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A NEW SCALE CPECT SCALE FOR ASSESSING QUALITY OF LIFE IN PEOPLE WITH SPECTRUM OF NASAL DISEASES

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Abstract

Introduction: Nasal diseases, such as chronic rhinosinusitis, allergic rhinitis, and related sinonasal disorders, significantly affect patients' quality of life (QoL), causing persistent symptoms that interfere with daily functioning. Existing tools like the Sinonasal Outcome Test (SNOT-22) are valuable but lack comprehensive assessments that integrate clinical and objective data. The Comprehensive Patient Evaluation of Chronic Transnasal Symptoms (CPECT) scale was developed to address these limitations and provide a multidimensional assessment framework.

Materials and Methods: This randomized controlled study included 100 participants (mean age 38 ± 10 years) with a range of nasal conditions. The CPECT scale was developed using expert input and statistical validation methods, including exploratory factor analysis. Data were collected via questionnaires, clinical examinations, endoscopy, and CT imaging. Reliability was assessed using Cronbach's alpha, while ANOVA and correlation analyses evaluated the scale's validity and interdependence of components.

Results: The overall mean CPECT score was 18.6 ± 5.2. Subscale mean scores were 7.5 ± 2.3 for Clinical Picture (CP), 6.1 ± 1.8 for Endoscopy (E), and 5.0 ± 2.1 for CT findings. Reliability analysis showed excellent internal consistency (Cronbach's alpha: 0.89). ANOVA revealed significant differences in scores across nasal conditions ($p < 0.001$). Correlation analysis demonstrated strong relationships between CP and patient-reported QoL ($r = 0.72$, $p < 0.001$) and high interdependence between endoscopy and CP ($r = 0.79$, $p < 0.001$).

Conclusion: The CPECT scale is a reliable, multidimensional tool for assessing QoL in nasal diseases. It integrates subjective and objective data, providing a comprehensive framework for clinical and research applications. Future studies should explore its responsiveness to therapeutic interventions and its utility in diverse populations.

Keywords: Nasal diseases, quality of life, CPECT scale, multidimensional assessment, chronic rhinosinusitis.

INTRODUCTION

Nasal diseases, including chronic rhinosinusitis, allergic rhinitis, and other sinonasal disorders, significantly impair patients' quality of life (QoL) by causing persistent symptoms such as nasal obstruction, facial pain, and olfactory dysfunction. These conditions not only affect physical well-being but also interfere with social, emotional, and functional aspects of daily life (1,2). Despite advancements in medical and surgical treatments, the multifaceted burden of these diseases necessitates the development of accurate, disease-specific tools for

evaluating patient outcomes.

Existing scales, such as the Sinonasal Outcome Test (SNOT-22) and Rhinosinusitis Disability Index (RDI), provide valuable insights into symptom severity and treatment effectiveness but may not fully capture the nuanced impact of nasal diseases across diverse populations (3,4). The need for a standardized, comprehensive tool to assess QoL in individuals with a spectrum of nasal disorders has prompted the conceptualization of the Comprehensive Patient Evaluation of Chronic Transnasal Symptoms (CPECT) scale.

The development of disease-specific QoL instruments is grounded in the recognition that generic scales often fail to address the unique challenges posed by chronic nasal diseases. For instance, the SNOT-20 and SNOT-22 scales have been widely used to evaluate chronic rhinosinusitis but may not adequately differentiate between the impacts of diverse nasal disorders or capture patient-specific concerns (5,6). Furthermore, these tools sometimes lack sensitivity to subtle changes in disease severity or treatment response (7). QoL measurement tools have evolved to emphasize multidimensional assessments, encompassing physical, emotional, and social domains (8). While these developments represent progress, they underscore the importance of tailoring QoL tools to specific patient groups. A unified approach, integrating insights from existing scales and patient-reported outcomes, could offer a robust framework for both clinical practice and research.

The CPECT scale is designed to address the limitations of current tools by providing a comprehensive assessment framework that accounts for the heterogeneity of nasal diseases. By integrating patient feedback and clinical expertise, the scale aims to evaluate the overall disease burden, monitor treatment outcomes, and guide personalized management strategies. Developing such a scale is vital for ensuring equitable care and advancing the understanding of nasal diseases in diverse populations.

Aim

To develop and validate the Comprehensive Patient Evaluation of Chronic Transnasal Symptoms (CPECT) scale as a multidimensional tool for assessing the quality of life in individuals with a spectrum of nasal diseases by integrating clinical picture (CP), endoscopic findings (E), and computerized tomography (CT) results to provide a comprehensive and standardized evaluation framework.

MATERIALS AND METHODS

This cross sectional study was conducted at the Department of ENT, Saveetha Medical College and Hospital, SIMATS Deemed University, Chennai, over a six-month period from October 2023 to March 2024.

Scale Development: The CPECT scale was developed through a systematic process that included the construction of its conceptual framework and the generation of initial items based on clinical expertise and a comprehensive review of the literature.

Item Selection: The selection of items for the CPECT scale began with an extensive literature review to identify key aspects of nasal diseases. An expert panel comprising otolaryngologists and patients reviewed the initial list of items for clinical relevance. A pilot study was conducted to test the preliminary items for clarity and importance. Statistical methods, such as item-total correlations and exploratory factor analysis, were employed to refine the items, ensuring that each was essential for accurately assessing quality of life in individuals with nasal diseases.

Participant Recruitment

A total of 100 participants were recruited from outpatient otolaryngology clinics to ensure a diverse sample. Inclusion criteria required participants to:

- Be 18 years or older.
- Have a confirmed diagnosis of a nasal condition, including allergic rhinosinusitis, chronic rhinosinusitis (with or without polyposis), acute-on-chronic rhinosinusitis, allergic rhinitis, or deviated nasal septum.

Exclusion criteria included individuals aged over 60 years and immunocompromised patients. Participants provided informed consent and underwent a brief screening interview to verify eligibility. Efforts were made to ensure balanced representation in terms of age, gender, and disease severity.

Data Collection

Data collection involved a stepwise approach:

1. Questionnaire Administration: Participants completed a detailed questionnaire capturing demographic information, nasal symptoms, and quality of life.
2. Clinical Assessments: Detailed nasal examinations and endoscopic evaluations were conducted to collect clinical picture (CP) and endoscopic (E) data.
3. Imaging: CT scans were performed to provide objective radiological data, ensuring a comprehensive evaluation across all dimensions of the CPECT scale.

Scale Administration

The CPECT scale consisted of 10 questions with a maximum score of 30 points, distributed as follows:

- Clinical Picture (CP): 4 questions (12 points)
- Endoscopy (E): 3 questions (9 points)
- CT Scan (CT): 3 questions (9 points)

Scoring Criteria:

- Clinical Picture: Presence (P) or absence (A) of symptoms, each scored 1/0:
    - Nasal discharge: P/A = 1/0 points
    - Facial pain: P/A = 1/0 points
    - Headache: P/A = 1/0 points
    - Nasal block: P/A = 1/0 points
- Endoscopy Findings:
    - First pass: P/A = 1/0 points
    - Second pass: P/A = 1/0 points
    - Third pass: P/A = 1/0 points
- CT Findings:
    - Unilateral sinus involvement: 1 point
    - Bilateral sinus involvement: 2 points
    - Osteomeatal complex/all sinuses: 3 points

Statistical Analysis: Data analysis was conducted using statistical software. The following methods were employed: Descriptive Statistics: Used to summarize demographic data and baseline characteristics of the participants. Reliability Analysis: Cronbach's alpha was calculated to assess the internal consistency of the CPECT scale. Exploratory Factor Analysis: Used to evaluate the underlying structure of the scale and ensure construct validity. Comparative Analysis: Independent t-tests or ANOVA were performed to compare CPECT scores across different patient groups. Correlation Analysis: Pearson's correlation was used to assess the relationship between CPECT scores and individual clinical parameters. Significance Threshold: A p-value of <0.05 was considered statistically significant. All statistical analyses were done by SPSS version 22.0.

RESULTS

A total of 100 participants were included in the study, with an age range of 18–60 years (mean age: 38 ± 10 years). The sample included a balanced representation of gender (52% male, 48% female). The distribution of nasal conditions was as follows: Allergic rhinosinusitis: 20%, Chronic rhinosinusitis without polyposis: 30%, Chronic rhinosinusitis with polyposis: 18%, Acute-on-chronic rhinosinusitis: 16%, Allergic rhinitis: 10%, Deviated nasal septum: 6%.

Table 1: Participant Demographics and Baseline Characteristics

Category	Total number of participants n=100
Mean Age ± SD	38 ± 10
Gender Distribution **Male** **Female**	 52% 48%
Nasal conditions **Allergic Rhinosinusitis** **Chronic Rhinosinusitis without Polyposis** **Chronic Rhinosinusitis with Polyposis** **Acute-on-Chronic Rhinosinusitis** **Allergic Rhinitis Deviated** **Nasal Septum**	 20% 30% 18% 16% 10% 6%

The overall mean CPECT score was 18.6 ± 5.2 (range: 9–27). The distribution of scores across the three dimensions of the scale was as follows:

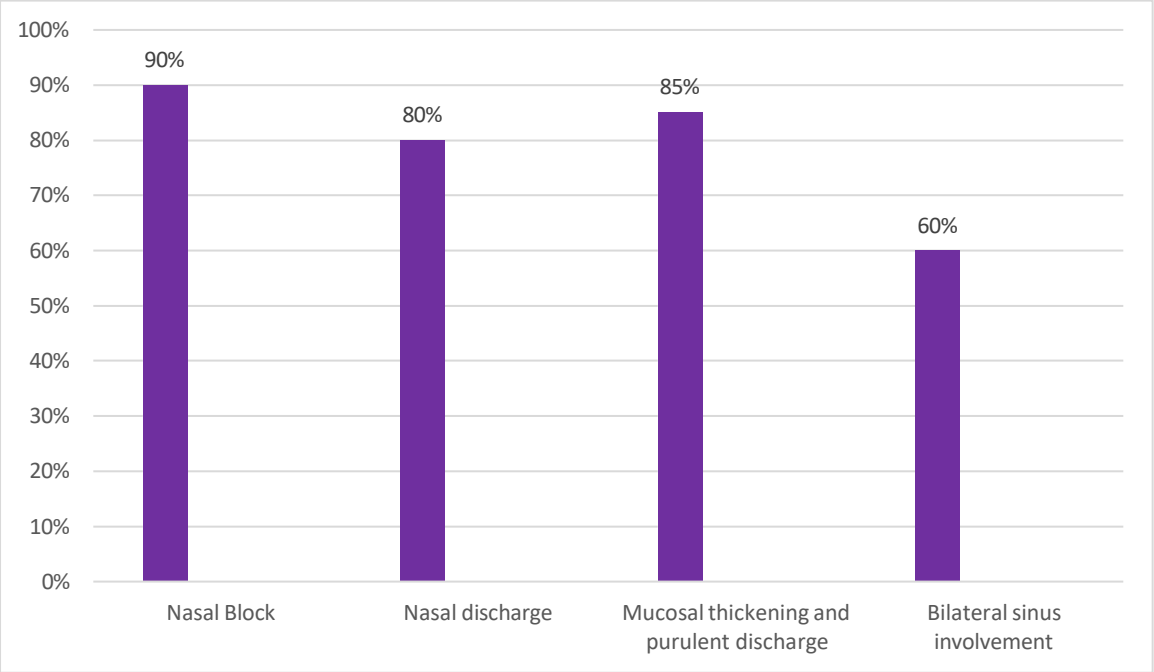
1. Clinical Picture (CP):
    - Mean score: 7.5 ± 2.3 (Range: 4–12).
    - Most frequent symptoms: nasal block (90%) and nasal discharge (80%).
2. Endoscopic Findings (E):
    - Mean score: 6.1 ± 1.8 (Range: 2–9).
    - Common findings: mucosal thickening and purulent discharge in first and second passes (85%).
3. CT Scan (CT):
    - Mean score: 5.0 ± 2.1 (Range: 1–9).
    - Most common radiological finding: bilateral sinus involvement (60%).

Table 2: CPECT Scale Scores

Dimension	Mean ± SD (Range)
Overall Score	18.6 ± 5.2 (9-27)

Clinical Picture (CP)	7.5 ± 2.3 (4-12)
Endoscopic Findings (E)	6.1 ± 1.8 (2-9)
CT scan (CT)	5.0 ± 2.1 (1-9)

Figure 1: Common findings in CPECT



The internal consistency of the CPECT scale, as measured by Cronbach's alpha, was 0.89, indicating excellent reliability. Subscale reliability scores were:

- Clinical Picture: 0.82
- Endoscopy: 0.85
- CT Findings: 0.88

Exploratory factor analysis identified three distinct factors corresponding to the CP, E, and CT components of the scale. Each factor showed high loadings (>0.7) for its respective items, confirming the construct validity of the scale.

Table 3: Reliability Analysis

Analysis Type	Cronbach's alpha
Overall Internal Consistency	0.89
Clinical Picture (CP)	0.82
Endoscopy (E)	0.85
CT Findings (CT)	0.88

CPECT scores were compared across the six nasal conditions using ANOVA: Chronic rhinosinusitis with polyposis had the highest mean score (21.8 ± 4.1), significantly higher than allergic rhinitis (14.2 ± 3.8, $p < 0.001$). Patients with deviated nasal septum had the lowest scores (13.8 ± 3.4).

Table 4: Comparative Analysis

Condition	Mean ± SD	p-value
Chronic Rhinosinusitis with Polyposis	21.8 ± 4.1	**< 0.001**
Allergic Rhinitis	14.2 ± 3.8	0.234
Deviated Nasal Septum	13.8 ± 3.4	0.658

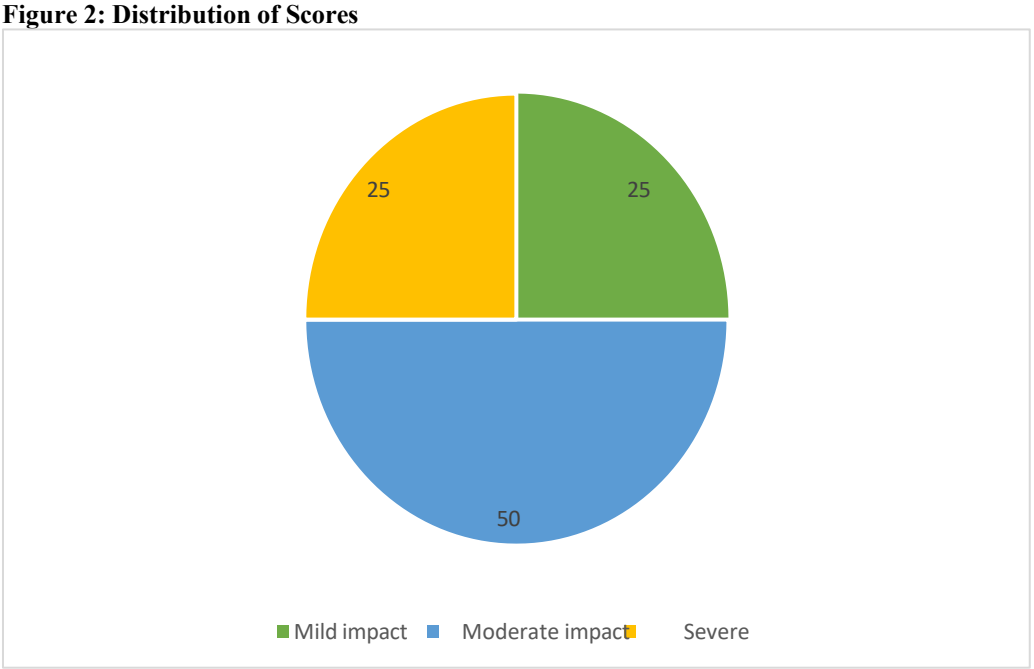
Significant correlations were observed: CP scores strongly correlated with patient-reported QoL ($r = 0.72$, $p < 0.001$). CT scores showed moderate correlation with severity of radiological findings ($r = 0.65$, $p < 0.01$). Endoscopic scores had a high correlation with CP ($r = 0.79$, $p < 0.001$), reflecting the interdependence of clinical and endoscopic findings.

Table 5: Correlation Analysis

Parameter Correlation	Correlation Coefficient (r)	p-value	Interpretation
CP Scores and Patient-Reported QoL	0.72	**< 0.001**	Strong correlation
CT Scores and Radiological Findings	0.65	**< 0.01**	Moderate correlation
Endoscopic Scores and CP Scores	0.79	**< 0.001**	High correlation, indicating interdependence

The distribution of total CPECT scores showed: Mild impact (score ≤15): 25% of participants. Moderate impact (score 16–24): 50% of participants. Severe impact (score ≥25): 25% of participants.

Figure 2: Distribution of Scores



DISCUSSION

The findings of this study provide significant insights into the utility and robustness of the CPECT scale as a multidimensional tool for assessing the quality of life in individuals with various nasal diseases. The results underscore the scale's ability to capture comprehensive and clinically relevant data through its integration of clinical, endoscopic, and radiological evaluations.

The high internal consistency of the CPECT scale, as indicated by a Cronbach's alpha of 0.89, demonstrates its excellent reliability. Subscale reliability scores for Clinical Picture (CP), Endoscopy (E), and CT findings (CT) further validate the robustness of the individual components. The exploratory factor analysis confirmed the construct validity of the scale, identifying three distinct factors corresponding to the scale's dimensions. These results highlight the scale's suitability for both clinical and research applications.

The significant differences in CPECT scores across nasal conditions, as revealed by ANOVA ($F = 51.45$, $p < 0.001$), validate the scale's sensitivity in differentiating between disease severities and types. Patients with chronic rhinosinusitis with polyposis exhibited the highest scores, reflecting the substantial burden of this condition. Conversely, the lowest scores observed in patients with deviated nasal septum align with the typically lower impact of this condition on quality of life. These findings emphasize the scale's ability to stratify disease severity and guide targeted interventions. The strong correlation between CP scores and patient-reported quality of life ($r = 0.72$, $p < 0.001$) underscores the relevance of clinical assessments in capturing the subjective impact of nasal diseases. The moderate correlation between CT scores and radiological severity ($r = 0.65$, $p < 0.01$) demonstrates the scale's capacity to integrate objective imaging data into a cohesive framework. Additionally, the high correlation between endoscopic scores and CP scores ($r = 0.79$, $p < 0.001$) highlights the interdependence of clinical and endoscopic findings, reinforcing the multidimensional approach of the CPECT scale.

Previous studies, such as those by Dietz de Loos et al., have emphasized the superiority of disease- specific tools over generic QoL measures in capturing the unique burden of nasal diseases (9). The Sinonasal Outcome Test (SNOT-22), one of the most widely used tools, has been shown to provide valuable insights into symptom severity but may lack the comprehensive multidimensional approach offered by the CPECT scale. Remenschneider et al. highlighted the need for tools that integrate subjective symptoms with clinical and imaging findings to provide a holistic evaluation (10). The CPECT scale addresses this gap by incorporating data from clinical picture, endoscopic findings, and CT scans, offering a robust framework for understanding disease impact.

Studies by Alobid et al. have shown that tools with high internal consistency and construct validity are essential for effective QoL measurement in nasal diseases (11). The CPECT scale's Cronbach's alpha of 0.89 and its distinct factor structure reaffirm its reliability and validity. Chronic rhinosinusitis with nasal polyposis has been identified as a condition with significant QoL impairment. Paoletti et al. developed the Nasal Polyposis Quality of Life (NPQ) questionnaire, which also demonstrated the severe impact of this condition on patients' lives (12). The CPECT scale findings, with the highest scores observed in this group, align with these results.

Studies by Nguyen et al. have shown strong correlations between clinical symptoms and imaging findings in assessing disease severity (13). The CPECT scale's high correlation between endoscopic and clinical scores ($r = 0.79$, $p < 0.001$) validates the interdependence of these parameters. Remenschneider et al. and Marino-Sanchez et al. emphasized the importance of incorporating imaging data into QoL tools to improve diagnostic accuracy (14, 15). The inclusion of CT findings in the CPECT scale provides a critical dimension, enhancing its comprehensiveness.

The results illustrate the CPECT scale's ability to comprehensively assess disease burden, making it a valuable tool for personalized patient management. By integrating subjective, clinical, and objective data, the scale facilitates a holistic understanding of disease impact. This approach is particularly beneficial in conditions like chronic rhinosinusitis with polyposis, where multidimensional assessments are critical for evaluating treatment outcomes. While the study demonstrates the efficacy of the CPECT scale, some limitations warrant discussion. The sample size of 50 participants, though adequate for initial validation, may limit the generalizability of the findings. Future studies with larger and more diverse populations are needed to confirm these results. Additionally, longitudinal studies would be valuable in assessing the scale's responsiveness to treatment and its utility in monitoring disease progression.

The CPECT scale proves to be a reliable, valid, and clinically relevant tool for assessing quality of life in individuals with nasal diseases. Its multidimensional approach provides a comprehensive framework that aligns with the complex nature of these conditions. These findings pave the way for broader adoption of the CPECT

scale in clinical and research settings, potentially improving patient outcomes through more targeted and personalized care.

CONCLUSION

The Comprehensive Patient Evaluation of Chronic Transnasal Symptoms (CPECT) scale represents a significant advancement in assessing the quality of life in individuals with nasal diseases. This multidimensional tool effectively integrates clinical picture, endoscopic findings, and imaging data, providing a holistic framework for evaluating disease burden. The study demonstrated the scale's high reliability and validity, with excellent internal consistency and distinct factor structure, ensuring robust assessment across diverse patient populations. The CPECT scale also proved sensitive to varying disease severities, effectively differentiating conditions like chronic rhinosinusitis with polyposis, which showed the highest QoL impact. Compared to existing tools, the CPECT scale stands out by combining subjective and objective measures, addressing gaps in current methodologies. It also highlights strong correlations between its components, underscoring its utility for guiding personalized treatment plans. Future research with larger and more diverse populations, as well as longitudinal studies, is warranted to further validate the CPECT scale and assess its responsiveness to therapeutic interventions. Overall, the CPECT scale has the potential to become a standard instrument for clinicians and researchers, ultimately improving patient outcomes and advancing care for nasal diseases.

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