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Title: Normal values for maximal inspiratory and expiratory pressures of adolescents

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Body: Introduction: The literature offers few studies with normal values for maximal respiratory pressures (MRP) of adolescents. Objectives: To provide normal values and lower limits of normal (LLN) for maximal inspiratory and expiratory pressures (MIP and MEP, respectively) of healthy adolescents. Methods: 182 adolescents with a mean age of 15±2 (age range from 12 to 18 years old) were assessed: 98 boys (BMI: 20±3.15 Kg/m²) and 84 girls (BMI: 19±4 Kg/m²). Spirometry was performed prior to the assessment of respiratory muscle strength. MIP and MEP were measured with a digital manometer with the adolescent in the seated position wearing a nose clip. Participants randomly selected the first MRP to be assessed. MIP was performed from residual volume and MEP from total lung capacity. A maximum of nine maneuvers were performed for each MRP. Data were expressed as mean and standard deviation. The LLN was calculated by subtracting a value two times greater than the standard deviation of measurements from mean MRP. Results: The normal values and the LLN for MIP and MEP are shown in table 1.

Normal values and lower limits of normal for maximal respiratory pressures according to sex

MRP	Girls (n = 84)	Boys (n = 98)
MIP (cmH ₂ O)	75.3±22	86.8±24.94
MEP (cmH ₂ O)	104.65±26.8	121.1±30
LLN MIP (cmH ₂ O)	30.91	36.98
LLN MEP (cmH ₂ O)	50.91	61.84

MRP: maximal respiratory pressures; MIP: maximal inspiratory pressure; MEP: maximal expiratory pressure; cmH₂O: centimeters of water; LLN: lower limits of normal

Conclusion: The reference values and the LLN provided by this study for MRP may serve as an important parameter to the evaluation of respiratory muscle strength of adolescents.