

Sialorrhea: Less Commonly Addressed Symptom of Patients Presenting with Neurological Disorders in Neurology and Oral Medicine Specialties

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ABSTRACT

Background: Saliva-related challenges significantly impact individuals diagnosed having motor neuron disease (MND). Despite existing clinical guiding principles outlining evaluation and management protocols, research attention towards the management of saliva problems has been limited. **Objective:** To evaluate physicians' perspectives on sialorrhea as a major concern for patients presenting with neurological disorders in neurology clinics. **Study Design:** Retrospective hospital-based cross-sectional study. **Settings:** Department of Oral Medicine, Lahore Medical and Dental College. Neurology departments of various hospitals in Lahore including Lahore General Hospital, Jinnah Hospital and Sharif Medical & Dental College, Lahore Pakistan. **Duration:** An analysis was conducted on individuals diagnosed with MND between January 2021 and January 2023. **Methods:** The association between clinical factors and drool matters was scrutinized through univariate and multivariable logistic regression, with outcomes presented as odds ratios and corresponding 95% confidence intervals. Additionally, a survey involving health care authorities responsible for patients with motor neuron disease (pwMND) care was carried out to provide context to the conclusions. **Results:** 250 individuals with motor neuron disease (pwMND) received a diagnosis, with data on saliva issues available for 125 (50%) through direct questioning. Those without available data on saliva problems were slightly older (mean age 68.0 vs. 65.2 years; $p = 0.032$), but no significant differences found in terms of gender, location of onset, and MND subtype. **Conclusion:** Saliva problems are prevalent in individuals with MND. Despite this association, a noteworthy proportion of pwMND encountering drooling did not undergo suggested treatments.

Keywords: Amyotrophic lateral sclerosis; Sialorrhea; Drooling.

INTRODUCTION

Adequate salivary production plays a pivotal role in maintaining optimal oral and gastrointestinal health. Saliva serves multifunctional purposes, including mouth lubrication, facilitation of swallowing, distribution of food to taste buds, prevention of bacterial overgrowth, and protection against tooth decay and oral deterioration¹. The human body orchestrates saliva production through six major salivary glands and numerous minor salivary glands, contributing to approximately 90% of the daily production of 1.5 liters of

saliva. In individuals with good health, the rate of swallowing, prompted by pooled saliva, typically occurs around once a minute, though this frequency may vary based on salivary production rates.² The submandibular and sublingual salivary glands consistently produce basal saliva throughout the day, while the parotid glands primarily secrete saliva in response to olfactory, gustatory, and tactile stimuli. Stimulation of beta-adrenergic receptors is responsible for the generation of mucoid secretions. Saliva, with its diverse physiological

functions, serves to protect oral tissues, lubricate food for swallowing, and contribute to overall dental health.

The term "sialorrhea" is inconsistently used but is commonly associated with an excess of serous saliva in the oral cavity, stemming from hypersecretion, anatomical irregularities, or facial-bulbar weakness.³ In neurological conditions, this surplus saliva results from weakened or poorly coordinated bulbar or facial musculature. This leads to compromised swallowing mechanics, reduced swallowing frequency, inadequate lip seal, and ineffective saliva control, rather than an actual overproduction of saliva. Sialorrhea frequently impacts adults with various neurological conditions, including Parkinson's disease, multiple system atrophy, progressive supranuclear palsy, and dementia with Lewy bodies. Contrary to common belief that autonomic dysfunction in Parkinson's disease causes hypersalivation contributing to sialorrhea, studies indicate reduced or normal salivation in this condition compared to controls.

Despite its significance, issues such as sialorrhea, characterized by an excess of serous saliva, are less addressed in neurology and oral medicine specialties.⁴

Objective: To evaluate physicians' perspectives on sialorrhea as a major concern for patients presenting with neurological disorders in neurology clinics.

Hypothesis: Sialorrhea is not a major concern for neurologists.

METHODS

A retrospective hospital-based cross-sectional study was conducted in the department of Oral Medicine and Diagnosis, Lahore Medical and Dental College. Neurology departments of various hospitals in Lahore including Lahore General Hospital, Jinnah hospital and Sharif medical and dental college (Sharif Medical City). Duration of study was Six months following approval from "Ethical Review Board" of the institution (Ref.No.LMDC/FD/1507/23) from January 2021 to January 2023. Probability Randomized Convenient Sampling Technique was used. All known and diagnosed patients with neurological diseases presenting with sialorrhea and those Patients who are willing to participate in the study.

Patients with neurological diseases not presenting with sialorrhea. And patients who are unwilling to participate in the present study were not included. Clinical and demographic information was collected from 250 patients who visited the neurology department of major hospitals in Lahore, including Sharif Medical City, Jinnah Hospital, Lahore General Hospital, and the Oral Medicine Department of Lahore Medical and Dental College from

January 2021 to January 2022. These patients presented with sialorrhea alongside with other major neurological disease. To complement the collected data, a diverse group of healthcare professionals, including neurologists and oral medicine specialists involved in treating patients with neurological disorders, were requested to participate in an anonymous survey. The survey sought their opinions on instruction-suggested treatment varieties for saliva-related issues and inquired regarding their treatment choices. Summary figures, presented as median and interquartile range (IQR), were employed for data analysis. Univariate and multivariable logistic regression were used to explore relations among salivary issues and various clinical qualities⁵. Results were reported as odds ratios with 95% confidence intervals. Various imputation with predictive mean matching ($m = 5$) was applied for handling missing data in regression analysis.⁶ All p values were two-tailed, with a significance threshold set at <0.05

RESULTS

Study duration that extended to two years, 250 individuals with motor neuron disease (pwMND) received a diagnosis, with data on saliva issues available for 125 (50%) through direct questioning. Those without available data on saliva problems were slightly older (mean age 68.0 vs. 65.2 years; $p = 0.032$), but no significant differences were found in terms of gender, site of onset, and MND subtype. The median age at identification was 67 years (IQR 16), with 60.2% (130) being male. Amyotrophic lateral sclerosis constituted 54.0% (135) of cases, 18.0% (45) were diagnosed with progressive bulbar palsy, 10% (27) with primary lateral sclerosis, and 12% (30) with progressive muscular atrophy; subtypes were unspecified for the remaining cases. Among those diagnosed, 52% (135) had saliva problems, categorized as marked excess drooling (13.3%, 92), moderate excess with minimal drooling (12.9%, 89), slight but definite excess (28.3%, 195), and no excess saliva (45.5%, 314).

In univariate logistic regression, age at disease onset, female gender, bulbar onset, progressive bulbar palsy, and progressive muscular atrophy were linked with higher odds of saliva problems. However, in multivariable analysis, only bulbar onset retained independent association with saliva problems (odds ratio 9.46 [4.7, 19.2]; $p < 0.001$) (see Table

Treatment of Saliva Problems: Out of the ones with saliva problems, 52.7% received drug treatment, with hyoscine, amitriptyline, carbocisteine, glycopyrrolate, and atropine being the most predominant medications. Survey respondents identified the evidence base and local guidelines as pivotal factors influencing treatment decisions.^{7,8}

Table 1: Demographic and clinical risks associated with saliva problems

| Characteristics | Category | p value Univariate | p value Multivariate |
|---|---|--------------------|----------------------|
| Male gender | | <0.001 | 0.001 |
| Interval between start and diagnosis (months) | | 0.01 | 0.01 |
| Site where the disease started | Spinal (reference) | 1 | 1 |
| | Bulbar | <0.001 | <0.001 |
| | Mixed | 0.01 | 0.02 |
| | Pure respiratory | 0.59 | 0.01 |
| MND subtype | Amyotrophic lateral sclerosis (reference) | 1 | 1 |
| | Progressive bulbar palsy | <0.001 | 0.02 |
| | Primary lateral sclerosis | 0.52 | 0.01 |
| | Progressive muscular atrophy | 0.04 | 0.001 |
| OR odds ratio | | | |

DISCUSSION

The study's identification of a 31.3% prevalence of saliva problems among pwMND is noteworthy. This figure emphasizes the substantial impact of this symptom on the quality of life for a considerable proportion of individuals with motor neuron disease.⁹ The prevalence underscores the need for heightened awareness and proactive management of saliva-related challenges in clinical practice.

The study's revelation that salivary issues are independently linked with bulbar onset is a crucial finding. Bulbar onset in pwMND is characterized by initial symptoms affecting the bulbar region, including the mouth and throat.¹⁰ The association with bulbar onset highlights the anatomical basis of salivary issues, suggesting that weakened or poorly coordinated bulbar musculature contributes significantly to the compromised swallowing mechanics and inadequate saliva control observed in individuals with sialorrhea.¹¹

This association emphasizes the importance of universal screening for saliva problems, particularly in individuals with bulbar onset symptoms. Early identification and targeted interventions in this subgroup may help mitigate the impact of saliva-related challenges on swallowing and overall oral health of the patients presented.^{12,13}

Despite the clinical guidelines recommending treatment for all individuals with saliva problems, the study reveals

that only 52.7% of pwMND with salivary issues getting drug therapy. This treatment disparity raises important questions about the barriers to effective intervention¹⁴. Potential reasons may include concerns about side effects, therapeutic nihilism associated with the life-limiting nature of MND, or a lack of awareness among healthcare providers.¹⁵

Understanding these barriers is critical for developing targeted strategies to improve treatment uptake. Education campaigns, professional training, and patient awareness initiatives may contribute to addressing these disparities and ensuring that individuals with MND receive comprehensive and timely care for their saliva-related challenges.¹⁶

The survey among clinicians highlighted challenges in accessing botulinum toxin treatment for saliva problems. Limited availability or expertise emerged as barriers to utilizing this treatment option. Botulinum toxin injections, which can temporarily paralyze salivary glands, are a well-established intervention for managing sialorrhoea.¹⁷ The identified challenges underscore the importance of enhancing accessibility to specialized treatments and building expertise among healthcare professionals.¹⁸

Efforts to overcome these challenges may include specialized training programs, collaborative care models involving neurologists and oral medicine specialists, and increased availability of botulinum toxin treatment options.¹⁹ Addressing these challenges can contribute to a more comprehensive and accessible treatment landscape for individuals with saliva problems in the context of motor neuron disease.²⁰

The study also sheds light on the role of supportive measures in managing saliva problems. Supportive measures, including postural advice, were reported by 90.9% of clinicians as frequently employed techniques. This finding suggests that a combination of supportive measures and pharmacological interventions may offer a comprehensive approach to managing saliva-related challenges.²¹

The potential sufficiency of supportive treatments alone for some individuals underscores the need for personalized and holistic care plans. Clinicians should consider the individualized needs and preferences of pwMND when designing treatment strategies, with an emphasis on maintaining optimal oral health and improving overall well-being.²²

Future research should focus on assessing the relative efficacy of individual pharmacological interventions, exploring patient preferences, and understanding the factors influencing treatment discontinuation. This evidence-driven approach can contribute to the

refinement of clinical guidelines and the development of targeted interventions tailored to the unique needs of individuals with motor neuron disease and saliva-related challenges.²³

Exploring patient preferences, treatment efficacy, and reasons for treatment discontinuation should be central to future research endeavors.²⁴ Additionally, efforts should be made to enhance the understanding of the psychosocial impact of saliva problems on individuals with motor neuron disease, further contributing to the development of comprehensive and patient-centered care approaches.²⁵

CONCLUSION

In conclusion, this comprehensive study provides valuable insights into the prevalence, clinical factors, and management practices related to saliva problems in individuals with motor neuron disease. The findings underscore the need for universal screening, targeted interventions, and an evidence-driven approach to address the complex challenges associated with saliva-related symptoms.

LIMITATIONS

As we move forward, ongoing research, interdisciplinary collaboration, and a patient-centered approach will be instrumental in refining clinical practices and ensuring that individuals with motor neuron disease receive comprehensive and effective care for their saliva-related symptoms.

SUGGESTIONS / RECOMMENDATIONS

Further work should be carried out to explore the cure of the disease and Neurologists must address sialorrhea as a major concern for the patients along with the primary symptom for which patient seeks treatment.

CONFLICT OF INTEREST / DISCLOSURE

None.

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