Dyspnea Index (DI) & Cough Severity Index (CSI)
Development and Validation of Two Indexes

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Introduction
- Validation + Standardization
- Patient interview + clinical presentation = gold standard
- Limitations
- Importance of tools:
  - Objective
  - Disease-specific
    - Appropriate population

Objectives
To develop symptom severity index – clinical tool:
1. Estimate perceived severity of upper airway dyspnea and cough
2. Evaluate treatment outcomes

Phase One: Development
Dyspnea Index (DI)
&
Cough Severity Index (CSI)
Methods
- Survey methodology
- Clinical consensus
  - 4 laryngologists & 5 SLPs
- Common symptoms
  - Dyspnea → 41 questions
  - Cough → 49 questions

Methods
- 2 separate questionnaires
  - Dyspnea Index (DI)
  - Cough Severity Index (CSI)
- 5-point Likert Scale
  - 0 = none
  - 1 = almost never
  - 2 = sometimes,
  - 3 = almost always
  - 4 = always

Recruitment
- Participants
  - n = 200
- 15 month span
- Upper-airway dyspnea and/or cough complaint

Reliability
- Internal Consistency:
  - Dyspnea Index
    - $\alpha = 0.97$
  - Cough Severity Index
    - $\alpha = 0.97$
- Principle Component Analysis
  - Single factor for both indexes
**Item Reduction – DI**
- Measurement techniques
  - $<0.5 \rightarrow$ 3 out of 41 questions
- Rank order – 38 Questions
  - Total-item correlation + communality
  - Top 15 questions chosen

**Item Reduction – CSI**
- Measurement technique
  - $<0.5 \rightarrow$ 6 out of 49 questions
- Rank order - 43 questions
  - Total-item correlation + communality
  - Top 15 questions

**Final DI and CSI**
- Two 10-item questionnaires
  - Dyspnea Index (DI)
  - Cough Severity Index (CSI)
- Good reliability
- Clinical relevancy

**Item Reduction**
- 2nd Clinical consensus
- 15 Questions – DI and CSI
  - Clinical relevancy
  - Highest $\rightarrow$ Lowest
**Dyspnea Index (DI)**

1. I have trouble getting air in.
2. My breathing problem causes me to restrict my personal and social life.
4. The change in weather affects my breathing problem.
5. My breathing gets worse with stress.
6. **I have to strain to breathe.**
7. It takes more effort to breathe than it used to.
8. My breathing problem upsets me.
9. My shortness of breath scares me.
10. My breathing problem makes me feel stressed.

**Cough Severity Index (CSI)**

1. My cough is worse when I lay down.
2. My coughing problem causes me to restrict my personal and social life.
3. I tend to avoid places because of my cough problem.
4. **I feel embarrassed because of my coughing problem.**
5. People ask “What’s wrong?” because I cough a lot.
6. I run out of air when I cough.
7. My coughing problem affects my voice.
8. My coughing problem limits my physical activity.
9. My coughing problem upsets me.
10. People ask me if I am sick because I cough a lot.

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**Results**

- Reliability analysis
  - Internal consistency
    - **Dyspnea Index**
      - $\alpha = 0.93$
    - **Cough Severity Index**
      - $\alpha = 0.93$
  - Principal Components Analysis
    - Single factor for both indexes

**Phase Two: Validation & Reliability**

Dyspnea Index (DI) & Cough Severity Index (CSI)
Validity

- General Validity
  - Healthy Controls

- Divergent Validity
  - DI vs. COPD Assessment Test (CAT)
  - CSI vs. Cough-Specific Quality of Life Questionnaire (CQLQ)

Reliability

- Test-Retest reliability
  - Each participant given DI and CSI x2
  - 30-45 minutes apart

Methods

- Validity
  - Participants with Dyspnea (n = 50)
    - DI & CAT
  - Participants with cough (n = 50)
    - CSI & CQLQ

- Reliability: Test-retest

Results

- General Validity
  - DI
    - 17 out of 20 healthy controls = 0
  - CSI
    - 18 out of 20 healthy controls = 0

- Mann-Whitney Test
  - Highly significant (p<0.0004)
  - Healthy vs. symptomatic
Results

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Dyspnea Index (DI)</th>
<th>Cough Severity Index (CSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Divergent Validity</td>
<td>r = 0.67 (CAT)</td>
<td>r = 0.60 (CQLQ)</td>
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<td></td>
<td>(medium correlation)</td>
<td>(medium correlation)</td>
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<tr>
<td>Test-retest</td>
<td>r = 0.95 (2nd DI)</td>
<td>r = 0.83 (2nd CSI)</td>
</tr>
<tr>
<td>reliability</td>
<td>(high correlation)</td>
<td>(high correlation)</td>
</tr>
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</table>

Phase Three: Treatment Outcomes

Dyspnea Index (DI) & Cough Severity Index (CSI)

Treatment Outcomes

- 95 additional participants
- DI and CSI given post-treatment
- Related-Samples Wilcoxon Signed Ranks Test

Pre- and Post- Outcomes

<table>
<thead>
<tr>
<th>Dyspnea Index</th>
<th>Pre-DI</th>
<th>Post-DI</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
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<tr>
<td>17.81</td>
<td>12.42</td>
<td>10.85</td>
<td>13.06</td>
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<table>
<thead>
<tr>
<th>Cough Severity Index</th>
<th>Pre-CSI</th>
<th>Post-CSI</th>
<th>Significance</th>
</tr>
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<tbody>
<tr>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
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<tr>
<td>12.30</td>
<td>12.15</td>
<td>8.07</td>
<td>12.01</td>
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</table>
Treatment Outcomes

- Clinical Implications
  - Significant score decrease → pre- and post-treatment
  - Perceived decrease in severity of symptoms
  - Improved QOL

Conclusion

- Clinically relevant
- Statistically valid and reliable
- Quantify: Severity and QOL impact
- Outcome measure – pre-post therapy
- Supplement – diagnostic process

References


