



Spectrum of etiology for children presenting with failure to thrive in tertiary care hospital

Dr.Nasif Ahmed Hashmi, Dr.Rajib Chatterjee, Dr.Aamir Khan

(Pg resident,pediatrics,pims,loni)

(hod pediatrics and pg guide,pims ,loni)

(senior resident,pediatrics,loni)

Submitted: 15-05-2021

Revised: 26-05-2021

Accepted: 28-05-2021

ABSTRACT-Background-Failure to thrive(FTT) has been a major focus of attention and critical thought for all pediatricians.FTT usually develops by one of two alternate mechanisms.On some occasions,an underlying medical or surgical condition could lead to failure to growth which would present as “organic” FTT.In most cases,there is no underlying medical or surgical condition and they are said to have “non-organic”FTT.

Case Series-We report five cases in 4 months of duration from October 2020 to January 2021,presenting complains included loss or inability to gain weight,poor feeding,lethargy.poor activity,diarrhoea,vomiting,recurrent respiratory infections,burning micturition.Thorough history taking was done which included antenatal scans of mother,any events during pregnancy period,birth history,complete physical and biochemical examinations,imaging like neurosonography and ultrasonography along with lumbar puncture was done to rule out meningitis

Conclusion-FTT is a clinical condition which comprises of different causes which includes congenital malformations like cvs defects,cleft palate,gastrointestinal disorders, renal disorders etc.Some non organic causes includes cjild abuse,child neglect,emotional deprivation, According to the respective etiology treatments were initiated for the child.Proper examination at the time of birth and antenatal scans review and thorough history taking can reduce the severity by correcting the underlying defect and correct family counselling,with family planning and techniques for feeding practices can help prevent the condition.

Keywords-Failure to thrive,organic FTT,non organic FTT,congenital malformations,psychosocial factors

I. INTRODUCTION

Definition:The term Failure to Thrive (FTT) is usually applied for children younger than 3 years of

age, with failure to gain adequate weight over a period of time (weight gain velocity), height velocity, if a child’s weight is below the 5th percentile, if it drops down more than 2 major percentile lines, or if weight for height is less than the 5th percentile ($< 2\text{ SD}$)¹.Weight for height below the 5th percentile remains the single best growth chart indicator of acute undernutrition. Acute undernutrition is defined as having a duration of < 3 months². A BMI less than the 5th percentile also indicates that a child is underweight³.

This undernutrition is defined as an imbalance between nutrient requirements and intake or delivery that then results in deficit of energy, proteins, or micronutrients that may negatively affect growth and development.

Malnutrition may be illness related or non-illness related or both. Illness related malnutrition may be caused by one or more diseases, infections, or congenital anomalies, as well as by injury or surgery. Non-illness related causes include environmental, psychosocial, or behavioral factors. Often one cause may be primary and exacerbated by another.

Patient with failure to thrive may either have growth deceleration, faltering growth or even weight loss, as measured by anthropometric parameters².

Growth parameters should be measured serially and plotted on growth charts appropriate for the child’s sex, age and if preterm, post conceptual age.

The causes of insufficient growth include:

1. Failure of the child to ingest & utilize sufficient calories
2. Malabsorption
3. Increased metabolic demand

Hence we need to focus on the diagnostic approach for the causes of FTT.

History, physical examination & observation of parent child interaction usually suggest the most



likely etiologies & thus direct appropriate work up & management.

Significance of study:

Detecting failure to grow beyond 6 months of age is rather late for factors operative since early infancy, since they contribute to morbidity & mortality in later infancy & early childhood. FTT early in life is concerning because maximal postnatal brain growth occurs in first 6 months of life.

With the advances in the diagnostic technique such as Tandem mass spectrometry, Karyotyping, etc the causes of growth failure attributed solely to inadequate nutritional intake in the past can be diagnosed specifically.

Compared to the developed world where antenatal, intranatal, postnatal screening abound, the developing world is in a resource limited setting for the diagnosis of organic causes of failure to thrive. Early FTT may be associated with increased risk factors for cardiovascular disease as an adult.

Paucity of studies in Rural India & the emphasis on nutrition to achieve millennium development goals makes the study extremely significant.

Early detection of FTT is very important because, it can result in disorders, not only in physical growth, but also in cognitive & behavioral development where a appropriate treatment can prevent long term complications.

Pathophysiology-

➤ FTT may be classified as:

1. Organic
2. Non Organic
3. Mixed³

➤ Causes of Failure to Thrive

a. Inadequate caloric intake

- Gastroesophageal reflux
- Inadequate breast milk supply or ineffective latching
- Incorrect formula preparation
- Mechanical feeding difficulties (e.g., cleft lip or palate)
- Neglect or abuse
- Poor feeding habits
- Poor oral neuromotor coordination
- Toxin-induced gastrointestinal upset (e.g., elevated lead levels leading to anorexia, constipation, or abdominal pain)

b. Inadequate nutrient absorption

- Anemia, iron deficiency
- Biliary atresia
- Celiac disease

- Chronic gastrointestinal conditions (e.g., irritable bowel syndrome), infections
- Cystic fibrosis
- Inborn errors of metabolism, Milk protein allergy, Pancreatic cholestatic conditions

c. Increased metabolism

- Chronic infection (e.g., human immunodeficiency virus infection, AIDS, tuberculosis)
- Chronic lung disease of prematurity, Congenital heart disease, Hyperthyroidism
- Inflammatory conditions (e.g., asthma, inflammatory bowel disease)
- Malignancy, Renal failure

➤ Risk Factors for Failure to Thrive¹⁴

Medical conditions

- Congenital anomalies (e.g., cerebral palsy, autism, trisomy 21) Developmental delay
- Gastroesophageal reflux
- Low birth weight (< 2500 g) Poor oral health, Prematurity (< 37 weeks gestation)
- Tongue-tie (controversial)

Psychosocial (family) issues

- Disordered feeding techniques
- Family stressors
- Parental or family history of intimate partner abuse or violence (perpetrator or victim)
- Poor parenting skills
- Postpartum depression
- Social isolation of a caretaker
- Substance abuse
- Unusual health and nutritional beliefs (e.g., restricted diets)
- Maternal sleep deprivation
- Parental employment
- Type and amount of social support
- Financial resources, including money for baby supplies.

➤ The causation of FTT may be multifactorial or a single factor may predominate in any individual patient.

Several historical factors need to be considered in evaluation of growth failure after the neonatal period. FTT usually results from a complex interplay of factors between the infant's illness, attitude of the caregivers and home environment. The factors are usually intermeshed with the clinician finding it difficult to separate one from the other. The infant brings to this model an innate temperament with behavioral domains such as activity, adaptability, distractibility, response to new stimuli, and intensity of responses. Some infants are "easy babies", whereas others are more



“difficult”. These behaviors may interact with different maternal expectations or understanding of child behavior. Additional maternal contributions to this model may include postpartum depression, and the mothers own history of abuse or neglect as a child, as well as home environmental issues such as family stress, poor social/emotional support, poverty, and a chaotic lifestyle. In addition, many medical causes of FTT are associated with these same psychosocial risk factors; both need to be addressed in the management of FTT¹

Clinical manifestations-

Children with failure to thrive usually presents with following clinical features

- 1- Inadequate intake of food
- 2- History of prolonged fever(infections,malignancy,collagen disorders)
- 3- Fatty stools(fat malabsorption)
- 4- Diarrhoea(infections,malabsorption,chronic inflammatory bowel disease)
- 5- Vomiting(GERD,metabolic disorders)
- 6- Wheezing(asthma)
- 7- Loss of weight
- 8- Loss of appetite
- 9- Recurrent respiratory infections(cardiac defects)
- 10- Breathlessness(congestive cardiac failure)
- 11- Bleeding gums(leukemia)
- 12- Swallowing problems
- 13- Voracious appetite(hypothyroidism)
- 14- Pica
- 15- Oligouria or anuria
- 16- Burning micturition(urinary tract infection)

II. CASE SERIES-

Case 1-a one month old female child with low socioeconomic status,with incomplete immunization schedule was presented to us with chief complain of failure to weight gain and vomiting,since birth.Baby was born to full term mother,vertex vaginally delivered,cried immediately after birth,no adverse events during the delivery or during the antenatal period with birth weight of 2kg,current weight was 1.7 kg and was lethargic and dehydrated with baseline glucose of 62mg/dl.On admission,baby was started on iv fluids for dehydration,and was gradually shifted to feeds, lab investigations was done which came out to be normal along with thyroid levels and lumbar puncture profile.Complete physical examination was done which was normal.On careful history taking,there was history of improper feeding to the baby,after which proper counselling and feeding techniques were taught to the mother after which

baby started gaining weight,activity improved,improved feeding.Child was discharged after adequate weight gain and was diagnosed as inorganic cause i.e.**Improper feeding technique** for failure to thrive

Case 2-

A 2 month old male child with low socioeconomic status,vaccinated according to age,referred from outside hospital for higher centre care after treatment in their hospital for complaints of poor activity,difficulty in passing urine and weight loss.Baby was born to primigravida mother,full term. vertex vaginally delivered with birth weight of 1840grams with current weight of 1660grams.Antenatal scans showed **multicystic kidney disease** and baby had nicu stay for 15 days for the same.Ultrasonography was done on 3rd day of life which showed multicystic kidney disease.On admission,baby had severe respiratory distress and was intubated due to decrease in saturation on room air.Laboratory investigations was done which showed anemia,metabolic acidosis,electrolyte imbalance.Iv fluids,along with bicarbonate correction was given along with antibiotics were started and supplements were added after stabilization.Pediatric surgeon opinion was taken but child was not fit for surgery as child had inadequate weight and was started on medical management for blood pressure monitoring and bicarbonate losses.Baby gained weight gradually and was discharged after being stabilized with advice for regular followup .Cause for failure to thrive was **multicystic kidney disease**.

Case 3-

A one month old male infant born to 2nd by order of non consanguineous marriage delivered vertex vaginally with birth weight of 3000grams was presented to us with complains of inability to gain weight since 15 days and umbilical discharge since 5 days.

Current weight was 2.5kg and on 2nd day of admission mother complained of swelling over left elbow which was tender and with decreased range of movements.Orthopedic opinion was taken after which it was diagnosed as **Septic Arthritis**,following which baby was posted for incision and drainage,which was done under all aseptic precaution and appropriate i.v. antibiotics were given for 2 weeks and was then shifted to oral antibiotics for 4 weeks.Ultrasonography and neurosonography was normal and laboratory profile showed increase in total leukocyte count with neutrophil predominance.After 2



weeks, baby's condition gradually improved and started gaining weight. After all the clinical picture and laboratory evidence etiology for failure to thrive was found out to be infectious cause i.e. **Septic Arthritis**.

Case 4-

A month old female baby of low socioeconomic status vaccinated according to age, presented to us with complaints of poor feeding since 12 days and diarrhoea since 8 days. Baby was 2nd product of non consanguineous marriage born vertex vaginally, full term, with birth weight of 2.7kg with current weight of 2.1kg. On admission bsl was 82mg/dl and was dehydrated with respiratory distress. Arterial blood gas was done which showed metabolic acidosis and laboratory profile showed electrolyte imbalance. Baby was started on i.v. fluids and bicarbonate correction and antibiotics were added after which baby was gradually shifted to full feeds after which her general condition improved and weight gain was adequate. After all the laboratory profile and complete physical examination cause for failure to thrive was found out to be **Sepsis and Diarrhoea**.

Case 5-

A 3 month old male child with low socioeconomic status, vaccinated according to age, came with chief complaints of vomiting since 15 days and failure to gain weight. Baby was born as primigravida, twin gestation, vertex vaginally delivered at 35 weeks of gestation with birth weight of 1890grams with first twin expired after 3 days of birth due to respiratory distress syndrome. Baby was discharged from outside hospital after 7 days of hospital stay for treatment for low birth weight. Baby was then presented to us with vomiting episodes and failure to gain weight with current weight of 1770 grams. Careful physical examination showed incomplete formation or gap on the roof of the palate, after which oromaxillofacial surgeon opinion was taken and was treated accordingly with advice for surgery after 6 months of age and after gaining adequate weight. Plate for the roof of palate was advised after there was decreased incidence of vomiting and baby started gaining weight and was discharged with advice for followup for further treatment. The cause for failure to thrive was **Cleft Palate**.

III. DISCUSSION

Failure to thrive is a condition where the growth of the child is much below the expected for that age or the child loses weight significantly over a short period of time. This term is used only for

children up to 3 years of age. It is not a diagnosis but a term which is used to describe

1-persistent weight loss

2-failure to gain weight, or

3-fall in the rate of growth from the child's normal percentile

The child usually weighs below 3rd or 5th percentile, or the weight may decrease from 75th percentile to 25th percentile in as short time.

Causes are traditionally classified as-

1) Non-organic-these are responsible for up to 80% of cases of failure to thrive, these include

-psychosocial factors-emotional deprivation, child neglect, child abuse

-poverty

-lack of knowledge regarding feeding practices

2) Organic causes-there is an underlying medical condition or abnormality present antenatally

3) Mixed

Treatment of underlying conditions usually corrects the disease which includes nutritional rehabilitation, management for psychosocial issues, treatment for organic conditions

IV. CONCLUSION

Failure to thrive is a life threatening yet treatable condition which if ignored may result in long term consequences and sequelae. Preventable causes like feeding techniques, child care, proper family environment may help prevent the condition. On the other hand early detection of congenital malformations, proper physical and laboratory examinations may help detect the underlying cause and treat accordingly.

REFERENCES

- [1]. McLean HS, Price DT. Failure to thrive. Nelson Textbook of Pediatrics. 19th ed. Philadelphia, PA: Elsevier Saunders. 2011:147-9.
- [2]. Becker PJ, Carney LN, Corkins MR, Monczka J, Smith E, Smith SE, Spear BA, White JV. Consensus statement of the Academy of Nutrition and Dietetics/American Society for Parenteral and Enteral Nutrition: indicators recommended for the identification and documentation of pediatric malnutrition (undernutrition). Journal of the Academy of Nutrition and Dietetics. 2014 Dec 1;114(12):1988-2000.
- [3]. Virginia K. Assessment of growth. Nelson textbook of pediatrics. 18th ed. Philadelphia: Saunders Elsevier. 2008:70-1.



- [4]. Zenel Jr JA. Failure to thrive: a general pediatrician's perspective. *Pediatrics in review*. 1997 Nov;18(11):371.
- [5]. Olsen EM, Skovgaard AM, Weile B, Jørgensen T. Risk factors for failure to thrive in infancy depend on the anthropometric definitions used: the Copenhagen County Child Cohort. *Paediatric and perinatal epidemiology*. 2007 Sep;21(5):418-31.
- [6]. Gahagan S, Holmes R. A stepwise approach to evaluation of undernutrition and failure to thrive. *Pediatric Clinics*. 1998 Feb 1;45(1):169-87.
- [7]. Sherry B. Epidemiology of inadequate growth.
- [8]. Guyer B, Wehler C, Anderka M, Friede A, Bithoney W, Frank D, Fogerty S. Anthropometric evidence of malnutrition among low-income children in Massachusetts in 1983. *Massachusetts Journal of Community Health*. 1985;2:3.
- [9]. Drotar D. The family context of nonorganic failure to thrive. *American Journal of Orthopsychiatry*. 1991 Jan;61(1):23-34.
- [10]. Sills RH. Failure to thrive: the role of clinical and laboratory evaluation. *American Journal of Diseases of Children*. 1978 Oct 1;132(10):967-9.
- [11]. Bithoney WG, McJUNKIN JA, Michalek J, Snyder J, Egan H, Epstein D. The effect of a multidisciplinary team approach on weight gain in nonorganic failure-to-thrive children. *Journal of Developmental and Behavioral Pediatrics*. 1991 Aug.
- [12]. Beaton GH. Small but healthy? Are we asking the right question?. *Human Organization*. 1989 Apr 1:30-9.
- [13]. Wright CM, Matthews JN, Waterston A, Aynsley-Green A. What is a normal rate of weight gain in infancy?. *Acta Paediatrica*. 1994 Apr;83(4):351-6.
- [14]. American Academy of Pediatrics. *Pediatric Nutrition: Policy of the American Academy of Pediatrics*. American Academy of Pediatrics; 2014.
- [15]. Singer LT, Song LY, Hill BP, Jaffe AC. Stress and depression in mothers of failure-to-thrive children. *Journal of Pediatric Psychology*. 1990 Dec 1;15(6):711-20.
- [16]. Benoit D, Zeanah CH, Barton ML. Maternal attachment disturbances in failure to thrive. *Infant Mental Health Journal*. 1989 Sep;10(3):185-202.
- [17]. Pollitt E, Eichler AW, Chan CK. Psychosocial development and behavior of mothers of failure-to-thrive children. *American Journal of Orthopsychiatry*. 1975 Jul;45(4):525.
- [18]. Gelfand DM, Teti DM. The effects of maternal depression on children. *Clinical psychology review*. 1990 Jan 1;10(3):329-53.
- [19]. Hutcheson JJ, Black MM, Starr Jr RH. Developmental differences in interactional characteristics of mothers and their children with failure to thrive. *Journal of pediatric psychology*. 1993 Aug 1;18(4):453-66.
- [20]. Wehler CA. Community Childhood Hunger Identification Project: A Survey of Childhood Hunger in the United States.