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IMPACT OF COCCYDYNIA ON ACTIVITIES OF DAILY LIVING (ADLs) IN OBESE INDIVIDUALS

Saniya Saher[1], Sidra Tul Muntaha[1], Shay Kaheer[1], Shazia Kiran[2], Adeel Kamal[2], Saba Memon[1*]

Pakistan Institute of Rehabilitation and Medical Sciences, Karachi, Pakistan[1]
Rabia Moon Memorial Institute of Neuroscience Trust, Karachi, Pakistan [2]

Abstract: Coccydynia is a painful condition characterized by significant discomfort in the coccyx region of the spine. Activities of daily living (ADLs) such as standing, sitting, walking and engaging in social activities are affected. The current study evaluated the impact of coccydynia on ADLs in obese individuals. Besides, this the relationship between body mass index (BMI), functional impairments, and demographic predictors influencing severity was also assessed. A cross-sectional study was conducted in 2024 at the Rabia Moon Memorial Institute of Neurosciences, Karachi. A total of 110 obese individuals aged 18 years or older, clinically diagnosed with coccydynia were included. The Visual Analog Scale (VAS) and the Oswestry Low Back Pain Disability Index (ODI) were used for data collection. Statistical analysis was performed using SPSS version 23, applying Chi-square and ANOVA tests. A total of 58.2% of participants were females and 41.8% males, and severe disability in both cases was 50.2%. Among ADLs social life (66.4%) was affected followed by standing (42%), traveling (32.7%) and sitting (30%) which demonstrates the wide ranging effects of coccydynia. Statistical analysis showed significant associations between BMI, demographic factors and ADL impairments ($p < 0.05$). ANOVA identified BMI as a key factor influencing disability, with a mean BMI value of 32.82 kg/m². Coccydynia significantly impacts obese individuals, particularly middle-aged females. Social life, standing, and traveling are the most affected activities of daily living, with pain severity strongly correlated to ADL. In low-income countries, management should be focused on affordable approaches such as community-based physiotherapy, ergonomic adaptations and weight management programs that promote physical activity to reduce disability and enhance quality of life.

Key words: Coccydynia, Activities of daily living, Visual Analog Scale, Oswestry Low Back Pain Disability Index

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INTRODUCTION

Coccydynia is derived from the Greek words "coccyx" (tailbone) and "dynia" (pain) refers to localized pain at the bottom of the tailbone region (Lirette *et al*., 2014) (1). It is a relatively rare but debilitating musculoskeletal condition often aggravated by prolonged sitting or sudden movement (Turgut and Toy, 2021) (2). The coccyx, a small bone at the base of the spine, has six types, with types III and IV commonly linked to coccydynia due to its position, which makes it vulnerable to strain from activities like sitting, cycling, standing, urination, sleep, sexual activity and trauma (Garg and Ahuja, 2021; Elezović *et al*.,2023) (3,4). Other factors that also cause coccydynia include coccygeal hypermobility, discogenic pain, tuberculous spondylitis and neoplasms (Kodumuri *et al*.,2018; Baziaa *et al*.,2025; Blanco-Diaz *et al*., 2025). It was more common in women and individuals who are overweight and sit for prolonged periods (7-8 hours per day)(Elezović *et al*.,2023). Women's anatomical differences and childbearing make them five times more susceptible to coccydynia (Turgut and Toy, 2021) and 86.7% may develop coccydynia after giving birth (Anersen *et al*.,2022; Shah *et al*., 2023) 8,9). In women, coccydynia pain may worsen during menstruation due to pelvic muscle strain. Severe cases can also involve numbness, leg weakness, impaired bladder control, fatigue, depression and sleep disturbances (Shah *et al*., 2023; Suresh *et al*., 2022; Bonder *et al*., 2017). Coccydynia is not common in children, but in some reported cases trauma is the key factor (Blanco-Diaz *et al*., 2025).

The global prevalence of coccydynia remains uncertain, although it is estimated that approximately 1-3% of individuals with back pain are affected by coccydynia (WHO, 2021). Obesity is a major public health concern and the main risk factor for coccydynia, as excess body weight exerts more pressure on the spine which affects sitting posture (Elezović *et al*.,2023) (4). A Body Mass Index (BMI) value ≥30 kg/m2 is considered obese (WHO, 2021) and its elevated level is a critical factor that can exert mechanical stress on the coccyx bone. This alteration of biomechanics and increased pressure on the coccyx causes difficulty for obese individuals to perform ADLs (Garg and Ahuja, 2021). Asian countries have a higher prevalence of coccydynia due to a greater number of obese individuals,

inadequate health care systems and limited awareness (Tham *et al*., 2023).

Coccydynia in obese individuals hampers mobility, sitting tolerance and overall daily functioning, making comprehensive management essential. Physiotherapy exercises such as posture training and pelvic floor are effective in managing coccydynia by relieving pain, improving posture, and enhancing mobility (Andersen *et a*l.,2022; Garg and Ahuja, 2021).

MATERIALS AND METHODS

Study population

A cross-sectional study was conducted at the Rabia Moon Memorial Institute of Neurosciences Trust, Karachi, Pakistan, from January to December 2024. Data were collected from voluntary participants using questionnaires based on the last three-month history of coccydynia BMI and having age above 18 years, with no history of trauma, spinal malignancy, congenital spinal deformities, spinal inflammatory diseases or vertebral fractures.

The sample size was calculated as 385 using OpenEpi version 3; however, only 110 eligible obese patients (BMI ≥30 kg/m²) were recruited through consecutive sampling from March to August 2024 after providing informed consent. Coccydynia was clinically diagnosed by a neurologist based on localized coccygeal pain, pain aggravated by sitting, and tenderness on palpation..

Ethical approval

The study was exempted from full review by the institute's Ethics Review Committee (ERC number: PGC-ERC/2024-03/03). The committee waived the requirement for informed consent.

Data Collection

Pain severity was measured using the Visual Analogue Scale (VAS). Participants rated their pain on a scale from 0 (no pain) to 10 (worst pain imaginable) (Delgado et al., 2018). Pain was categorized as mild (1–3), moderate (4–7) or severe (8–10). Functional disability was assessed using the modified Oswestry Low Back Pain Disability Questionnaire (Fritz and Irrgang, 2001), which consists of 10 sections each assessing a specific aspect of daily life, such as pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, and traveling. Disability was classified as minimal, moderate or severe using the following score ranges. The ODI was developed for low back pain and was not specifically developed or validated for coccydynia; it was used here because it assesses functional limitations in daily activities that are also commonly affected by coccydynia. ODI scores were interpreted as overall functional disability in patients with coccydynia, not as disability attributable solely to coccydynia. Demographic data, clinical history and ADL impairments were collected through structured interviews

Statistical Analysis

Data analysis was carried out using SPSS version 23. Descriptive statistics summarize demographic and clinical data. Interferential statistics including chi-square test and ANOVA were applied to evaluate the association between coccydynia, obesity and its impact on daily activities. A p-value of <0.05 was considered statistically significant.

RESULTS

During the six-month study period, 379 obese individuals (BMI ≥30 kg/m²) were screened; 110 (29.0%) were clinically diagnosed with coccydynia and included in the analysis. Of these, 58.2% were female and 41.8% male (female-to-male ratio 1.39:1) (Figure 1). Most participants (69.1%) were aged 36–50 years and 1.8% were aged over 66 years (Table 1).

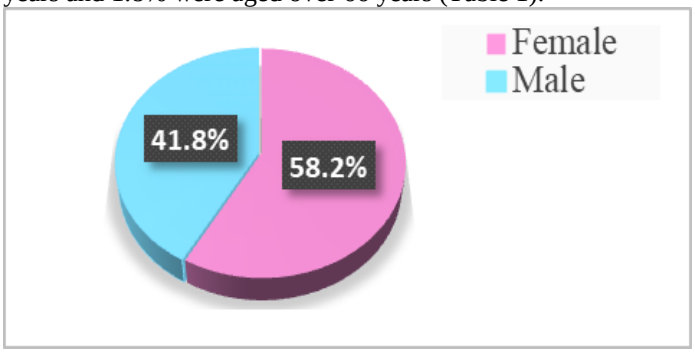


Figure 1: Occurrence of coccydynia in the obese population

Table 1: Age and Gender Wise distribution

	Variable (n=110)	Frequency (%)	Ratio
Female 58.2	20 – 35	8.2	1.39
	36 – 50	38.2	
	51 – 65	8.2	
	>66	0.9	
Male 41.8	20 – 35	4.5	
	36 – 50	30.9	
	51 – 65	8.2	
	>66	1.8	

BMI ranged from 30.01 to 39.1 kg/m², with a mean of 32.82 kg/m² (SD = 2.28). Based on the Oswestry Disability Index, 55 participants (50.0%) were classified as experiencing severe disability, 32 (29.1%) had moderate disability, and 23 (20.9%) had minimal disability. Most participants (80%) reported moderate pain on the VAS, while 10% reported mild and 10% severe pain. The most commonly affected ADLs were social life (66.4%), standing (42%), travelling (32.7%), sitting (30.0%), and personal care (29%) (Table 3).

Table 2: Association between demographic factors and disabilities

Variables (n=110)	Chi Square X^2 p-value	ANOVA F p-value
Age	7.793	0.856
	0.020	**0.357**
BMI	81.991	7.980
	0.001	**0.006**
Occupation	16.14	0.513
	0.013	**0.476**

Chi-square analysis showed statistically significant associations of ODI category with age (χ^2 = 7.793, p = 0.020), BMI (χ^2 = 81.991, p = 0.001) and occupation (χ^2 = 16.14, p = 0.013). In ANOVA, only BMI showed a significant effect on disability score (F = 7.980, p = 0.006), whereas age (F = 0.856, p = 0.357) and occupation (F = 0.513, p = 0.476) did not (Table 2). Pain severity (VAS) was significantly associated with impairment in all eight ADL domains (all p < 0.001). Age was significantly associated with limitations in social life (p = 0.001), travelling (p = 0.045), standing (p < 0.001) and personal care (p = 0.007). Occupation was significantly associated only with standing (p = 0.045). No other associations were statistically significant (Table 3).

Table 3: Clinical characteristics vs. ADLs

Clinical characteristic	Walking (x2) P-valve	Lifting (x2) P-valve	Sitting (x2) P-valve	Social life (x2) P-valve	Sleeping (x2) P-valve	Traveling (x2) P-valve	Standing (x2) P-valve	Personal care (x2) P-valve
				Age				
Young Adult	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)	14/110 (12.7)
Middle Adult	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)	76/110 (69.1)
Older Adult	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)	18/110 (16.4)
Elderly	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)
X2	18.330[a]	17.830[a]	12.829[a]	37.787[a]	16.907[a]	25.407[a]	46.715[a]	31.536[a]
P-value	.246	.272	.615	**< 0.001**	.324	**.045**	**.000**	.007
				Occupation				
Labor	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)	13/110 (11.8)
Housewife	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)	36/110 (32.7)
Office worker	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)	59/110 (53.6)
Retired	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)	2/110 (1.8)
X2	18.106[a]	9.534[a]	12.991[a]	12.156[a]	21.653[a]	11.380[a]	25.355[a]	11.880[a]
P-value	**.257**	**.848**	**.603**	**.667**	**.117**	**.725**	**.045**	**.688**
				Pain				
Mild	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)
Moderate	88/110 (80)	88/110 (80)	88/110 (80)	88/110 (80)	88/110 (80)	88/110 (80)	88/110 (80)	88/110 (80)
Severe	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)	11/110 (10)
X2	68.841[a]	79.946[a]	52.294[a]	47.253[a]	32.780[a]	46.207[a]	14.149[a]	69.809[a]
P-value	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**

Mild (1-3), Moderate (4-7), Severe (8-10) and Young Adult (20 - 35), Middle age Adult (36- 50), Older Adult (51 - 65) and Elderly >66 year

DISCUSSION

This cross-sectional study of 110 obese patients with coccydynia found considerable functional disability: half of the participants had severe disability on the ODI, and social life, standing, travelling and sitting were the most frequently affected activities. Higher BMI, within this obese sample, was associated with greater disability. Because of the cross-sectional design and the lack of a non-obese comparison group, these findings describe associations and cannot show that obesity causes disability or coccydynia.The coccyx or tailbone is located at the bottom of the human's spine and its main purpose is to maintain the posture, support body weight and sitting (Kara *et al*., 2023). The current study showed that coccydynia is most commonly found in individuals with a mean age of 43 years which aligns with reported mean age of 38.3 years and 64.2% prevalence in middle-aged populations (Izci and Keskin, 2023). This prevalence due to age-related degenerative changes in spine, lifestyle factors and trauma. However, it is important to note that coccydynia can also affect a wider age range, including adolescents and younger adults. Females are five times more affected than men due to anatomical differences and childbirth (Garg and Ahuja, 2021). In the current study, 58.2% females were consistent and similar findings were reported, highlighting a strong association between females and coccydynia. The relationship between obesity and coccydynia is well established and our findings also confirm that a BMI ≥30 kg/m is significantly associated with coccydynia leading to restrictions in daily activities. Previous research has also shown that obesity as a key factor in both traumatic and non-traumatic coccydynia with BMIs over 27.4 for females and 29.4 for males (Maigne *et al*., 2000). Our study found that occupational factors further influence the incidence and severity of symptoms. Prolonged sitting has been linked to musculoskeletal dysfunction. A study involving healthcare professionals in Karachi found that 79% experienced coccydynia due to repetitive movement and extended sitting hours (Bonder, *et al.*, 2017). Consistently, occupations requiring more than 10 hours of daily sitting have been associated with degeneration in the lumbosacral and coccygeal areas, resulting in significant pain and functional limitations (Kallings *et al*., 2021).Previous research indicated that over 50% of individuals working in sedentary roles reported muscle function impairment, particularly involving the lumbosacral and coccygeal regions (23). Pain intensity, as measured by the Visual Analog Scale, demonstrated a significant correlation with functional disability across various domains of daily life. The Oswestry Disability Index results revealed that 50% of individuals experienced severe disability with the most affected areas being social participation, standing, traveling and sitting. Chi-square analysis confirmed significant associations between age, BMI, occupation and disability severity while ANOVA showed BMI as the most statistically significant factor influencing functional impairment. Impairments in specific activities such as personal care, traveling and social engagement were strongly linked to BMI and pain levels. Although some occupational roles were correlated with limited mobility the main cause of functional restriction is obesity rather than the nature of the job itself.

Limitations

This was a single-center, cross-sectional study with a sample (n = 110) smaller than the calculated requirement (n = 385) because of the limited number of eligible patients during the six-month recruitment period and subgroup analyses (for example, the elderly and retired groups) were based on very small numbers. There was no non-obese comparison group, and consecutive sampling at one institute may limit generalizability and introduce selection bias. The ODI was developed for low back pain and has not been specifically validated for coccydynia, and ODI scores reflect overall disability. Pain duration and other clinical factors that could confound the results were not analyzed.

CONCLUSIONS

Coccydynia significantly impacts obese individuals particularly middle-aged with BMI playing a crucial role in pain intensity and disability. Social life, standing, and traveling are the most affected activities of daily living with pain severity strongly correlating to ADL's limitations. In low-income countries management should focus on affordable approaches such as community-based physiotherapy, ergonomic adaptations using locally available resources, and weight management programs that promote education, dietary changes, and physical activity to reduce disability and enhance the quality of life.

Ethics statement

The study was approved from Ethics Review Committee, Pakistan Group of Colleges (ERC number: PGC-ERC/2024-03/03). The study was conducted in compliance with the ethical policies of the journal, as noted on the journal's author guidelines page.

Conflict of interest

None for any of the authors

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Corresponding author
Dr. Saba Memon*
Pakistan Institute of Rehabilitation and Medical Sciences, Karachi, Pakistan
E.mail: sabamemon19@yahoo.com