# *Prevalence of drooling in patients with parkinson disease*

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## Abstract

***Background and aims:*** *Drooling is the involuntary spillage of saliva from the mouth and is apparent in approximately 75% of individuals with PD and was historically interpreted as resulting from hypersecretion of saliva because of autonomic dysfunction. Alteration in salivary gland function is believed to arise from PD-associated changes in the autonomic nervous system and possibly involves the salivary para-sympathic*

*ganglia. Irrespective of the amount of saliva produced, drooling probably occurs because of PD-related inability to efficiently swallow with normal frequency, an inability to fully close the mouth, and an anterior flexed head position. Recognizing and managing sialorrhea is an important issue to ensure quality of life for patients with PD. The study aims to identify prevalence of drooling at patients hospitalized at neurology department in Tirana and increasing awareness about the importance of sialorrhea treatment in PD patients.*

***Methods*:** *In this retrospective study we investigated the prevalence of drooling in PD patients. We investigated the distribution of drooling according to sex and age and also the impact of drooling in this population by neurological examination and questionnaires given to them in a 6-month time distance. In addition, we studied the impact of gender in drooling in this population.*

***Results**: Our results show that most of the patients participating in the study showed signs of drooling. A significant correlation exists between drooling and stages of disease. Furthermore, in males, the correlation between the prevalence of drooling was found to be clinically significant compared to females.*

***Conclusion:** Our findings suggest that drooling is a major concern in the course of PD and should be addressed and treated early in patients with PD.*

***Key word:** Parkinson Disease, prevalence, sialorrhea, quality of life*

## Introduction

Drooling, or sialorrhea, is a frequent non-motor symptom in Parkinson's disease (PD) (Ou et al., 2015). Studies found that pathologic sialorrhea may develop due to hypersalivation, together with various neurologic disorders including cerebral palsy, Parkinson's disease, and amyotrophic lateral sclerosis, or as an adverse effect of medications (Güvenç, 2018). Even when drooling does not unduly bother the individual, its potential consequences for swallowing, speech, oral and general health mean it should be attended to as a strategy to prevent other possible complications (Pedersen et al., 2018). The exact pathophysiological mechanism of drooling in Parkinson's disease (PD) is not yet fully understood. Healthy saliva flow produces around 0.75–1.5 liters per day (Miller, Walshe and Walker, 2019). Production varies throughout the day. Excessive drooling in patients with Parkinson's cannot be attributed to a single factor but to a mixture of factors, including but not limited to impaired nigrostriatal pathways (Polychronis et al., 2022). Surveys show that drooling can affect up to 78 percent of people with Parkinson's (Very well Health, n.d.). Drooling can be a devastating and debilitating complication of PD and is one of the most prevalent complaints of patients. It is often unrecognized and

undertreated (Isaacson et al., 2020). Some clinical factors participate in the onset of drooling while others are concomitant (Nascimento, 2021). As we have seen, drooling is more prominent during the "off" period. Two major domains possibly influencing the pathophysiology of drooling in PD have been proposed: one is an abnormality of salivary production, and the other is insufficient salivary clearance (Srivanitchapoom, Pandey and Hallett, 2014). Several other studies have also shown that a possible explanation is dopamine deficiency (Marg, Walz and Blenau, 2004). Supportive evidence consists of lesions at the striatum, globus pallidus, or its output pathway, which is the lateral mesencephalic reticular formation, could significantly decrease salivary secretion (Srivanitchapoom, Pandey and Hallett, 2014). Swallowing dysfunction in PD patients, in which the oropharyngeal phase is a major component, is the other domain that might contribute to drooling. Oropharyngeal dysphagia in PD patients can result from bradykinesia Impaired food transportation in Parkinson's disease related to lingual bradykinesia (Umemoto et al., 2010). The Drooling Severity and Frequency Scale (DSFS) has been shown to be a quick and accurate measure of drooling that can be used to help guide clinical management of drooling, particularly in patients who are unable to undergo the Drooling Quotient assessment (Rashnoo and Daniel, 2015). In addition, a recent study showed that severe hypomimia, unintentional mouth opening and stooped posture with dropped head, could cause drooling in PD patients. Hypomimia can affect the patients' ability to maintain saliva inside their oral cavity, and, therefore, cause drooling in PD (Kalf et al., 2011). It is reported that 70%–80% of PD patients worldwide are demonstrating sialorrhea (Isaacson et al., 2020). In moderately advanced PD patients, subjective drooling occurs in over one-third of patients and was significantly associated with decreased quality of life. Dysphagia occurred significantly more often in patients with drooling (van Wamelen et al., 2020).

There are several drug treatments that can address the problem of excess saliva and drool. Conservative management and speech therapy, oral therapy and botulinum toxin. Noninvasive management, which includes speech-language therapists, dentists, and physiotherapists, is often the first step in management for most providers, but unfortunately, these measures have not shown significant long-term benefits (Isaacson et al., 2020). And medication known as anticholinergics, such as Artane (trihexyphenidyl hydrochloride) and Cogentin (benztropine mesylate) in an attempt to dry up any excess saliva you may have. There are treatments that can help. These include medication, Botox injections, drops, or a spray that can dry your mouth.

There are not many studies in Albania related to this topic, so our study intends to emphasize the importance of drooling as an important clinical feature of PD.

## Aim of the study

The main purpose of this study is to provide an overview of drooling in Albanian' patients to increase awareness on recognition and referral for care for patients with PD. Increased awareness will help nurses and caregivers address drooling at its earliest onset.

This study evaluated the prevalence of drooling in patients with PD, the stage of onset and the relationship between gender and drooling.

## Materials and methods

This is a retrospective study in which 106 patients with PD are included. The data is collected from the PD patients from 18 to 65+ years old that were hospitalized in Neurology Service of UHC "Mother Teresa" in Tirana during the period 2021-2022 and that have given their consent. The patients were examined by our neurologists and the stage of the disease was confirmed by them too. We investigated the distribution of drooling according to sex and age and also the impact of drooling in this population by neurological examination. Discrete variables are shown in frequencies and percentages, while continuing variables are shown as standard deviation. The data is worked in Microsoft Excel 2013 and SPSS

23.0. There are several statistical tests used such as: $\chi^2$, ANOVA, Fisher exact test. The internal consistency of the study is measured by Cronbach`s alpha.

## Results

Most of the patients in this study were in stage II and III of the disease, 24.5% and 65.1 respectively. 62 patients of the study or 58.5% were males, while there were 44 female or 41.5%. Age of the patients included in this sample is from 38 years old to 85 years old. The mean age of the group was 67.6 ±9.0. The age group with highest number of patients were 56-65 years old and 66-75 years old; 22 and 26 males respectively, 13 and 18 females respectively.

**TABLE 1:** Age distribution of patients

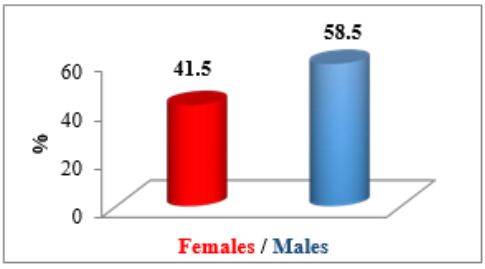
| Age | total | Min | Max | Med. | Std. Dev. |
|---|---|---|---|---|---|
| | 106 | 38 | 87 | 67.6 | 9.0 |

**TABLE 2:** Group ages according to sex

| sex | 36 - 45 | 46 - 55 | 56 - 65 | 66 - 75 | 76 - 85 | 86+ | Total |
|---|---|---|---|---|---|---|---|
| M | 1 | 1 | 22 | 26 | 12 | 0 | 62 |
| F | 1 | 5 | 13 | 18 | 6 | 1 | 44 |
| Total | 2 | 6 | 35 | 44 | 18 | 1 | 106 |

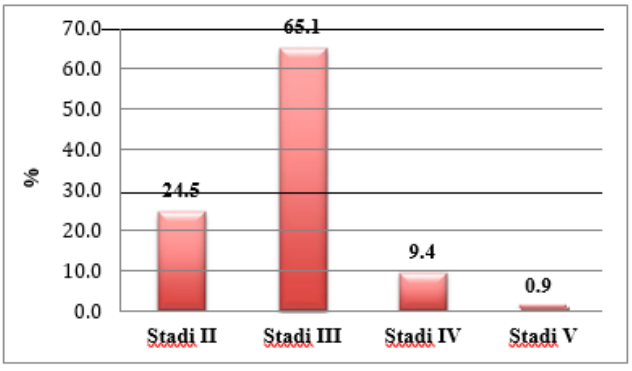
Our results show that a significant correlation exists between drooling and stages of diseases in our sample pf PD patients. The prevalence of drooling in males was found to be clinically significant compared to females. Therefore, 34% of male population with PD have drooling during the progress of the disease, while only 21.7% of female population with PD disease have drooling.

**FIGURE 1:** Sex distribution




As for the questionnaire, the Cronbach1s alpha was used and it was qualified as "good". So, the question "Do you have drooling during the daytime?", in the first month was answered YES by 55.7% (in which 34% are Males and 21.7% Females) of the group study and in the sixth month by 57.0% (in which 35% are Males and 22% Females).

**FIGURE 2:** Distribution according to the stages of disease



## Discussion

Neurological disorders are an important cause of disability and death worldwide. Globally, the burden of neurological disorders has increased substantially over the past 25 years because of expanding population numbers and ageing, despite substantial decreases in mortality rates from stroke and communicable neurological disorders (Feigin et al., 2017). Recognizing, identifying, and addressing problems that affect the quality of life of patients with PD is an important part of health care services. Drooling is one of the most common complaints affecting Parkinson`s patients which often results in social isolation, embarrassment, depression, skin infections and aspiration pneumonia. Previously, sialorrhea has been underrecognized in Parkinson's disease (PD) patients. Despite this, many patients rank sialorrhea as one of the most debilitating complaints of Parkinson's disease (Isaacson et al., 2020). In the study was found that most of our patient's referee drooling as a clinical sign. In order to increase the quality of life of our patients it's necessity that this sign be taken in consideration and treated specifically along with all other concerns that patients with PD exhibit. In the study find as a limitation the fact that answering questionnaire might have been a little subjective. As in other studies, in our center the majority of patients who reported the symptom of drooling were men (Kalf et al., 2009).

Also in our study, in males, the correlation between the prevalence of drooling was found to be clinically significant in comparison to female population.

## Conclusion

Drooling is a major concern in the course of Parkinson Disease and should be addressed and treated early in patients with PD. Training the nursing and caregivers on the importance and early management of drooling will serve to increase the well-being and quality of life of our patients. In order to increase the quality of life of our patients it's necessity that this symptom be taken into consideration and treated specifically along with all other concerns that patients with Parkinson Disease exhibit.

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