered and in adolescents eating disorders (anorexia, bulimia), psychiatric illnesses or abuse can occur.

Common causes of FTT by age of onset under 24 months

Pre-natal:	Prematurity Syndromes Congenital infections Maternal drugs Placental insufficiency
0–4 weeks:	Breastfeeding problems Genetic disorders Maternal depression Neglect Systemic disorders Anatomical abnormalities
3–6 months:	Underfeeding GOR Systemic disorders Cystic fibrosis Cow's milk intolerance
6–24 months:	Coeliac disease Cystic fibrosis Eating disorders Chronic diarrhoea states Neglect Systemic disorders Immunodeficiencies Insufficient calories Factitious illness

Table 1

Failure to retain or absorb calories: occurs in malabsorption states, excessive vomiting or metabolic deficiencies. Certain disorders require **higher calorie requirements** than a normal diet for age can meet to maintain adequate growth as seen in many of the chronic diseases of childhood. In cystic fibrosis all three factors may lead to growth faltering.

Neglect: should always be considered in the differential diagnosis and may affect children of all ages, and sometimes can be fatal if not recognized. Poor growth may be falsely attributed to recurrent minor illnesses rather than neglect. Neglect is associated with parental risk factors such as unemployment, adolescent or single parents, marital problems, history of abuse in childhood, lack of family support, depression, other mental health problems or periods of separation during prolonged hospitalization. Population studies have shown that between 5 and 10% of FTT sufferers are on the child protection register for abuse or neglect, and that children with FTT were at 25% greater risk of abuse than controls.

Traditionally the causes of growth faltering were divided into exogenous (non-organic) or endogenous (organic). Recently these terms have fallen out of favour, nevertheless the clinician may find it helpful in thinking of the organic causes by organ system, starting at the top of the body and working downwards.

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