**Gender Differences, Determinants, and Association between Handgrip Strength and Measures of Lung Function in Childhood**

**Authors:** Laura Marie Hesselberg1, MD; Julie Nyholm Kyvsgaard1, MD; Jakob Stokholm1+2, MD, PhD; Klaus Bønnelykke1, MD, PhD; Hans Bisgaard1, MD, DMSc; Bo Chawes1, MD, PhD, DMSc.

**Affiliations:**

1. COPSAC, Copenhagen Prospective Studies on Asthma in Childhood, Herlev and Gentofte Hospital, University of Copenhagen, Copenhagen, Denmark.
2. Department of Pediatrics, Slagelse Sygehus, Slagelse, Denmark

**Correspondence:**

Professor Hans Bisgaard, MD, DMSc

E-mail: bisgaard@copsac.com

Website: www.copsac.com

# ABSTRACT (247 words)

**Introduction:** Studies have shownassociation between handgrip strength (HGS) and FEV1, but the importance of this in relation to asthma remains unclear. Therefore, we investigated the relationship between HGS, lung function metrics and its potential role in diagnosing asthma.

**Methods:** We included 330 participants (mean age: 17.7 years, males: 48.7%) from the COPSAC2000 cohort and analysed the associations between HGS, forced flows (FEV1, FVC), airway resistance (sRAW), methacholine reactivity (PD20), airway inflammation (FeNO) and allergy endpoints. We also investigated gender differences and predictors of HGS and whether HGS improved FEV1 prediction and classification of asthma status based on FEV1.

**Results:** Birth weight, length, and BMI; weight for gestational age; bodyfat%, bodyfat mass, muscle% and VO2/kg/min at 18 years were associated with HGS and showed significant gender differences (*P*-interactions<0.05). Among lung function and allergy measures, HGS was only associated with FEV1 (males: adjusted-β-coefficient 0.01L (95% CI, 0.003-0.022), *P*=0.009; females: 0.01L (0.001-0.025), *P*=0.039) and FVC (males: 0.01L (0.002-0.023), *P*=0.023; females: 0.02L (0.002-0.029), *P*=0.024). There was no interaction between HGS and asthma status for FEV1 or FVC (*P*-interactions>0.088). HGS improved adjusted R2-values for FEV1 (*P*-values<0.009) but did not improve classification of asthma status (*P*-values>0.703).

**Conclusion:** We found gender-specific prenatal programming of HGS at age 18 years. HGS was associated with the effort-dependent measures FEV1 and FVC, but not with airway resistance, reactivity, inflammation, or allergy measurements. HGS improved the accuracy of FEV1 estimation, but did not improve classification of asthma status, suggesting that the observed associations are not asthma specific.