Original Article

The Frequency of Weight Gain in Children of Probable Tuberculosis under Treatment

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ABSTRACT

Objective: To determine the frequency of weight gain in children of probable Tuberculosis under treatment.
Study Design: Descriptive case series study
Place and Duration of Study: This study was conducted at the TB DOTS Clinic, CMC Children Hospital, Larkana from July 2017 to January 2019.
Materials and Methods: Total 100 children of age 6 months to 5 years age, both genders and new cases of probable tuberculosis were consecutively selected. Children with malnutrition, complain of Refusal to feed, convulsions, unconsciousness or having HIV co-infection were excluded.
Results: Mean age ± SD was 33.53 ± 12.56 months. (Ranged 07-60 months). Mean ± SD initial weight was 18.75 ± 6.33 Kgs while mean ± SD final weight was 25.36 ± 9.23 Kgs. Overall, net minimum & maximum weight gain were 0.5 to 15.6 Kgs with mean ± SD weight gain of 9.61 ± 4.03 Kgs. Male children were in almost two third majority i-e; 63% (n= 63). Sixty percent (60%, n= 60) children had confirmed tuberculosis. Weight gain in probable cases of TB after treatment given was found to positive among seventy nine percent (n= 79) children.
The stratification analysis showed that frequency of weight gain increased with increasing age, male children, rural living children and with taking four ATT drugs.
Conclusion: Tuberculosis is a great burden among our population especially children in whom diagnosis is difficult or late. Weight gain is main indicator of successful treatment. The current study highlighted the importance of TB occurrence in children by investigating one of its core issues. Further studies are warranted to understand other changing phenomenon of presentations, diagnosis and treatment effectiveness and compliance.
Key Words: Probable Tuberculosis, Antituberculous, Gain, Children, Malnutrition

INTRODUCTION

Tuberculosis affected an estimated 8.8 million people and caused 1.4 million deaths globally in 2010, including at least 64000 children.[1] In one study from south Africa, children <13 years of age contributed to 14% of the burden, with a childhood tuberculosis incidence rate of 407 per 100,000 population per year.[2]
According to National Tuberculosis Control Programme (NTCP) has created guidelines for early diagnosis and management of Tuberculosis in children that consist of four criteria: suggestive clinical features, evidence of close contact with an adult case of tuberculosis, tuberculin skin testing and suggestive radiological findings.[3]
As in children there is difficulty in collection of respiratory specimens and there is low yield of organisms, therefore the diagnosis of Tuberculosis in children is difficult,[4,5] Investigations such as Gene Xpert help in diagnosing Tuberculosis[6] but in resource poor health facilities with limited access to these diagnostic investigations, diagnosis becomes an even greater challenge.[7] Tuberculosis is a wasting disease[8] and outcome of ATT can be predicted by body weight assessment.[9] Each child should be clinically assessed every 2 weeks during the intensive phase, and every 4 weeks during the continuation phase until treatment completion. The assessment should be done about symptoms, weight, treatment compliance and any side effects. Most children with Tuberculosis will start to show signs of improvement within 4-8 weeks of ATT.[10] Weight gain is a sensitive indicator of good response to treatment. Treatment failure is considered if child is receiving ATT and there is no symptom resolution or symptoms are getting worse and continued weight loss. The bodyweight has been assessed in many studies during the intensive phase[11] and it is obvious from previous studies that there is an association between

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inadequate weight gain and poor outcome of ATT.[12]Assessment of weight is a cheap and easy method to see the outcome of ATT.[13]

As local data is deficient on weight gain in children having probable tuberculosis during ATT so rationale of this study is to determine the treatment outcome by monitoring weight in every new case of Probable Tuberculosis as weight is a cheap and easy method to determine the outcome of ATT. It will help to predict the treatment outcome clinically and prevent deaths and treatment failures by early interventions. It will further helps to adjust drug dosages in children who are gaining weight.

MATERIALS AND METHODS

Probable Tuberculosis: When a child got score of 5-6 by current National Tuberculosis Control Programme (NTCP) scoring chart.

Weight Gain: When the child had gained weight of ≥2kg at the 8 weeks of treatment as compared to baseline weight.

New cases of Probable Tuberculosis: Those cases which had been labelled probable and started antituberculous therapy (ATT) within previous 2 weeks, confirmed by taking proper history.

Compliance of drugs: Patient taking > 80% of medicine as physician advised was taken as good compliance.

Data Collection Procedure: Study was conducted in TB DOTS Clinic, CMC Children hospital, Larkana. All eligible and consented patients were selected according to selection criteria.

At the start of treatment, weight was noted and then weight was measured after every 2 weeks of initiating anti-tuberculous therapy given until 8 weeks of treatment.

Finally; the weight at the 8 weeks of treatment was compared to the baseline weight and seen that whether the child had gained weight or not.

Detailed information regarding age, initial weight, number of drugs and drug compliance as defined by operational definition were taken. Weight measurement was carried out on each visit. Weight was measured in kilograms after removing excessive cloths of children and compared to the baseline weight and if the child had gained weight of ≥ 2kg at the 8 weeks of treatment as compared to baseline weight then it was labelled as weight gain.

Data Analysis: Data were analyzed on SPSS version 21.0. Percentage and frequency were calculated for categorical variables. Mean and standard deviation were calculated for quantitative variables. Applying Chi-square test, P value ≤ 05 assumed as significant.

RESULTS

During study period 312 children were treated and out of these 100 children with probable TB were included in the study as per the selection criteria. The results on these patients are as under.

Mean age ± SD was 33.53 ± 12.56 months. Ages of these patients ranged from 07-60 months. (Table 1)

Table No.1: Baseline data of all participating children. (n= 100)

Viariable	Minimum	Maximum	Mean	Standard deviation
Age of child in months	07	60	33.53	12.56
Initial Weight (Kgs) (Before initiating treatment)	5	29	18.75	6.33
Weight on 1st visit	5.5	32	20.41	6.72
Weight on 2nd visit	5.7	34.8	22.14	7.17
Weight on 3rd visit	6.7	37.3	23.88	7.61
Weight on 4th visit	7	43.1	25.36	9.23
Net weight gain	0.5	15.6	9.61	4.03

Table No. 2. Effect of different variables of child on frequency of weight gain in probable Tuberculosis under treatment

Variable		Weight gain		Total	P value
		Yes	No		
Age of child (Years)	Upto 1 Year	2(66.6%)	1(33.3%)	3(100%)	0.348
	1-2 Years	23(88.5%)	3(11.5%)	26(100%)	
	2-3 Years	22(73.3%)	8(26.7%)	30(100%)	
	3-4 Years	18(69.2%)	8(30.8%)	26(100%)	
	4-5 Years	14(93.3%)	1(6.7%)	15(100%)	
Gender	Male	32(80%)	8(20%)	40(100%)	0.524
	Female	47(78.3%)	13(21.7%)	60(100%)	
Residence	Urban	29(78.4%)	8(21.6%)	37(100%)	0.549
	Rural	50(79.4%)	13(20.6%)	63(100%)	
Drugs	3 drugs	36(78.3%)	10(21.7%)	46(100%)	0.530
	4 drugs	43(79.6%)	11(20.4%)	54(100%	

Initial weight (before initiating treatment) ranged from 05 to 29 Kgs with a mean ± SD initial weight of 18.75 ± 6.33 Kgs. Weight on 4th visit was noted to minimum to maximum from 7 to 43.1 Kgs with mean ± SD final weight of 25.36 ± 9.23 Kgs. Overall, net minimum & maximum weight gain were 0.5 to 15.6 Kgs with mean ± SD weight gain of 9.61 ± 4.03 Kgs (Table 1). Measurement of weights on 1st visit, 2nd visit and 3rd follow up visits which gradually changed were recorded and are given in Table 1.

Age of children ranges mostly 1-4 years. Accordingly; children with age <1 year were 3% (n= 3), 1 to 2 years and 3 to 4 age were 26% (n= 26) each and 2 to 3 years, 4-5 age were 30% (n= 30) and 15% (n= 15) respectively.

Male children were in almost two third majority i-e; 63(63%), belong to rural areas; 63(63%).

After inclusion in the study and starting treatment for probable TB, it was observed that sixty percent (60%, n= 60) children had confirmed tuberculosis.

Forty six percent (n= 46) children were given three drugs while other 54% (n= 54) received four drugs as treatment of TB however; among to four drug therapy.

The actual outcome of this study was the weight gain in probable cases of TB after treatment given which was found to positive among seventy nine percent (n= 79) children.

In this study the stratification analysis showed that frequency of outcome variable (weight gain) increased with increasing age groups from in 66.7% in upto 1 year age to 93.3% in 4-5 years children; however these results did not accompany the significant p value. (P value 0.348, Table: 2).

Further it was noted that male children had slightly higher rates of weight gain (80%) compared to (78.3%) in the female children. (P value 0.524, Table: 2).

Likewise; there was slightly more frequency of weight gain in rural than the urban living children (79.4% vs 78.4%). (P value 0.549, Table: 2).

Finally; it was also noted that children taking four drugs were more toward to weight gain (79.6%) compared to those taking three drugs (78.3%) for TB; however these results too did not accompany the significant p value. (P value 0.530, Table: 2).

DISCUSSION

The burden of childhood TB in developed world is as high as 7% while, it triples in the developing nations reaching up to 20%.[14] Published reports are common in adults but there is a very little number of studies can be identified investigating this serious issue among children. One thing which raises the severity of this critical concern is that among adults, TB is easily and quickly identifiable through manifestation of its typical symptoms but the children with tuberculosis often pose diagnostic difficulties due to atypical features.[15-18]

Children with pulmonary TB present with a wide variety of signs and symptoms. Children may either be asymptomatic or, at the other extreme, present with severe weight loss and wasting in cases with disseminated TB.[19,20] An evident fact is that there is very strong association between malnutrition and TB in children as well as adults, though in children it direction of causality may be sometime misleading or confusing regarding weight loss and TB. This is because TB in itself causes wasting and malnutrition with poor weight gain makes child prone to attract TB. On the other hand children taking ATT show a progressive weight gain and are monitored for it as an indicator or treatment effectiveness.[10-13]

The current study was conducted to assess the children diagnosed with probable tuberculosis by investigating the frequency of weight gain under TB treatment. The results of the study show a clear picture of treatment effectiveness. A big majority of children (79%) showed weight gain ranging from 0.5 Kgs minimum to 15.6 Kgs maximum. This can be considered an enormous success and it had been more profound had there been a more compliance among the treated children. The compliance rate was 46%. There is only one study in comparison with our findings. The study by Mexitalia M, et al., [17] studied the effect of tuberculosis treatment on leptin levels & weight gain in Indonesian children and found that there were significant changes in weight gain of children having probable TB. Mean weight of children at baseline was 18.65 Kgs which increased upto 19.75 Kgs after intensive phase (P value < 0.001) and further to 20.85 kgs after continuation phase (P value < 0.001).

This shows resemblance in the two studies regarding effect of TB treatment on weight of children. However; the stipulated difference is due to the difference of selection criteria and the age ranges of the two studies. Mexitalia M, et al.,[17] in their study has taken children of age 5-14 years with a mean age of 6.8 years while in the current study the age range was set between 6 months to 60 months (5 years). Another study had taken children of age form 1 month to 15 years with mean age ± SD age of 105.2 ± 45.3 on patients of intrathoracic TB patients. The mean body weight of children documented in this study was 19.8 kg which is comparable with the current study. [18]

The current study also report that increasing age affects positively on weight gain with TB treatment. Likewise; male gender and rural living are also factors which favour more weight gain with ATT in children. No other contemporary study has evaluated these factors. Compliance to ATT is a critical issue not only in adults but in children also. In current study the compliance rate was only 46% however one study documented almost complete compliance (97%) among all groups of TB treatment.[22] We think that age, education, number of drugs given, counselling/ support and motivation for

treatment may be the reasons for difference of the compliance rates in the two studies. In case of children, it is their parents who need to be counseled and motivated for completion of treatment of their children. Directly Observed Treatment, Short Course (DOTS) is a useful measure in this regard however; patients loose compliance soon afterward which needs to be controlled. Poor adherence to drug therapy is the main barrier to cure. Co-operation and other strategies are required. [11,19,20,]

Treatment show signs of improvement after 2 to 4 weeks of anti-TB treatment in which if, there is continued weight loss then it is labeled as treatment failure. However; children should be monitored at least on a monthly basis for the first 2 months, thereafter every 2 months until completion of treatment. Children responding well to treatment will have resoluton of symptoms and gain weight.[19,20]

CONCLUSION

As infective but chronic disease, the Tuberculosis is a great burden among our population. The children are especially worse targets because of unclear manifestataion leading to late diagnosis and increasing morbidity. TB in children is known to present with weight loss or at least failure to gain weight. In the scenario of changing presentations a strict vigilance on the new cases especially among children is the need of hour. Strategies exist to address some of the challenges. Unfortunately, the hopes engendered by new diagnostic and therapeutic methods are tempered by the reality that most of the world's children with TB are excluded from them by poverty and poor medical infrastructure.

The current study highlighted the importance of TB occurrence in children by investigating one of its core issues. The study found that with good compliance the TB treatment bring about significant positive changes of weight gain in children. Elder age, male gender, rural living and use of four drugs leads to more frequency of weight gain among probable cases of TB.

Further studies are warranted to understand the changing phenomenon of TB in children.

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