

# Can Simple Postural Assessment Help Identify Obstructive Sleep Apnea in Primary Care?

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“Forward head posture is a simple clinical clue associated with OSA severity”

### CONTEXT

Obstructive sleep apnea (OSA) is common but remains underdiagnosed, particularly in primary care.

- OSA is frequent and underdiagnosed in primary care**
  - High prevalence in the adult population
  - Many patients remain undiagnosed and untreated
- Screening relies on questionnaires and anthropometry**
  - Questionnaires: Stop-Bang, Epworth, Berlin, etc.
  - Anthropometric measures: BMI, neck circumference
  - Useful but not always sensitive or specific
- Clinical observation is underused**
  - During consultation, GPs routinely observe patients' posture
  - Postural assessment is simple, quick, but rarely formally evaluated

**HYPOTHESIS**  
Posture reflects airway constraints and may provide a simple clinical clue to identify patients at risk of OSA.

Forward head posture and rounded shoulders may be markers of increased airway collapsibility and OSA severity.

### MATERIALS AND METHODS

Simple postural assessment in standing position using the posterior vertical plane (wall) as reference.

#### 1. STUDY DESIGN

- Initial cohort: 523 patients
- Referred for suspected sleep disorders
- Extended dataset: 660 PSG recordings with postural data available
- Objective**: Evaluate the clinical relevance of simple postural measurements to identify patients at risk of OSA in primary care.

#### 2. POSTURAL ASSESSMENT

**A. FORWARD HEAD POSTURE (FHP) AND MEASUREMENT OF DIV**

- NORMAL POSTURE**: Head aligned with the posterior vertical plane.
- FORWARD HEAD POSTURE (FHP)**: Head anterior to the posterior vertical plane.
- HOW DIV IS MEASURED**: DIV (Inion-Vertical Distance) is the distance (cm) between the inion (back of skull) and the posterior vertical plane (wall). **Higher DIV = more severe FHP.**

**B. OTHER POSTURAL MEASUREMENTS**

- DAV (Acromion-Vertical Distance)**: Distance (cm) between the acromion (lateral point of shoulder) and the wall.
- DMV (Hand-Vertical Distance)**: Distance (cm) between the dorsum of the hand (fully elevated arm) and the wall.

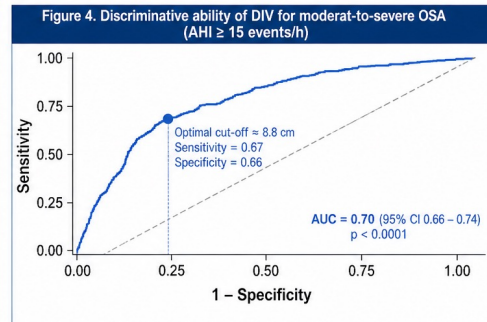
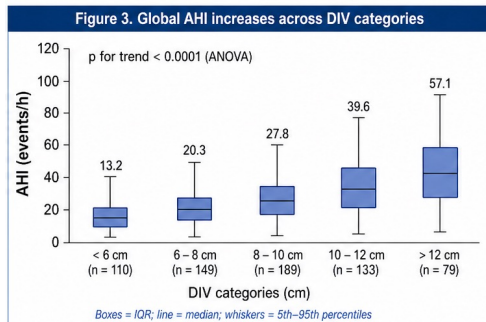
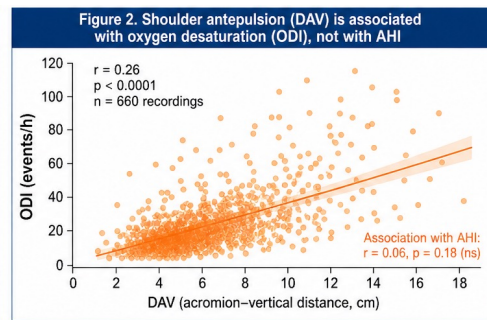
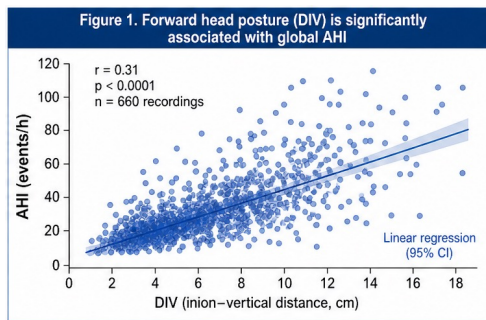
**STANDARDIZED PROCEDURE**

- Patients stand barefoot, heels, buttocks, upper back and head in contact with the wall as much as possible.
- Arms are raised overhead and hands touch the wall (for DMV).
- Measurements are taken with a tape measure (cm).
- Each measurement is performed twice; mean value is used for analyses.

#### 3. ANALYSES

- CORRELATIONS**: Associations between postural parameters (DIV, DAV, DMV) and PSG variables (AHI, ODI, etc.).
- REGRESSION ANALYSES**: Multivariable linear regression with adjustment for potential confounders (Age, BMI, neck circumference, etc.).
- ROC ANALYSIS**: Discriminative ability of postural parameters for moderate-to-severe OSA (AHI ≥ 15 events/h). AUC, optimal cut-off, sensitivity, specificity.
- PSG REFERENCE STANDARD**: All participants underwent polysomnography (PSG). Outcomes: AHI (events/h), ODI (events/h), mean SpO<sub>2</sub> (%).

**KEY TAKE-HOME MESSAGE**  
Postural assessment is a quick, low-cost and reproducible clinical approach that provides useful information for identifying patients at risk of obstructive sleep apnea.



### DISCUSSION

Simple postural assessment provides clinically relevant information and may support early identification of OSA in primary care.

- Forward head posture is strongly associated with OSA severity**
  - DIV shows a significant correlation with AHI across all sleep stages
  - This supports the concept of posture as a marker of airway impairment and a specific respiratory phenotype
- Not all postural parameters are equally informative**
  - Shoulder antepulsion is more closely related to oxygen desaturation than to AHI
  - Targeted observation is essential to identify the most relevant clinical clues
- A simple, quick and reproducible clinical approach**
  - Postural assessment takes less than 2 minutes, requires no equipment other than a wall and a tape measure
  - It can be easily integrated into routine consultations
- A complementary tool, not a stand-alone diagnostic method**
  - Posture should complement questionnaires, anthropometry and clinical evaluation
  - It may help guide referral for sleep investigations

**KEY FINDING**  
DIV is significantly associated with OSA severity ( $r = 0.30$ ). Association observed across all sleep stages.

**CLINICAL RELEVANCE**  
Quick (< 2 minutes)  
No equipment required  
Easily integrated into routine primary care consultations

**INTERPRETATION**  
Posture reflects airway biomechanics  
Not limited to REM sleep  
Not all postural parameters are equally informative

**LIMITATIONS**  
Repeated measurements in some patients  
Moderate discriminative performance (AUC = 0.70)  
Observational design

No conflict of interest.  
No specific funding was received for this study.

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Simple postural observation may improve early identification of OSA in primary care

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No conflict of interest - No specific funding

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