HAND GRIP FORCE IN CHILDREN AND ADOLESCENTS WITH CYSTIC FIBROSIS

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Background: The measurement of handgrip force (HGF) is recommended by the combined ESPEN-ESPGHAN-ECFS guidelines on nutrition care in cystic fibrosis (CF) patients. This recommendation is however based on data in small groups of adult CF patients, while pediatric data are scarce.

Aims: Our study aimed to: 1) investigate hand grip force in CF children and adolescents; 2) analyze HGF in relation to nutritional and pulmonary status; 3) provide longitudinal data on changes in HGF in CF children and adolescents.

Methods: HGF data of CF children (≤16 years old at the time of inclusion) having a body composition and lung function measurement at a yearly follow up were analyzed retrospectively over a 10-year period (2007-2016). Z-scores for weight (WFA), height (HFA), body mass index (BMI) and mid-upper arm circumference (MUAC) were calculated using Belgian reference data. HGF z scores, adjusted for height were calculated based on a Scottish groups of healthy controls (n=536). Forced vital capacity (FVC) and forced expiratory volumes in one second (FEV₁) were expressed as % for age and body height.

Results: A total of 482 HGF measurements from 107 patients were recorded, with a median (Q1;Q3) of HGF 3 (2;5) measurements per patient. The median (Q1;Q3) age across all measurements was 12.1 (9.1;15.2) and 9.1 (6.8;13.1) years at the time of first HGF recording; 61 (57.0%) were male, representing 290/482 (60.2%) of the measurements. Pancreas insufficiency was present in 94/107 (87.9%), corresponding with 427/482 (88.6%) of the measurements. Their mean (95% CI) WFA, HFA, BMI
and MUAC z-scores across all measurements were -0.55 (-0.65; -0.46), -0.42 (-0.51; -0.33), -0.44 (-0.53; -0.35) and -0.54 (-0.63; -0.44) and their overall median (Q1;Q3) was 0.55 (0.65; 0.46), 0.42 (0.51; 0.33), 0.44 (0.53; 0.35) and 0.54 (0.63; 0.44). The mean (95% CI) for FVC and FEV1 was 97% (88%; 106%) and 97% (84%; 106%).

The mean (95% CI) for HGF across all measurements was -0.99 (-1.10; -0.88); 104 measurements had HGF scores <-2. HGF was significantly different according to sex (p<0.001) but not pancreas involvement (p=0.800). HGF correlated significantly (p<0.001) with overall WFA (r=0.85), HFA (r=0.82), BMI (r=0.62), age (r=0.79) and MUAC (r=0.73), FEV1 (r=0.15, p=0.002) and FVC (r=0.26). However, based on linear models, change of HGF was not predictive of a change in lung function or MUAC over time (p>0.1).

Conclusions: CF children and adolescents have a lower handgrip force than healthy controls. HGF correlated significantly with lung function and anthropometric factors at cross sectional time points, but a change in HGF was not predictive of a change in lung function over time.

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