

Prevalence, Contributing Factors, and Ergonomic Risk Assessment of Coccydynia in IT Professionals

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ABSTRACT

Introduction: Coccydynia, defined as pain or discomfort in the coccyx (tailbone) region, is a common condition that significantly affects quality of life and functional ability. Individuals engaged in prolonged sitting, particularly IT workers with suboptimal ergonomic setups, are at higher risk, yet few studies have focused on this population.

Aim and Objectives: This study aimed to determine the prevalence of coccydynia among IT employees and identify occupational and demographic risk factors. The first objective was to assess prevalence using the Oswestry Disability Index (ODI). The second objective was to examine its impact on work performance, identify ergonomic risk factors, and explore associations between demographic variables and coccydynia development.

Methodology: A cross-sectional observational study was conducted on 200 IT and government employees aged 35–55 years in Gandhinagar, Gujarat, using convenience sampling. Data were collected via structured questionnaires, ODI, Numerical Pain Rating Scale (NPRS), and ergonomic assessments. Inclusion criteria included ≥ 1 year of employment, ≥ 6 hours of daily sitting, and ≥ 3 months of tailbone pain. Data analysis was performed with SPSS 28.0, including descriptive statistics, chi-

square tests, logistic regression, and correlation analysis.

Results: Coccydynia prevalence was 71.0% (95% CI: 64.2–77.8). Mean ODI score was 35.2 ± 16.8 , indicating moderate disability. Prevalence was higher in females (75.9%) than males (65.9%) and peaked in the 45–50 age group (75.6%). Prolonged sitting (>6 hours/day, OR = 6.207, $p < 0.001$) and poor ergonomics (OR = 3.435) were significant risk factors. Work productivity was affected in 91.6%, with 62.7% reporting absenteeism. Pain intensity and disability were strongly correlated ($r = 0.742$, $p < 0.001$).

Conclusion: Coccydynia is a serious occupational health concern in IT employees. Long sitting hours and poor ergonomics are key modifiable risk factors. The condition significantly affects function and productivity, highlighting the need for workplace ergonomic interventions and health policies.

Keywords: Coccydynia, IT Employees, Occupational Health, Prevalence, Oswestry Disability Index, Ergonomics, Tailbone Pain, Workplace Health, Musculoskeletal Disorders

INTRODUCTION

Coccydynia, also known as coccygodynia or tailbone pain, is a condition characterized by pain and discomfort around the coccyx, typically exacerbated during sitting or

transitioning from sitting to standing.^{1,2} While many cases resolve within weeks to months, a significant proportion progresses to chronic pain, severely affecting quality of life and complicating clinical management.^{3,4} Pain may radiate to the lumbar, gluteal, or posterior thigh regions and is aggravated by hip flexion activities such as defecation or prolonged sitting.^{5,6} Office and IT workers, who spend extended periods seated on hard surfaces, are particularly at risk.^{7,8} Chronic cases often develop compensatory postural adaptations, which may contribute to secondary musculoskeletal imbalances.⁹

Coccydynia diagnosis is primarily clinical, based on patient history and physical examination. Point tenderness over the coccyx, often evaluated via rectal palpation, allows assessment of coccygeal mobility and detection of hyper- or hypomobility.^{3,10} Imaging studies, such as lateral radiographs in standing and seated positions, may identify abnormal motion or fractures.¹¹ MRI is indicated when inflammatory, infectious, or neoplastic causes are suspected.⁴

The condition has been documented since the 16th century. Simpson first coined the term “coccydynia” in 1859, describing inflammation, tenderness, and impaired ability to sit or rise comfortably.¹² Coccygectomy was historically common but yielded inconsistent outcomes. Modern management emphasizes conservative measures, with surgery reserved for refractory cases.¹³

Anatomically, the coccyx is the distal vertebral segment, typically consisting of 3–5 fused segments forming a triangular bone.¹ It articulates with the sacrum at the sacrococcygeal joint and serves as an attachment for pelvic floor muscles, ligaments, and parts of the gluteus maximus, contributing to postural stability and weight-bearing during sitting.^{2,3} Prolonged sitting or poor posture can lead to microtrauma and inflammation, predisposing individuals to coccydynia.⁴ Coccygeal morphology, classified by Postacchini and Massobrio into

four types (I–IV), influences predisposition to pain.⁵ Types II–IV, which involve pronounced curvature or subluxation, are more frequently associated with coccydynia.⁶ Morphological differences affect the distribution of mechanical forces during sitting, potentially triggering or exacerbating pain.⁶

Coccydynia accounts for approximately 1% of primary care back pain cases, with an estimated incidence of 40 per 100,000 annually.⁷ Women are five times more likely to be affected than men, attributed to pelvic anatomy, childbirth trauma, and hormonal changes during pregnancy.^{8,9} Peak incidence occurs between 40–60 years, coinciding with high occupational sitting demands.³ Obesity, rapid weight loss, and prolonged sitting on inadequate surfaces further increase risk.¹⁰

Coccydynia is categorized as post-traumatic, non-traumatic, or idiopathic. Post-traumatic causes include falls, childbirth-related injury, or repetitive microtrauma, accounting for up to 70% of cases.¹¹ Non-traumatic etiologies include degenerative disc changes, sacrococcygeal hyper- or hypomobility, infections, and anatomical variations.⁴ Idiopathic cases are often associated with myofascial dysfunction or psychosomatic factors and require exclusion of structural pathology.¹² Chronic coccydynia may persist due to central sensitization, wherein nociceptive neurons in the central nervous system remain hyperresponsive even after tissue healing.¹³ Psychological factors, including anxiety, depression, and pain catastrophizing, further modulate pain perception and treatment response. This underscores the biopsychosocial nature of chronic coccygeal pain, integrating mechanical, neurological, and psychosocial dimensions.¹³

The research addresses a neglected occupational health issue among IT and government workers who sit for prolonged periods. This study provides evidence-based insights into ergonomic risk factors contributing to coccydynia and offers direction for preventive workplace strategies. Identifying modifiable factors can guide

ergonomic interventions, thereby reducing the burden of occupational musculoskeletal disorders. Furthermore, understanding the economic implications—such as reduced productivity, absenteeism, and healthcare costs—can support policy development and promote organizational commitment to preventive health initiatives.

METHODOLOGY

Study Design

The present study adopted an observational study design to assess the prevalence and associated factors of coccydynia among the target population. This design allowed for data collection without intervention, providing an objective understanding of the natural occurrence and characteristics of the condition.

Sampling Method and Study Setting

A convenient random sampling method was employed to recruit participants. This approach ensured practical feasibility while maintaining some degree of randomization to reduce selection bias. The study was conducted in Gandhinagar, Gujarat, providing a representative sample from an urban Indian population and ensuring participant accessibility and diversity relevant to the study objectives.

Sample Size Calculation

Sample size of approximately 165 participants. To account for non-response and incomplete data, the sample was increased to 200 participants to ensure reliability and representativeness.

Sampling Criteria

Inclusion criteria included participants aged 35–55 years, both male and female, and willingness to participate with informed consent. Exclusion criteria encompassed

individuals with structural deformities, prior trauma or spinal surgery, pregnant women, and participants with neurological conditions affecting spinal function.

Data Collection and Research

Instruments

Prior to data collection, written informed consent was obtained from all participants, and the purpose and procedures of the study were thoroughly explained. Data were collected using a questionnaire-based survey among participants who met eligibility criteria. The primary research instrument was the Modified Oswestry Disability Index (ODI) to assess functional disability. Pain intensity was measured using the Numerical Pain Rating Scale (NPRS). Additional tools included assessment forms, consent forms, and stationery for consistent data recording.

Data Collection Procedure

Participants were systematically screened against the inclusion and exclusion criteria before Enrollment. Data were collected following a structured questionnaire-based survey, ensuring standardization, confidentiality, and accuracy throughout the process. Each participant received a thorough explanation of the study objectives and procedures to promote comprehension and voluntary participation.

RESULT

A total of 200 IT and government employees aged 35–55 years participated in the study. The overall prevalence of coccydynia was 71.0% (95% CI: 64.2–77.8), which is considerably higher than the reported prevalence in the general population. The condition was more prevalent among females (75.9%) than males (65.9%), with the peak prevalence observed in the 45–50 years' age group (75.6%).

Table 1.1 Correlation between Pain Intensity and Disability Scores

Variables	Pearson Correlation (r)	p-value	Interpretation
Pain Intensity vs ODI Score	0.742	<0.001*	Strong positive correlation
Sitting Duration vs ODI Score	0.589	<0.001*	Moderate positive correlation
Years of Employment vs ODI Score	0.412	<0.001*	Moderate positive correlation

Table 1.2 Hypothesis Testing Results

Test Parameter	Value	Reference Value	t-statistic	df	p-value	Decision
Mean ODI Score	35.2%	12.0% (normal population)	17.842	141	<0.001*	Reject Ho
95% CI	32.4 38.0%					

Table 1.3 Predictors of Coccydynia (Logistic Regression)

Predictor Variable	B	SE	Wald	df	p-value	OR	95% CI for OR
Age (years)	0.045	0.023	3.82	1	0.051	1.046	0.999-1.095
Gender (Female)	0.672	0.334	4.05	1	0.044*	1.958	1.018- 3.766
Sitting Duration (>6hrs)	1.826	0.412	19.63	1	<0.001*	6.207	2.767-13.921
Poor Ergonomics	1.234	0.389	10.05	1	0.002*	3.435	1.602- 7.366
Years of Employment	0.089	0.045	3.92	1	0.048*	1.093	1.001- 1.194
Constant	-4.567	1.234	13.67	1	<0.001*	0.010	

Participants reported a mean Oswestry Disability Index (ODI) score of 35.2 ± 16.8 , indicating a moderate level of functional disability. The majority (91.6%) of participants experienced reduced work productivity, while 62.7% reported absenteeism due to coccygeal pain.

Prolonged sitting for more than six hours per day and poor ergonomic setup were identified as significant occupational risk factors. Logistic regression analysis demonstrated that prolonged sitting increased the odds of developing coccydynia by 6.2 times (OR = 6.207, $p < 0.001$), while poor ergonomics increased the odds by 3.4 times (OR = 3.435, $p = 0.002$). Female gender (OR = 1.958, $p = 0.044$) and longer employment duration (OR = 1.093, $p = 0.048$) were also significant predictors.

Correlation analysis revealed a strong positive relationship between pain intensity and ODI scores ($r = 0.742$, $p < 0.001$), and a moderate positive correlation between sitting duration and ODI ($r = 0.589$, $p < 0.001$). These results indicate that greater pain and longer sitting duration are associated with increased disability.

A one-sample t-test comparing the mean ODI with normative values (12%) revealed a statistically significant difference ($t = 17.842$, $p < 0.001$), confirming substantial functional impairment among participants.

DISCUSSION

The prevalence of coccydynia amongst the IT/government workers was found to be extremely high at 71.0% which is much higher than 1-3 percent of the general

population prevalence as indicated in the available literature. This observation is in line with the occupational aspect of the long sitting position and unsatisfactory ergonomic conditions of IT working places, proving that coccydynia is one of the significant occupational diseases that should be addressed as a priority. The reasonable correlation between the extend of sitting time (>6 hours daily) and the coccydynia prevalence (OR = 6.207) illustrates the true nature of the biomechanical theory of its occurrence namely that the micro trauma as a result of constant pressure on then coccyx causes micro trauma and consequent development of the pain. This is comparable to the research of Maigne et al, who showed that the coccygeal pressure was raised when individuals sat in lengthy postures. The association between sitting time and the prevalence of coccydynia, which is located in the dose-response relation, proves the benefits of introducing workplace interventions aimed to promote a change in sedentary behavior. The gender variations found in this study with prevalence better in women (75.9 per cent versus 65.9 per cent) confirm the given evidence in the existing literature as the reason 0behind this variation in sex is the difference in pelvic structure and positioning of the coccyx. This enlarged female pelvis and posterior exposure of coccyx during the sitting posture could be a predisposing factor to increased coccygeal strain as has already been reported in morphological literature by Postacchini and Massobrio. The moderate functional impairment as attested by the mean ODI

scores (35.2 +/- 16.8%) proves the high influence of coccydynia on the daily mechanisms and the occupation process. The high relationship between the scores of pain and disability ($r = 0.742$) confirms the appalling characteristics of this condition, especially considering that 91.6 pct of affected employees registered decrease in productivity and 62.7 pct endured occupational absenteeism. Inadequate ergonomic conditions became one of the major modifiable risk factors ($OR = 3.435$), which emphasizes the role of software in workplaces to prevent coccydynia. Prevalence was associated with the absence of adjustable chairs and appropriate height of the desk, which count as major positive factors to implement effective ergonomic assessment and intervention strategies in IT-related workplaces. The cross-sectional design of the study does not allow establishing causal inferences, but its results have strong corresponding associations, which gives strong arguments in favor of temporal relationships. Convenience sampling methodology can influence generalizability, therefore, there is a need to conduct multi-site validation studies on different populations of individuals in IT sectors and geographic locations. The clinical implications are instant as the findings indicate that screening of coccydynia should be a regular part of the occupational health program in IT workers. Prevention of the modifiable risk factors offers obvious points of evidence-based intervention, such as ergonomic workplace changes, sitting habits training, and preventive physical activities. Longitudinal studies in future should concentrate on causality and randomized control trials on effectiveness assessment of interventions in minimizing incidences related to coccydynia among IT professionals.

limitations of the study: Study limited to specific geographic region (Gandhinagar, Gujarat), Potential unmeasured confounders (BMI, physical activity, mental health), Limited follow-up data for progression tracking

CONCLUSION

This study highlights coccydynia as a significant yet under recognized occupational health issue among IT/government employees, with a high prevalence (71.0%) and substantial functional impact (mean ODI score 35.2%). Strong associations with modifiable factors especially prolonged sitting and poor ergonomic conditions underscore the urgent need for targeted interventions. The robust methodology, validated tools, and consistent statistical evidence support workplace-focused prevention and management strategies. As sedentary work becomes increasingly common, these findings have broad implications for clinical practice, occupational policy, and public health, offering a strong foundation for immediate action and future research.

Declaration by Authors

Ethical Approval: Approved

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