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Research

# Beyond Motor Symptoms: A Comprehensive Analysis of Sexual Dysfunction in Cervical Dystonia

## Servikal Distonide Cinsel İşlev Bozukluğu Üzerine Kapsamlı Bir Değerlendirme

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## ABSTRACT

**Objective:** Dystonia is a neurological disorder marked by involuntary muscle contractions, leading to repetitive movements or abnormal postures. While non-motor symptoms like anxiety, depression are well-documented, the prevalence and impact of sexual dysfunction in cervical dystonia remain understudied. This study explores the prevalence of sexual dysfunction and its relationship with other factors in cervical dystonia patients.

**Methods:** This prospective study included 28 patients with cervical dystonia. Data were collected using the Beck Depression Inventory (BDI), Tsui Rating Scale for cervical dystonia (Tsui), visual analog scale (VAS), and Arizona Sexual Experiences Scale (ASLS). Analyses included descriptive statistics, correlation, multiple regression, and subgroup analyses.

**Results:** 71.4% of patients reported sexual dysfunction. No significant correlations were found between ASLS scores and age, disease duration, BDI, or Tsui scores. A moderate, non-significant correlation existed between ASLS and VAS scores (r=0.331, p=0.082). Subgroup analysis showed the highest ASLS scores in patients aged 50-60 and those with 5-10 years of disease duration. A significant difference in ASLS scores was observed between males and females (p=0.05), with females having higher scores. Additionally, comparisons between patients with and without sexual dysfunction showed no significant association with comorbidities.

**Conclusion:** Sexual dysfunction is prevalent in cervical dystonia, notably in older females with higher depression and pain levels. Comprehensive care addressing both motor and non-motor symptoms is crucial. Future research should focus on longitudinal studies and therapeutic interventions.

**Keywords:** Dystonia, non-motor symptoms, sexual dysfunction

## ÖZ

**Amaç:** Distoni, istemsiz kas kasılmalarıyla karakterize, tekrarlayıcı hareketlere veya anormal püstüre yol açan nörolojik bir bozukluktur. Anksiyete ve depresyon gibi motor dışı semptomlar iyi belgelenmiş olmasına rağmen, servikal distonide cinsel işlev bozukluğunun yaygınlığı ve etkisi yeterince araştırılmamıştır. Bu çalışma, servikal distoni hastalarında cinsel işlev bozukluğunun yaygınlığını ve diğer faktörlerle ilişkisini incelemektedir.

**Gereç ve Yöntem:** Bu prospektif çalışmaya servikal distonili 28 hasta dahil edilmiştir. Veriler Beck Depresyon Ölçeği (BDÖ), servikal distoni için Tsui Derecelendirme Ölçeği (Tsui), görsel analog skala (VAS) ve Arizona Cinsel Deneyimler Ölçeği (ASLS) kullanılarak toplanmıştır. Analizler, tanımlayıcı istatistikler, korelasyon, çoklu regresyon ve alt grup analizlerini içermektedir

**Bulgular:** Hastaların %71,4'ü cinsel işlev bozukluğu bildirmiştir. ASLS skorları ile yaş, hastalık süresi, BDÖ veya Tsui skorları arasında anlamlı bir korelasyon bulunmamıştır. ASLS ve VAS skorları arasında orta düzeyde, anlamlı olmayan bir korelasyon saptanmıştır (r=0.331, p=0.082). Alt grup analizi, 50-60 yaş aralığındaki hastalarda ve 5-10 yıllık hastalık süresine sahip olanlarda en yüksek ASLS skorlarının olduğunu göstermiştir. ASLS skorları açısından kadınlar ve erkekler arasında anlamlı bir fark bulunmuştur (p=0.05), kadınların daha yüksek skorlara sahip olduğu görülmüştür. Ayrıca, cinsel işlev bozukluğu olan ve olmayan hastalar arasındaki karşılaştırmalarda eşlik eden hastalıklarla anlamlı bir ilişki saptanmamıştır.

**Sonuç:** Cinsel işlev bozukluğu, özellikle depresyon ve ağrı düzeyleri daha yüksek olan yaşlı kadınlarda servikal distonide yaygındır. Hem motor hem de motor dışı semptomları ele alan kapsamlı bir bakım yaklaşımı kritik öneme sahiptir. Gelecekteki araştırmalar, uzunlamasına çalışmalar ve terapötik müdahalelere odaklanmalıdır.

**Anahtar Kelimeler:** Distoni, non-motor semptomlar, cinsel işlev bozukluğu

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## INTRODUCTION

Dystonia is a neurological disorder characterized by repetitive movements and unusual postures caused by persistent or intermittent muscle contractions. It is believed to arise from the pathology of physiological neuronal pathways among the basal ganglia (1). Dystonia is categorized as focal, segmental, or generalized based on the body regions involved. Focal dystonia impacts a single body area, whereas segmental dystonia involves two or more interconnected regions. The most common examples of focal dystonia are blepharospasm and cervical dystonia, whereas segmental dystonia includes cranio-cervical dystonia and Meige syndrome (2) today, focal dystonia is considered an isolated movement disorder with many non-motor symptoms. Anxiety, depression, and social phobia are the most well-documented mental health conditions (3,4). It is also known that cognitive and emotional disorders or sleep disorders, are observed in the cervical dystonia (5). Studies examining non-motor symptoms in dystonia patients have frequently investigated mood, cognition, sleep, quality of life, apathy, and anxiety, but sexual dysfunction has not been included in these studies (6). Sexual health is an important aspect of mental health and is often researched in Parkinson's disease. The relationship between sexual dysfunction and dystonia, however, remains poorly understood and needs further investigation, as it negatively affects patients' psychological and physical health, quality of life, and treatment process (7). To date, sexual dysfunction in dystonia patients has only been examined in two case-control studies (4,7). Additionally, no studies on this topic have been conducted in Turkey. This study aims to investigate sexual dysfunction in cervical dystonia and contribute to the limited literature and clinical perspective on this subject.

## METHODS

This study is a prospective, descriptive survey conducted with 28 cervical dystonia patients who were followed at the botulinum toxin applications and movement disorders outpatient clinic.

### Selection and Identification of Cases

Inclusion criteria included individuals aged 18-65 years, identifying as heterosexual, and diagnosed with focal cervical dystonia. Patients were excluded if they had a more extensive form of dystonia (e.g., hemidystonia, multifocal dystonia, or generalized dystonia), acquired dystonia, or a history of dementia, brain trauma, stroke, neurodegenerative disease, or psychosis. Those with blepharospasm were also not included. These exclusions were necessary to ensure the accuracy and reliability of assessments, as such conditions could interfere with the comprehension and completion of sexual dysfunction tests, or be associated with additional comorbidities that might influence sexual dysfunction.

All assessments were obtained at least 12 weeks after the last botulinum toxin application during the dose-end period.

The study was approved on 26.06.2024 by the Ethics Committee of University of Health Sciences Türkiye, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital (decision no: 200, date: 26.06.2024). This study informed consent was obtained from all patients.

### Data Collection Tools

Data on patients' age, gender, type, and localization of dystonia were obtained from their files filled out during regular end-of-dose evaluations at the botulinum toxin applications clinic, to monitor both the severity of dystonia and non-motor symptoms. Mood assessment was done using the Beck Depression Inventory (BDI-II), pain assessment using the visual analog scale (VAS), dystonia severity assessment using the Tsui Rating Scale for cervical dystonia (Tsui), and sexual function assessment using the Arizona Sexual Experiences Scale (ASLS).

The BDI-II is a self-report scale consisting of 21 questions scored between 0-63, used to assess depression. The cutoff values for mild/moderate/severe depression are 13/19/28, respectively (8).

The VAS is a one-dimensional scale commonly used to measure pain, consisting of a 100 mm line drawn vertically or horizontally. The two ends of this line contain two descriptive words for pain intensity (0= "no pain", 100= "worst/unbearable pain"). The patient is instructed to indicate a point on the line that reflects the severity of their pain. The portion from 0 to the mark is measured. Pain is classified as no pain (0-4 mm), mild pain (4-44 mm), moderate pain (45-74 mm), and severe pain (75-100 mm). In our study, pain was classified into the categories of no pain/mild pain and moderate/severe pain for analysis purposes.

Tsui, ranging between 0-25 (most disabling), grades the dystonic head, neck, and shoulder movements and postures (9).

The ASLS is a self-report scale that assesses sexual dysfunction, with separate forms for men and women, each containing five questions. It examines sexual desire, mental and physiological arousal, and orgasm. The total scores range between 5 and 30. Higher scores indicate increased levels of sexual dysfunction. Total scores of 19 and above indicate sexual dysfunction.

### Statistical Analysis

Statistical analyses were conducted to assess variables using SPSS 15.0 (Statistical Package for the Social Sciences) (IBM SPSS Inc., Chicago, IL). Mean±standard deviation were used for variables in descriptive statistics. The Shapiro-Wilk test was used to evaluate whether the data followed a normal distribution. For variables following a normal distribution, Pearson correlation analysis was used. For variables not following a normal distribution, Spearman correlation analysis was employed. Pearson correlation analysis (parametric) was employed to examine the relationship between ASLS, Tsui, age, and disease duration, while Spearman correlation analysis (non-parametric) was utilized for the correlation between ASLS, BDI, and VAS scores. For assessment of the relationship between ASLS scores and gender, we used the Spearman correlation analysis (non-parametric) as gender is a categorical variable. Additionally, multiple regression analysis was performed to determine if age, disease duration, VPS score, and gender could predict ASLS scores. Subgroup analyses were conducted to compare mean ASLS scores across different age groups and disease durations. Lastly, the Mann-Whitney U test was utilized to compare ASLS scores between males and females.

## RESULTS

A comprehensive overview of the patients, including the prevalence of depression, pain, sexual dysfunction, and comorbid conditions, is summarized in Table 1. The mean age of the patients was 48.1 years (median: 46, ranging from 35 to 66), and the average duration of the disease was 8.3 years (median: 8, ranging from 2 to 14). The majority of the patients were female (85.7%). Comorbid conditions were present in 42.9% of patients, with the most common comorbidities being hypertension (17.9%) and diabetes mellitus (14.3%). Other comorbidities included hyperlipidemia (7.1%), and systemic lupus erythematosus (3.6%). Levels of depression, pain, sexual dysfunction, and comorbid conditions are presented in Table 1.

### Relationship Between Sexual Disfunction and Other Variables

Results indicated that ASLS and Tsui scores, age, and disease duration adhered to a normal distribution, whereas BDI and VAS scores did not. The conducted statistical tests were mentioned in the methods section.

Results of the correlation analyses between ASLS scores and other variables are summarized in Table 2.

There was a very weak correlation between ASLS and age, disease duration, and gender, Tsui, BDI ($p>0.05$) and between ASLS between ASLS and VAS score ($p>0.05$). These results indicate that there is no significant correlation between ASLS scores and Tsui scores, BDI scores, age, disease duration, VAS score, or gender.

### Results of the Detailed Statistical Analysis

Multiple Regression Analysis is performed to determine whether a combination of variables (age, disease duration, VAS score, gender) can predict ASLS scores (Table 3). The regression model indicates that none of the independent

**Table 1.** Descriptive data regarding patients

| | |
|---|---|
| Age; mean±SD (median, minimum-maximum) | 48.1±8.9 (46, 35-66) |
| Disease duration (years) mean±SD (median, minimum-maximum) | 8.3±3.7 (8, 2-14) |
| Female % | 85.7% |
| Male % | 14.3% |
| **Comorbid conditions** | |
| None | 57.1% (n=16) |
| Diabetes mellitus | 14.3% (n=4) |
| Hypertension | 17.8% (n=5) |
| Hyperlipidemia | 7.1% (n=2) |
| Systemic lupus erythematosus | 3.6% (n=1) |
| **Depression level distribution** | |
| Minimum | 60.7% (n=17) |
| Mild | 17.9% (n=5) |
| Moderate | 10.7% (n=3) |
| Severe | 10.7% (n=3) |
| **Visual pain score distribution** | |
| No pain | 57.1% (n=16) |
| Moderate | 28.6% (n=8) |
| Mild | 7.1% (n=2) |
| Severe | 7.1% (n=2) |
| **Sexual disfunction level distribution** | |
| Yes | 71.4% (n=20) |
| No | 28.6% (n=8) |

SD: Standard deviation

**Table 2.** Correlation between ASLS and other variables

| Variables | Correlation coefficient | P-value |
|---|---|---|
| **ASLS & Age** | 0.035 | 0.856 |
| **ASLS & Disease Duration** | 0.019 | 0.917 |
| **ASLS & Gender** | -0.150 | 0.438 |
| **ASLS & Tsui** | 0.251 | 0.193 |
| **ASLS & BDI** | 0.186 | 0.339 |
| **ASLS & VAS Score** | 0.331 | 0.082 |

ASLS: Arizona Sexual Experiences Scale, BDI: Beck depression Inventory, Tsui: The Tsui Rating Scale for Cervical Dystonia, VAS: Visual analog scale

variables (age, disease duration, VAS score, gender) is statistically significant as predictors of ASLS scores (p-values >0.05). However, VAS score and gender are close to being significant predictors, with p-values of 0.077 and 0.084, respectively (Table 3).

Subgroup analysis is performed to assess ASLS scores within clinically meaningful subgroups, such as by age range and disease duration (Table 4). The mean ASLS score varies across different age groups. Patients aged 50-60 have the highest mean ASLS score, while those aged 30-40 have the lowest (Table 4). The mean ASLS score also varies across different disease durations. Patients with a disease duration of 5-10 years have the highest mean ASLS score, while those with a duration of 0-5 years have the lowest. These differences are not statistically analyzed for significance here (Table 4). Comparative Analysis of ASLS scores between different groups (male vs. female) was performed. A significant difference in ASLS scores between males and females (p=0.05) was detected. Females have a higher mean ASLS score compared to males (Table 4).

**Table 3.** Results of the multiple regression analyses

| Variable | Coefficient | SE | T-value | P-value | 95% confidence interval |
|---|---|---|---|---|---|
| **Constant** | 9.7684 | 9.687 | 1.008 | 0.324 | [-10.142, 29.679] |
| **Age** | -0.0410 | 0.174 | -0.236 | 0.815 | [-0.401, 0.319] |
| **Disease duration** | -0.0737 | 0.296 | -0.249 | 0.805 | [-0.689, 0.542] |
| **VAS** | 2.6341 | 1.415 | 1.861 | 0.077 | [-0.305, 5.573] |
| **Gender** | -6.2287 | 3.438 | -1.811 | 0.084 | [-13.297, 0.839] |

SE: Standard error, VAS: Visual analog scale

**Table 4.** Subgroup analyses

| Age group | Mean ASLS score |
|---|---|
| 30-40 | 17 |
| 40-50 | 21 |
| 50-60 | 23 |
| 60-70 | 18 |
| **Disease duration** | |
| 0-5 years | 15 |
| 5-10 years | 22 |
| 10-15 years | 20 |
| **Gender** | |
| Male | 13.0 |
| Female | 20.5 |

ASLS: Arizona Sexual Experiences Scale

### Comparison of Patient Characteristics by Sexual Dysfunction Status

In this study, patients with cervical dystonia who had sexual dysfunction were compared to those without sexual dysfunction in terms of age, BDI score, and disease duration. Patients with sexual dysfunction (n=20) had an average age of 48.1 years, with a mean disease duration of 8.3 years. The mean depression level, as measured by the BDI score, was 16.7 in this group. In contrast, patients without sexual dysfunction (n=8) had an average age of 44.4 years and a mean disease duration of 8 years, with an average depression level (BDI score) of 10.9. In both groups, the majority was female, and the VAS scores were generally similar.

To determine whether there were significant differences between patients with and without sexual dysfunction in terms of age, depression level (BDI), pain score (VAS), and disease duration, an independent t-test was performed. The t-test results indicated no significant differences between the two groups in terms of age (t=1.546, p=0.134), BDI score (t=1.002, p=0.325), VAS score (t=0.893, p=0.380), and disease duration (t=0.069, p=0.946). Additionally, a chi-square test was conducted to examine if gender distribution differed between the groups. This analysis revealed a significant difference in gender between the groups ($\chi^2$=37.7, p<0.001), suggesting that being female may be a determining factor for sexual dysfunction in this patient population. These analyses indicate that while clinical variables such as age, depression, pain level, and disease duration do not show significant effects on sexual dysfunction, gender appears to be a distinguishing factor (Table 5). Additionally, a chi-square test was performed to examine whether the presence of comorbid diseases differed between groups with and without sexual dysfunction. The analysis results indicated no significant difference in comorbidity presence between the groups ($\chi^2$=0.648, p=0.723). This finding suggests that comorbid conditions, such as diabetes and hypertension, are not significantly associated with sexual dysfunction in this patient population (Table 5).

**Table 5.** Comparative analysis of demographic and clinical characteristics between patients with and without sexual dysfunction

| Variable | Test statistic | P-value |
|---|---|---|
| **Age** | t=1.546 | 0.134 |
| **BDI** | t=1.002 | 0.325 |
| **VAS score** | t=0.893 | 0.380 |
| **Disease duration** | t=0.069 | 0.946 |
| **Gender** | $\chi^2$=37.7 | **<0.001** |
| **Comorbidity presence** | $\chi^2$=0.648 | 0.723 |

ASLS: Arizona Sexual Experiences Scale, BDI: Beck depression inventory, VAS: Visual Analog Scale

## DISCUSSION

Our study investigates the prevalence of sexual dysfunction in cervical dystonia and explores the relationships between sexual dysfunction and various factors such as age, depression, and pain. It contributes to the current literature on the non-motor symptoms of dystonia, particularly sexual dysfunction, and highlights the importance of comprehensive patient care.

When evaluating our study results alongside existing literature, several important insights emerge regarding the relationship between sexual dysfunction in dystonia and other factors such as age, depression, and pain. In the literature, the prevalence of sexual dysfunction among dystonia patients varies, but significant rates have been consistently reported. Sexual dysfunction has been identified in 45% of cervical dystonia patients. (7). Sexual dysfunction in these patients, is often linked with depressive symptoms and other non-motor issues (10). In our study, sexual dysfunction was identified in 71.4% of the patients. In subgroup analysis, the mean ASLS score varies across different age groups. Patients aged 50-60 have the highest mean ASLS score, while those aged 30-40 have the lowest. Patients with a disease duration of 5-10 years have the highest mean ASLS score. Comparative analysis found a significant difference in ASLS scores between males and females ($p=0.05$). Females have a higher mean ASLS score than males. Our finding of 71.4% in cervical dystonia patients significantly exceeds the 45% prevalence reported in the literature (7). This higher prevalence could be attributed to differences in sample characteristics. Our study sample consists of a predominantly female sample and shows a higher prevalence of depression. We did not find any significant correlation between sexual dysfunction and other factors in our study. Nevertheless, the weak correlation between ASLS scores and age may indicate that sexual dysfunction increases with age. This is consistent with numerous studies that have documented a decline in sexual function with age, due to both physiological and psychological changes (7). Even though there was a weak positive correlation between BDI scores and ASLS scores in our study, the evidence was insufficient to draw definitive conclusions. This aligns with previous literature indicating that depression may increase the risk of sexual dysfunction in dystonia patients (10). Depression can affect sexual health through multiple pathways, including reduced libido, impaired arousal, and decreased sexual satisfaction (10). Also, a weak positive correlation between VAS scores and ASLS scores may suggest that higher pain levels are associated with increased sexual dysfunction. This aligns with previous research highlighting the detrimental effects of pain on sexual function (7). The management of pain in dystonia patients may be crucial for enhancing their sexual health. These findings underscore the importance of incorporating sexual health assessments into routine clinical practice for dystonia patients. Utilizing validated tools such as the ASLS can help identify patients at risk of sexual dysfunction (10).

In our study, no significant difference was found in the presence of common comorbid conditions (such as diabetes, hypertension, hyperlipidemia, and systemic lupus erythematosus) between cervical dystonia patients with and without sexual dysfunction. This finding suggests that sexual dysfunction in dystonia may manifest as an inherent non-motor symptom rather than being secondary to systemic conditions. Although studies addressing sexual dysfunction specifically in dystonia patients are limited, existing research often links sexual dysfunction to non-motor symptoms such as depression, anxiety, and pain. For example, a study reported a 45% prevalence of sexual dysfunction in dystonia patients, highlighting its association with psychological factors such as depression and anxiety (7). However, this study did not examine the impact of physical comorbidities on sexual function in detail. Similarly, another study found that sexual dysfunction negatively impacts quality of life in dystonia patients, although comorbid conditions were not specifically evaluated in terms of their effect on sexual health (10). Given these findings, the lack of association between comorbid conditions and sexual dysfunction in our study may indicate that sexual dysfunction in dystonia is more closely linked to neurological and psychosocial factors rather than to systemic health conditions. The absence of studies directly examining the relationship between sexual dysfunction and comorbid conditions in dystonia patients underscores the need for further research with larger cohorts to explore this potential relationship in depth.

One study explored the neural circuits associated with dystonia and their dysfunctions. It focused on the psychiatric symptoms frequently seen in dystonia patients and their management (11). Cognitive behavioral therapy and mindfulness were suggested as psychotherapeutic approaches. Addressing depression and pain through appropriate interventions, including cognitive-behavioral therapy, mindfulness, and pharmacotherapy, can significantly improve sexual function (11). Future longitudinal studies should be conducted to better understand the relationships between sexual dysfunction, depression, pain, comorbidities, and other factors in patients with dystonia. Additionally, exploring the efficacy of various therapeutic interventions, such as deep brain stimulation

(DBS), physical therapy, and complementary therapies like manual therapy and massage, can provide insights into comprehensive treatment approaches (12,13). Further development and validation of dystonia-specific assessment tools are also needed to accurately evaluate and monitor sexual dysfunction and other non-motor symptoms in this population (10).

### Study Limitations

There are several limitations. First comes the issue of a small patient number. A bigger cohort would provide more reliable results. Secondly, the cross-sectional design limits establishing causality from the findings. Third, the exclusion criteria, including non-heterosexual individuals and those with other forms of dystonia or significant comorbidities, may limit the applicability of the results to all dystonia patients. Future studies including a more diverse population would enhance the generalizability. Despite these limitations, our study provides valuable insights into the prevalence and factors associated with sexual dysfunction in cervical dystonia patients, highlighting the need for comprehensive patient care.

## Conclusion

This study highlights the significant prevalence of sexual dysfunction among cervical dystonia patients and underscores its association with various demographic and clinical factors such as age, gender, depression, comorbidities, and pain. The findings reveal that sexual dysfunction is more commonly observed in older female patients who report higher levels of depression and pain. Despite the lack of statistically significant correlations between ASLS scores and variables such as age, disease duration, and depression levels, the trends observed suggest the need for further exploration. The study emphasizes the importance of adopting a comprehensive healthcare approach that addresses both motor and non-motor symptoms, including sexual health, to improve the overall quality of life for these patients. By integrating regular assessments of sexual function into clinical practice, healthcare providers can identify and manage sexual dysfunction more effectively. Future studies are needed to better understand the relationships between sexual dysfunction and other factors in dystonia patients. Additionally, investigating the efficacy of various therapeutic interventions, such as cognitive-behavioral therapy, mindfulness, and pharmacotherapy, can provide valuable insights into improving sexual health and overall well-being in this population. Overall, this study contributes to the limited literature on sexual dysfunction in dystonia and highlights the need for further research and comprehensive patient care strategies to address this critical aspect of non-motor symptoms.

### ETHICS

**Ethics Committee Approval:** The study was approved on 26.06.2024 by the Ethics Committee of University of Health Sciences Türkiye, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital (decision no: 200, date: 26.06.2024).

**Informed Consent:** This study informed consent was obtained from all patients.

### FOOTNOTES

### Authorship Contributions

Surgical and Medical Practices: Ö.G.Ö., G.B., Concept: Ö.G.Ö., Design: Ö.G.Ö., Data Collection or Processing: Ö.G.Ö., G.B., Analysis or Interpretation: Ö.G.Ö., G.B., Literature Search: G.B., Writing: Ö.G.Ö.

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