P422

Validation of a Korean Digit-in-Noise Test for Categorizing Hearing Loss Severity

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Objective

- The Digit-in-Noise (DiN) test stands as a popular speech-in-noise measure for hearing loss screening measurement.
- Previously, we developed an app-version of Korean-DiN test. Expanding on this, we newly developed PC-based DiN test offering additional functionalities such as receiver, stimulus type, and scoring method.
- The aim of the study was to assess the feasibility of a DiN-pro test in categorizing degree of hearing loss among patients with mild to moderately severe impairment.

Methods Materials

- **Participants**
  - A total 352 ears with normal-hearing and various degrees of hearing loss were included for analyses (age range: 19-89 years).
  - All symmetrical hearing loss (< 15 dB difference between ears)

Figure 2. Korean Digit in Noise test

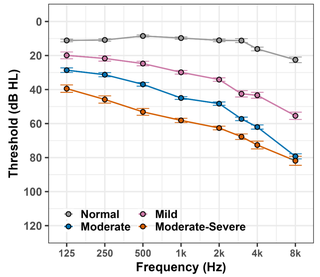

Figure 1. Hearing thresholds for normal-hearing and hearing loss groups.

- **DiN test & Procedures**
  - Speech reception threshold (SRT) were obtained using an up-down adaptive procedure by 2dB. SRT was determined at which 50% of the digit triplets were correctly identified.
  - 191 ears underwent the Korean Matrix sentence test to compare their DiN results.

Results

- **DiN-SRT for each subject groups and relation to age**
  - DIN-SRT increased as the hearing loss is severe.

	Normal	Mild	Moderate	Moderately severe
DiN-SRT	7.13 (±0.138)	-3.47 (±0.335)	1.51 (±0.359)	4.86 (±0.715)

  - DiN-SRTs increased with age.

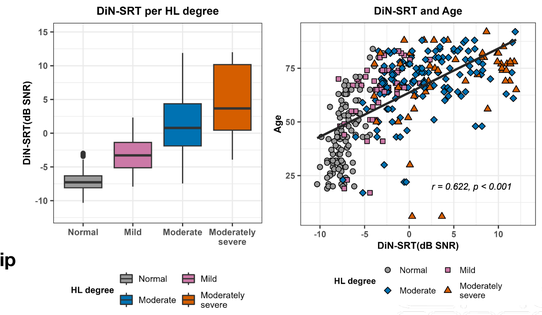

Figure 3. DiN-SRT for subject groups (left panel) and relationship between age and DiN-SRT (right panel)

Results

- **Relation to PTA and Korean Matrix sentence test**
  - DiN-SRTs were significantly related with the PTA, indicating SRTs increase as hearing sensitivity decreases.
  - A high correlation between DiN-SRTs and Matrix-SRTs was found. This suggests that DiN-SRTs can reflect an ability to perceive speech in noise.

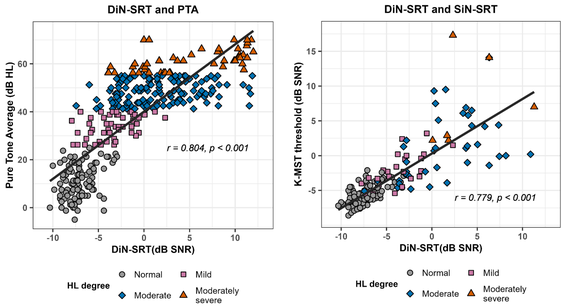

Figure 4. Relationships between DiN-SRT and PTA (left panel) and between DiN-SRT and Matrix-SRT (right panel)

- **Sensitivity and specificity of the DiN test**

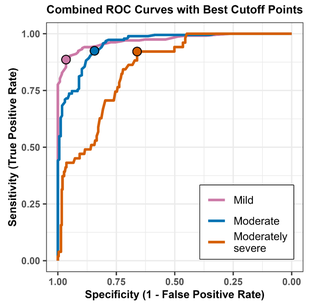

Figure 5. ROC curves for DiN test across hearing loss groups

  - ROC analysis demonstrated high sensitivity and specificity across degress of hearing loss.
  - High AUC values indicate that DiN is effective in detecting hearing loss.

Table 1. ROC analysis for hearing loss groups

Group	SRT (dB)	Sensitivity (%)	Specificity (%)	ROC area	*p*-value
Mild	-4.25	88	95	0.97	0.00
Moderate	-3.90	96	81	0.95	0.00
Moderately Severe	-1.29	90	70	0.86	0.00

- **Test-retest validity**
  - Significant correlations between SRT-Test1 and SRT-Test2 demonstrated a high levels of consistency and reliability of the DiN test

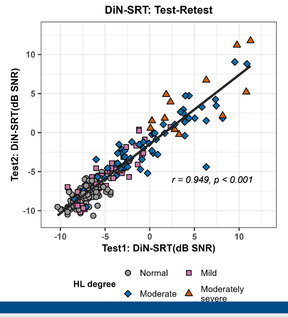

Figure 5. Test-Retest DiN-SRTs

Conclusion

- In conclusion, the DiN test is a reliable and valid measure for assessing speech reception thresholds across a range of hearing abilities.
- DiN test can be employed as a speech in noise test for clinical purposes.

Reference

Han, J.-H., Yi, D.-W., Lee, J., Chang, W.-D., Lee, H.-J., 2020. Development of a Smartphone-Based Digits-in-Noise Test in Korean: a Hearing Screening Tool for Speech Perception in Noise. J Korean Med Sci 35, e163.