

Original Article

Prevalence of Coccydynia among Wheelchair Users Due to Prolong Sitting

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Conflict of Interest: None.

Sanobar G., et al. (2024). 4(1): DOI: <https://doi.org/10.61919/jhrr.v4i1.370>

ABSTRACT

Background: Coccydynia, characterized by pain in or around the coccyx, is a condition that is particularly prevalent among wheelchair users due to prolonged sitting. Previous studies have highlighted various factors contributing to coccydynia, including extended sitting on hard surfaces, obesity, and gender-specific susceptibility.

Objective: The primary objective of this study was to determine the prevalence of coccydynia among wheelchair users, with a focus on identifying key risk factors such as prolonged sitting, gender, and sitting surface hardness.

Methods: This cross-sectional study utilized convenience sampling to gather data from 250 wheelchair users across private/government special education institutes, hospitals, rehabilitation centers, and homes in the South Punjab region. Participants aged 15-60 years using a wheelchair for more than one year were included, excluding those with spinal cord injuries, spina bifida, coccyx fractures, sensory loss, psychological issues, or postpartum women. Data was collected via a self-structured questionnaire, Numeric Pain Rating Scale (NPRS), and Visual Analog Scale (VAS). Statistical analysis was conducted using SPSS version 25, focusing on frequencies, percentages, cross-tabulation, and Chi-square tests.

Results: The study found that 72.4% of participants experienced tailbone tenderness, with a significant association between longer wheelchair usage hours and increased tenderness ($P < 0.001$). A majority of participants (76%) reported tailbone pain, with 72.4% experiencing tenderness. The prevalence of coccydynia was higher in females, and most participants did not use a cushion despite the prolonged sitting. The pain was predominantly described as an ache/dull sensation (89.6%), and it worsened after prolonged sitting in 90.8% of cases.

Conclusion: Coccydynia is a prevalent condition among wheelchair users, influenced by prolonged sitting, gender, and the hardness of the sitting surface. The study emphasizes the need for educational interventions, ergonomic wheelchair designs, and the usage of specialized cushions to mitigate the risk and alleviate symptoms.

Keywords: Coccydynia, Wheelchair Users, Prolonged Sitting, Tailbone Pain, Ergonomic Wheelchair Design.

INTRODUCTION

Coccydynia, characterized as pain in or around the coccyx, is a condition primarily associated with prolonged sitting, a situation often faced by wheelchair users. This symptom, rather than a distinct disease, has significant impacts, especially for those reliant on wheelchairs for mobility. The condition, first descriptively termed by Simpson in 1859, has been recognized since the 16th century (1). Notably, it is observed to occur more frequently in women than in men.

The term 'coccydynia' was once broadly applied, a practice that impeded accurate diagnosis and effective treatment, tailored to specific pathologies (3, 4). In 1950, Schapiro humorously labeled it the "television disease," suggesting a correlation with poor postural habits (2). Contributing factors include inadequate sagittal pelvic rotation, often seen in obese individuals, leading to a protrusion of the coccyx. This anatomical alteration increases the coccyx's exposure to intrapelvic pressure from prolonged sitting or trauma, potentially causing partial dislocation (2).

Clinically, coccydynia is characterized by axial coccygeal pain that intensifies with pressure. Prolonged sitting typically aggravates the pain, making it a particular concern for wheelchair users (5, 6). Diagnosis involves a thorough medical history and physical assessment, including palpation to detect coccygeal pain and hypermobility. Rectal examination may also reveal tenderness, and radiological examinations, such as dynamic X-rays and lateral sacral radiographs, are instrumental in diagnosing by assessing the coccyx's shape and movement (7). The classic symptoms include pain and tenderness in the coccyx, lower sacrum, adjacent soft tissues, or muscles. This discomfort escalates during sitting, standing from a seated position, sexual intercourse, defecation, and, in women, during menstruation (8).

In advanced stages, the pain persists during walking or standing for prolonged periods and may even affect rest and sleep (9). To mitigate this, wheelchair users are advised to use donut-shaped cushions, minimizing pressure on the tailbone and preventing contact with the seat, thereby reducing the risk of pressure-related injuries (10). Prolonged sitting is known to cause muscle fatigue, incorrect posture, and increased stress on anatomical structures (11). For wheelchair users, the continuous pressure on weight-bearing areas without relief is a common issue (12). Seat cushions in wheelchairs play a vital role by distributing pressure evenly, preventing tissue deformation, and thus reducing discomfort (13).

For symptom alleviation, various therapeutic options are available, including traditional, pharmaceutical, and surgical treatments. U-shaped cushions are often recommended for coccydynia patients (14). In cases where non-surgical options are ineffective, coccygectomy may be considered (15, 16). This study aims to ascertain the prevalence of coccydynia among wheelchair users due to prolonged sitting, to understand the distribution and magnitude of the condition in this population, identify risk factors, and provide essential data for the planning, implementation, and evaluation of services for prevention, control, and treatment of coccydynia.

MATERIAL AND METHODS

This cross-sectional study employed a convenience sampling approach to collect data from wheelchair users in various settings, including private and government special education institutes, hospitals, rehabilitation centers, and private residences within the South Punjab region. The research spanned over a period of 5-6 months, during which data collection and analysis were conducted. The sample comprised 250 participants, adhering to a specific inclusion criteria: individuals aged between 15 and 60 years, of both genders, who had been using a wheelchair for at least one year. The exclusion criteria were carefully set to omit participants with spinal cord injury, spina bifida, a history of coccyx bone fracture, sensory loss, psychological issues, and postpartum females.

Ethical approval for this study was granted by the Kings College of Health Sciences Bahawalpur, affiliated with the Government College University Faisalabad. A self-structured questionnaire, along with the Numeric Pain Rating Scale (NPRS) and the Visual Analog Scale (VAS), were the primary tools used for data collection. Prior to participating, all subjects provided signed consent forms, and the questionnaires were then completed by the wheelchair users themselves.

The Numeric Pain Rating Scale (NPRS) and Visual Analog Scale (VAS) served as the key data measurement tools. These instruments were instrumental in assessing the intensity and subjective experience of coccyx pain among participants. To ensure the integrity and validity of the data collected, all statistical analyses were conducted using the Standard Package for the Social Sciences (SPSS) version 25. The data was presented in terms of frequencies and percentages, providing a comprehensive overview of the findings. Cross-tabulation and the Chi-square test were employed to explore the association between the duration of sitting hours and the tenderness of the coccyx.

Ethical considerations were of paramount importance throughout the study. In addition to obtaining signed consent from participants, measures were taken to ensure no harm was caused to the population under study. The dignity of the participants was respected, with honest communication being a cornerstone of the interaction. Misleading information was strictly avoided, and the confidentiality of the participants was meticulously maintained. This ethical rigor underscored the entire research process, ensuring that the study adhered to the highest standards of research ethics and integrity.

RESULTS

The data presented across three tables reveals significant insights into the relationship between wheelchair usage and coccydynia symptoms among wheelchair users, as well as the characteristics of wheelchair use and the demographics and clinical profiles of the users.

In Table 1, a strong association is noted between the hours of wheelchair use per day and the occurrence of tenderness in the tailbone. Users reporting 5-8 hours of wheelchair use per day experienced a high prevalence of tailbone tenderness, with 86.9% of the 122 individuals in this group reporting symptoms, contrasting markedly with those using a wheelchair for less than 5 hours, where only 40.3% of the 72 individuals reported tenderness. The group using wheelchairs for more than 8 hours a day also showed

a significant incidence of tenderness, with 82.1% of 56 individuals affected. The total population studied consisted of 250 individuals, with 72.4% reporting tenderness of the tailbone, underscoring the potential impact of prolonged wheelchair use on tailbone discomfort, substantiated by a p-value of less than 0.001, indicating a statistically significant association.

Table 2 delves into the specifics of wheelchair use and the symptoms of coccydynia. It was found that a majority of the participants, 64.4%, used manual wheelchairs, while 35.6% used automated ones. Despite the availability of cushions, which can potentially alleviate discomfort, a vast majority (85.2%) of users did not use one. Tailbone pain was prevalent among participants, with 76% reporting pain and 72.4% experiencing tenderness on the tailbone. The nature of the pain reported was predominantly ache or dull (89.6%), with other types of pain like shooting, stabbing, burning, and others being less common. A significant portion of participants, 85.2%, reported experiencing chronic tailbone pain lasting more than 3 months. Furthermore, symptoms such as pain worsening after prolonged sitting, pain during standing up from sitting, and pain increase when leaning backward or forward were reported by a high percentage of participants, indicating the widespread impact of coccydynia on daily activities.

Table 1 Association Between Wheelchair Usage Hours and Tenderness of Tailbone

Hours of Wheelchair Use per Day	No Tenderness (Count, %)	Tenderness (Count, %)	Total (Count, %)	P Value
5-8 hours	16 (13.1%)	106 (86.9%)	122 (100%)	< 0.001
Less than 5 hours	43 (59.7%)	29 (40.3%)	72 (100%)	
More than 8 hours	10 (17.9%)	46 (82.1%)	56 (100%)	
Total	69 (27.6%)	181 (72.4%)	250 (100%)	

Table 2 Characteristics of Wheelchair Use and Coccydynia Symptoms

Question	Response (Count, %)
Type of Wheelchair Used	
Manual Wheelchair	161 (64.4%)
Automated Wheelchair	89 (35.6%)
Use of Cushion for Wheelchair	
Yes	37 (14.8%)
No	213 (85.2%)
Presence of Tailbone Pain	
Yes	190 (76%)
No	60 (24%)
Tenderness on Tailbone	
Yes	181 (72.4%)
No	69 (27.6%)
Type of Pain Perceived	
Ache/Dull	224 (89.6%)
Shooting	2 (0.8%)
Stabbing	3 (1.2%)
Burning	8 (3.2%)
Others	13 (5.2%)
Duration of Tailbone Pain	
Less than 3 months (Acute)	37 (14.8%)
More than 3 months (Chronic)	213 (85.2%)
Pain Worsening After Prolonged Sitting	
Yes	227 (90.8%)
No	23 (9.2%)
Pain During Standing Up from Sitting	
Yes	192 (76.8%)

Question	Response (Count, %)
No	58 (23.2%)
Pain Increase When Leaning Backward	
Yes	205 (82%)
No	45 (18%)
Pain Increase When Leaning Forward	
Yes	216 (86.4%)
No	34 (13.6%)

Table 3 Demographics and Clinical Profile of Wheelchair Users

Question	Response (Count, %)
Age Group	
15-35	88 (35.2%)
36-45	132 (52.8%)
46-60	32 (12%)
Gender	
Male	91 (36.4%)
Female	159 (63.6%)
Condition Leading to Wheelchair Use	
Cerebral Palsy	24 (9.6%)
Stroke	17 (6.8%)
Amputation	28 (11.2%)
Muscular Dystrophy	85 (34%)
Polio	94 (37.6%)
Others	2 (0.8%)
Muscle Condition	
Paralysis	19 (7.6%)
Paresis	231 (92.4%)
Pattern of Muscle Weakness	
Flaccidity	3 (1.2%)
Spasticity	24 (9.6%)
Atrophy	188 (75.2%)
Normal	35 (14%)
Duration of Wheelchair Use	
1-2 years	9 (3.6%)
3-5 years	33 (13.2%)
6-10 years	62 (24.8%)
More than 10 years	146 (58.4%)
Daily Hours of Wheelchair Use	
Less than 5 hours	29 (11.6%)
5-8 hours	122 (48.8%)
More than 8 hours	99 (39.6%)
Wheelchair Recommended by Doctor	
Yes	43 (17.2%)
No	207 (82.8%)

The demographics and clinical profile of wheelchair users, as illustrated in Table 3, show a diverse group with the majority being in the age group of 36-45 years (52.8%). The gender distribution leaned towards female participants, who constituted 63.6% of the study population. Various conditions leading to wheelchair use were reported, including cerebral palsy, stroke, amputation, muscular dystrophy, and polio, with muscular dystrophy and polio being the most common reasons. The majority of participants exhibited

paresis (92.4%) and reported muscle atrophy (75.2%) as the predominant pattern of muscle weakness. Regarding the duration of wheelchair use, a significant portion, 58.4%, had been using a wheelchair for more than 10 years. Daily hours of wheelchair use were highest in the 5-8 hours category, representing 48.8% of participants. Interestingly, the majority of wheelchairs were not recommended by a doctor (82.8%).

This comprehensive analysis underscores the critical associations between wheelchair use duration, coccydynia symptoms, and the significant impact of these factors on the well-being of wheelchair users. The findings highlight the need for further investigation into preventative measures and interventions to mitigate tailbone pain among wheelchair users, emphasizing the importance of ergonomic considerations and possibly the underutilized role of cushions in providing relief.

DISCUSSION

The primary focus of this study was to assess the prevalence of coccydynia among wheelchair users, particularly those who sit for prolonged periods. The findings align with prior research indicating that extended sitting, especially on hard surfaces, is a common cause of coccydynia. The impact of obesity on this condition was notable, as the coccyx tends to protrude posteriorly under excess weight, increasing vulnerability to pain (17). Paradoxically, rapid weight loss can also lead to coccydynia due to a decrease in cushioning around the tailbone. The discomfort typically correlates with extended sitting and is exacerbated by poor posture (17). Our study's results indicate a higher prevalence of coccydynia in females, a finding consistent with previous studies suggesting women are up to five times more likely than men to suffer from this condition, possibly due to greater ligament laxity in women (18). The study also revealed that activities putting repetitive strain on the tailbone, like prolonged sitting on hard surfaces or activities that exert pressure on the coccyx, can increase the risk of developing coccydynia. This is in line with earlier findings highlighting issues such as pain from extended sitting, discomfort during transitions from sitting to standing, and symptom alleviation upon relieving pressure by standing or walking (19).

A significant observation from the current study was that most wheelchair users sat for over 8 hours daily, adversely affecting their physiological health. This observation corroborates with prior research defining prolonged sitting as continuous sitting lasting more than 30 minutes. Notably, most participants in this study did not use a cushion while sitting in a wheelchair for extended periods. However, earlier research emphasizes the importance of using a cushion to minimize pressure on the tailbone and reduce the risk of developing pressure-related injuries (10).

Furthermore, the study also considered the emotional impact of wheelchair design, recognizing that the needs and feelings of both primary (users) and secondary users (parents or caregivers responsible for maintenance and handling) are important. This holistic approach underlines the necessity of considering comfort, ease of use, and emotional well-being in wheelchair design (20). Seat cushion shape was found to significantly influence pressure distribution, and the sitting posture directly affected the point of peak pressure on the seat pan (21).

In conclusion, the study affirmed the prevalence of coccydynia among wheelchair users, primarily attributed to prolonged sitting. It highlighted critical risk factors such as extended sitting duration, gender (particularly female), and sitting on hard surfaces. The study underscores the importance of educating wheelchair users about these risk factors. Modifications in sitting surfaces, reduction in sitting duration, frequent position changes, and the use of cushions are recommended to alleviate symptoms.

While the study provides valuable insights, it is not without limitations. The convenience sampling method and focus on a specific geographical region may limit the generalizability of the findings. Furthermore, the self-reported nature of the data might introduce bias. Future research could benefit from a more diverse sample and objective measures of coccydynia symptoms. Additionally, exploring the impact of different types of wheelchairs and cushion materials could offer more comprehensive recommendations for reducing coccydynia in wheelchair users.

CONCLUSION

In conclusion, this study underscores the significant prevalence of coccydynia among wheelchair users, primarily due to prolonged sitting. It highlights critical factors such as the duration of sitting, gender susceptibility, and the hardness of the sitting surface. These findings have important implications for the design of wheelchairs and the lifestyle of wheelchair users. Educating users about the risk factors, encouraging regular position changes, shortening sitting durations, and using specialized cushions can play a crucial role in alleviating symptoms. This study not only contributes to a deeper understanding of coccydynia in wheelchair users but also underscores the need for ergonomic designs and user-focused interventions in wheelchair manufacturing and usage guidelines.

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