

Correspondence

Growth assessment and risk factors of malnutrition in children with cystic fibrosis

To the Editor

I have 2 comments on the interesting study by Isa et al¹ on the growth assessment and risk factors of malnutrition in children with cystic fibrosis (CF).

First, the authors mentioned that despite the rapid improvements in medical care and the significant reduction in mortality rate, most of CF children in Bahrain (72%) were failing to thrive compared with the reference population.¹ The authors did well in addressing 4 limitations that might cast some suspicions on the accuracy of their results. I presume that the following methodological limitation might be additionally contributory. In the methodology, the authors employed World Health Organization (WHO) child growth standards 2006 to calculate various growth parameters.¹ It is noteworthy that growth monitoring of apparently healthy children aims at early detection of serious underlying disorders. However, existing growth-monitoring practices are mainly based on suboptimal methods, which can result in delayed diagnosis of severe diseases and inappropriate referrals. The available data suggest a large gap between the widespread implementation of growth monitoring and its level of evidence or the clinical implications of early detection of serious disorders in children.² In the clinical setting, there are many growth charts to be used for assessing the growth status in children, notably the Center for Disease Control data (CDC 2000), WHO 2006, and national reference. I presume that the authors referred to WHO 2006 growth charts to evaluate the growth status of their studied CF cohort due to the absence of national reference growth charts specific for Bahraini pediatric population. It is expected that employing different growth charts to monitor the growth of children could yield different results. This could be supported by the following 3 points: 1) The comparison of changes in growth percentiles of children on CDC 2000 growth charts with corresponding changes on WHO 2006 growth charts revealed that pediatricians who monitor children's growth on the basis of WHO 2006 growth charts might be more likely to refer children aged <6 months and less likely to refer those aged 6 to 12 months for further evaluation for failure

to thrive.³ 2) Growth patterns in children with CF were noticed to differ when using WHO and CDC references, particularly during the second year of life. In an interesting American study,⁴ the use of WHO charts in both boys and girls with CF aged 1-24 months resulted in ~8 percentile lower length-for-age and ~13% higher short stature rate (length-for-age <5th percentile). World Health Organization weight-for-age was ~9 percentile lower prior to age 6 months, crossed at 6-7 months, and remained ~14 percentile higher at 8-24 months. The WHO weight-for-length (WFL) percentile (WFLp) was similar before 12 months, but ~10 percentile higher at 12-24 months compared with CDC charts. When using WHO charts, 9% of children had underweight (WFLp <50th) classified differently, and this rate varied with age: 4% in the first year, 7% at 12 months, 13% at 15 months, and 16% at 18 months. Weight status assessed by WHO body mass index (BMI) charts was different from WHO WFL charts. At 24 months when switching back to CDC, 26% of children with normal WFLp on WHO charts appeared underweight on CDC charts. A 70th percentile of WHO BMI percentile was equivalent to the 50th percentile CDC BMI percentile.⁴ 3) It is worthy to mention that the WHO standards are the first globally representative growth standards. They describe the growth of children worldwide who are living in favorable circumstances. The WHO standards are well suited for intercountry comparisons. Comparison with other charts revealed important differences with implications for child health monitoring. Comparing the use of the WHO standards to use country-specific growth references suggested that the latter might describe the growth of children more faithfully than the WHO standards.⁵ I hope that Isa et al's study¹ would trigger the need to construct age and gender-specific Bahraini growth charts to precisely evaluate the growth status of children, including CF patients.

Second, though no recent data are yet present on the exact prevalence of pediatric CF in Bahrain, I presume that the prevalence is on rise due to substantial consanguinity. The available data pointed out that among parents of newborns in Bahrain in 2008-2009, the total consanguinity and first cousin marriage rates over a period of 4 months in 2008 were 10.9% and 6.9% in 2009, while during all of 2009 the rates were 11.4% and 6.8% of 2008.⁶ Interestingly, the rate of consanguinity among the families of patients with CF carrying transmembrane regulator gene mutations

(CFTR) was reported to be 77%.⁷ I presume that in the light of prevailing consanguineous marriage⁶⁻⁷ and preponderance of growth failure (72%) in CF patients,¹ neonatal screening program for CF needs to be seriously considered in Bahrain.

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Reply from the Author

Thank you Professor Al-Mendalawi for your valuable comments. In the method section, we preferred to use the WHO child growth standards 2006 to calculate various growth parameters in CF patients because of the lack of national reference growth charts specific for Bahraini pediatric population. In addition, we wanted to compare the results of the CF patients with the general population and the only available data on general population were obtained from the 2012 health statistic on growth indicators for children and these statistics were based on the WHO standards and not on the Center for Disease Control data (CDC 2000). We agree that WHO charts might under or overestimate the degree of malnutrition compared with the CDC standards but they remain the latest globally representative growth standards that can be used to compare our results with the most recent studies. We absolutely agree that the need for age- and gender-

specific Bahraini growth charts are highly required and a national neonatal screening program for CF should be implemented as soon as possible in a country like Bahrain were consanguineous and first cousin marriages rates are on rise.

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References

1. Isa HM, Al-Ali LF, Mohamed AM. Growth assessment and risk factors of malnutrition in children with cystic fibrosis. *Saudi Med J* 2016; 37: 293-298.
2. Scherdel P, Dunkel L, van Dommelen P, Goulet O, Salaün JF, Brauner R, et al. Growth monitoring as an early detection tool: a systematic review. *Lancet Diabetes Endocrinol* 2016; 4: 447-456.
3. Mei Z, Grummer-Strawn LM. Comparison of changes in growth percentiles of US children on CDC 2000 growth charts with corresponding changes on WHO 2006 growth charts. *Clin Pediatr (Phila)* 2011; 50: 402-407.
4. Zhang Z, Shoff SM, Lai HJ. Comparing the Use of Centers for Disease Control and Prevention and World Health Organization Growth Charts in Children with Cystic Fibrosis through 2 Years of Age. *J Pediatr* 2015; 167: 1089-1095.
5. Ziegler EE, Nelson SE. The WHO growth standards: strengths and limitations. *Curr Opin Clin Nutr Metab Care* 2012; 15: 298-302.
6. Al-Arrayed S, Hamamy H. The changing profile of consanguinity rates in Bahrain, 1990-2009. *J Biosoc Sci* 2012; 44: 313-319.
7. Eskandarani HA. Cystic fibrosis transmembrane regulator gene mutations in Bahrain. *J Trop Pediatr* 2002; 48: 348-350.