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Review Article

Saree- and dhoti-induced waist dermatoses leading to squamous cell carcinoma: A systematic review

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ABSTRACT

Saree and dhoti, the traditional attires worn by women and men, respectively, in the Indian subcontinent, have deep cultural significance. However, prolonged mechanical irritation from the tightly draped waistband can lead to chronic dermatoses, which, in rare cases, may progress to squamous cell carcinoma (SCC). This systematic review aims to evaluate the association between chronic saree- and dhoti-induced waist dermatoses and SCC by analyzing available case reports and studies. A comprehensive literature search was conducted, identifying 11 case reports and studies detailing the clinical progression, pathophysiology, diagnostic approaches, and management strategies of saree- and dhoti-induced SCC. Findings indicate that persistent frictional trauma at the waist leads to chronic inflammation, hyperkeratosis, and eventual malignant transformation in susceptible individuals. Delayed diagnosis and lack of awareness often contribute to advanced disease presentation. Early recognition of pre-malignant changes, along with appropriate histopathological evaluation, plays a crucial role in timely intervention. Surgical excision remains the primary treatment modality, with adjuvant therapies considered in advanced cases. Chronic mechanical irritation from saree waistbands poses a potential risk for SCC development. Increased awareness among healthcare providers and at-risk populations is essential for early detection and prevention. Adoption of preventive measures, including lifestyle modifications and periodic dermatological assessments, may help reduce the burden of saree- and dhoti-induced SCC.

Keywords: Dhoti cancer, Saree cancer, Skin cancer, Squamous cell carcinoma, Waistline cancer

INTRODUCTION

Waistline cancer is a rare form of cutaneous squamous cell carcinoma (cSCC) that develops around the waist, primarily affecting Indian men and women who wear traditional cotton clothing to cover their lower bodies.[1] In men, this attire is known as a dhoti, while in women, it is a saree. While this attire is an integral part of Indian culture, these garments are secured at the waist using a tightly tied cotton cord or drawstring, which has been identified as a potential risk factor for chronic mechanical irritation leading to malignancy.

The saree consists of a long piece of fabric draped around the body and fastened at the waist, while the dhoti is wrapped firmly around the waist with one end tucked at the back and passed under the groin. In 1945, the first cases of saree and dhoti cancers were documented in India as waistline cSCCs occurring along friction lines matching the placement of drawstrings.[1] These malignancies arise due to chronic pressure and irritation at the waistline, where the fabric exerts continuous friction, leading to dermatoses that may progress to squamous cell carcinoma (SCC).[2]

Skin cancer accounts for <1% of all malignancies in India,[3] with basal cell carcinoma being the most common type, followed by SCC.[4] While the exact mechanism behind the malignant transformation remains unclear, chronic trauma, repeated friction, and impaired healing are suspected contributors.[2] Indian women who wear sarees frequently get slight scaling and pigmentation around their waists, which they disregard since they think that it is normal. However, these early skin changes can progress to ulcerative lesions indicative of SCC. When lesions exceed 2 cm in diameter, they pose a higher risk of local recurrence, metastasis, and disfigurement.[5] Rare types of cSCC known as "saree cancers" and "dhoti cancers" get their names from the fact that they typically appear around the waists of people wearing traditional South Asian attire, such as sarees and dhotis, which have a tight cotton cord drawstring around the waist.[1] When lesions exceed 2 cm in diameter, they pose a higher risk of local recurrence, metastasis, and disfigurement.[5] In addition, malignancy in scar tissues, as seen in Marjolin's ulcers, occurs in 0.1–2.5% of cases.[6]

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This systematic review aims to analyze published case reports and clinical studies that investigate the association between saree and dhoti wear, waist dermatoses, and the development of SCC. By examining these articles, we explore the clinical features, underlying pathophysiology, diagnostic approaches, therapeutic strategies, and patient outcomes.

MATERIALS AND METHODS

This systematic review follows the "Integrated Methodology" procedure described in "The Joanna Briggs Institute Reviewers' Manual" from 2015.[7] Using a mixed method approach, it synthesizes study results from both quantitative and qualitative approaches while making reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement.[8] A PRISMA checklist was used to assess adherence to standard operating procedures for systematic reviews. A meta-analysis was not conducted due to the heterogeneity of the included data.

This systematic review was conducted to evaluate the current understanding of saree and dhoti-related waistline SCC, assess the association between chronic mechanical irritation and malignant transformation, and explore diagnostic approaches, treatment strategies, and preventive measures. The methodology followed the PRISMA guidelines to ensure rigorous and transparent reporting.

Search strategy

A thorough literature search was conducted across several electronic databases, such as DOAJ, Google Scholar, and PubMed.

The PRISMA rules were adopted based on the abbreviation PICO.[9] The PICO components of a research question–patient/population, intervention/exposure, comparator, and outcomes–were predetermined by the study team.[10] Saree/dhoti wearers with waist dermatoses are referred to as the population in this literature search; chronic friction/trauma from saree or dhoti drawstrings is the intervention/exposure; individuals without such mechanical irritation are the comparator; and the development of SCC, clinical features, diagnostic findings, and treatment are the outcomes of this review.

The search terms included "saree cancer," "sari cancer," "petticoat cancer," "petticoat-induced cancer," "sari-induced cancer," "saree-induced cancer," "waistline cancer," "dhoti cancer," and "dhoti-induced cancer." The search results were refined using Boolean operators (AND, OR). In addition, the references of the selected papers were searched for relevant and related articles. However, the search yielded no other results.

Eligibility criteria

Inclusion criteria

Studies were included if they met the following criteria: (1) Publications from the past 10 years (2015–2024); (2) carried out in India; (3) centered on waistline dermatoses associated with sarees or dhotis and how they progress to SCC; (4) included case reports, case series, observational studies, and clinical studies with primary data; (5) targeted populations with waistline dermatoses or SCC who wore sarees or dhotis; (6) published in English; and (7) studies indexed in PubMed, Google Scholar, and DOAJ databases.

Exclusion criteria

Studies were excluded if they: (1) Did not contain search terms listed in the inclusion criteria in their title or abstract; (2) were either abstract-only or full-text unavailable; (3) only examined other types of cutaneous cancers without looking at waistline SCC related to sarees or dhotis; (4) lacked empirical data; (5) were editorials, commentaries, or opinion pieces; or (6) did not specifically address the relationship between the development of SCC and chronic mechanical irritation from sarees or dhotis.

Data extraction

Titles and abstracts were screened for eligibility by two separate reviewers. The selected search results were exported from the databases and arranged using the Zotero citation manager program.[11] Duplicates were removed from the software. After that, the full texts of studies that might be pertinent were evaluated in light of the inclusion criteria. A standardized form was used to extract the data, capturing important details. Based on the Moher model, the screening and exclusion procedure is depicted in the PRISMA flow diagram [Figure 1].[8,12]

Quality assessment

The quality of the included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklist for case reports. This tool evaluates key aspects such as the clarity of patient demographics, clinical history, diagnostic methods, intervention details, follow-up outcomes, and the overall reliability of the findings. Discrepancies in assessment were resolved through discussion among reviewers.

Data synthesis

The extracted data from the chosen publications were systematically tabulated in accordance with the guidance provided by the JBI. The pertinent data were separately extracted by two researchers to guarantee correctness,

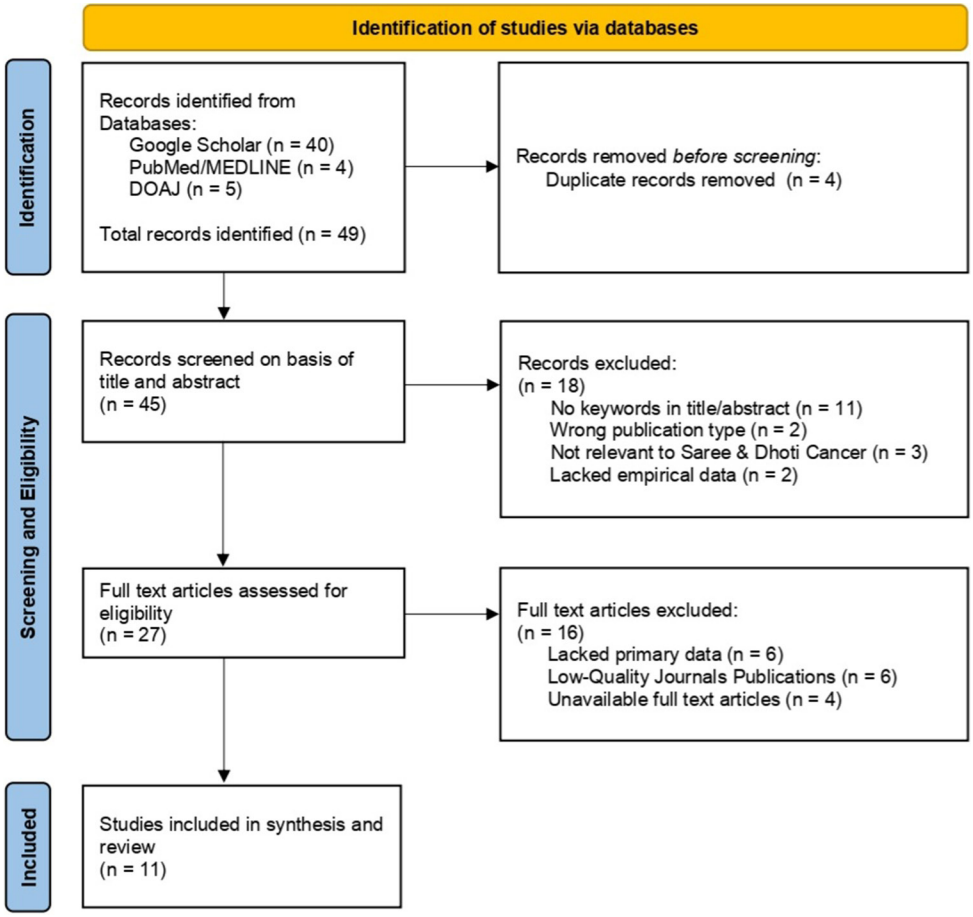

Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart.

and any disagreements were settled by discussion. For consistency and completeness, the reviewers double-checked the tabulated data. The clinical presentation, diagnostic methods, and treatment outcomes of waistline SCC related to sarees and dhotis were the main topics of a narrative synthesis that was carried out to describe the main findings. The prevalence, risk factors, and therapeutic approaches described in the included studies were summarized using quantitative data, when appropriate.

RESULTS

For this systematic review, 11 case reports and studies detailing saree-induced and dhoti-induced SCC were selected for analysis. These articles were chosen based on their focus on chronic mechanical irritation and its impact on the skin, specifically leading to the development of SCC in the waist region. Each article was meticulously reviewed for relevant clinical data, including:

- Patient demographics (age, sex, and duration of saree wear)
- Clinical presentation (location and appearance of lesions and progression of symptoms)
- Histopathological findings (biopsy results and type of cancer)
- Treatment protocols (surgical approaches and post-operative care)
- Patient outcomes (prognosis, recurrence, and long-term follow-up).

Each key point from these studies was synthesized and grouped into thematic sections such as clinical presentation, diagnosis, treatment, and prevention.

Clinical presentation

The clinical presentation of saree- and dhoti-induced SCC has been largely consistent across the 11 case reports. Most patients presented with chronic ulcers localized at the waist, often at the site of the saree and dhoti waistband, where constant pressure was applied. These ulcers were typically non-healing, with raised edges, serous discharge, and marked tenderness.[13,14] Many patients reported painful lesions that persisted for several months before seeking medical attention. Early skin changes such as hyperpigmentation, scaling, and the development of keratosis often preceded

the ulceration and carcinoma formation.[3,15] These skin alterations were sometimes mistaken for benign conditions, delaying the diagnosis and allowing the lesion to evolve into invasive SCC.

Pathophysiology

The underlying cause of saree- and dhoti-induced SCC appears to be the chronic mechanical irritation at the waistline, caused by the tightness of the saree waistband. This persistent friction leads to keratinocyte damage, chronic inflammation, and epithelial dysplasia, a condition in which cells become abnormally differentiated, increasing the risk of malignant transformation.[16] Over time, the continued cellular damage caused by pressure and friction disrupts the normal skin architecture, creating an environment conducive to cancer formation.[17,18] Keratinocytes in the affected area undergo abnormal proliferation, eventually developing into invasive SCC.[17] This process is akin to the development of actinic keratosis, which is also a known precursor to SCC triggered by long-term exposure to mechanical stress or ultraviolet radiation.[11,19]

Diagnosis

The diagnosis of saree-induced SCC is primarily based on histopathological examination of the ulcerated tissue. Biopsy samples from these lesions revealed invasive SCC in all reported cases.[20,21] Fine-needle aspiration cytology was also performed in some studies to assess the regional lymph nodes for metastatic involvement, with findings generally indicating reactive lymphadenopathy rather than malignant spread.[16] Early biopsy and histopathological examination were crucial in confirming the diagnosis and determining the extent of the malignancy. In many instances, diagnostic delays allowed the lesions to progress from benign irritation to malignant transformation, underscoring the need for early detection.

Surgical treatment

Surgical excision remains the gold standard for the management of saree-induced SCC. Wide local excision with margins of at least 2 cm was the treatment of choice in most cases, aimed at ensuring complete removal of the malignant tissue and preventing local recurrence.[17,18] For smaller lesions, primary closure of the wound was sufficient; however, in cases of larger ulcers or deeper involvement, skin grafting was necessary for reconstruction.[19] Surgical complications were minimal, with most patients recovering without major issues. The long-term outcomes of surgery were generally favorable, with no recurrence noted in the majority of cases.

Lymph node involvement

Lymph node involvement, although not universal, was observed in some cases, particularly in patients with advanced lesions. Bilateral inguinal lymphadenopathy was noted in a few reports, although it was generally reactive in nature, resolving after a course of antibiotics.[20] No evidence of distant metastasis was found in these cases, suggesting that saree- and dhoti-induced SCC tends to remain localized in the initial stages. This is consistent with the notion that SCC originating from chronic mechanical irritation is less aggressive than sun-induced SCC, which typically exhibits a higher risk of regional and distant metastasis.[16,17]

Prognosis

The prognosis for saree- and dhoti-induced SCC is generally favorable, particularly if the lesion is detected early and treated appropriately. Wide excision of the tumor provides excellent outcomes, with most patients being disease-free after surgery. However, delayed diagnosis and lack of timely intervention can lead to progression of the carcinoma and possible metastasis, which would significantly worsen the prognosis.[18,21] Regular follow-up care is critical to monitor for any recurrence of the disease or development of new lesions. Close monitoring ensures early intervention in case of recurrence and allows for the timely treatment of any complications.

Preventive measures

Preventive strategies include modifying the design of the saree waistband, such as using wider waistbands or alternative fastening mechanisms that reduce localized pressure. Such changes could help prevent the mechanical irritation that predisposes individuals to the development of dermatoses and, ultimately, SCC.[11,17] Public awareness campaigns focused on educating women about the potential risks associated with wearing tight clothing and the importance of seeking medical advice for persistent skin changes could play a crucial role in early diagnosis and prevention. Educating healthcare providers about this rare form of SCC would also improve early detection rates and ensure prompt intervention.

DISCUSSION

The findings from this systematic review highlight the significant yet often overlooked association between chronic mechanical irritation from traditional attire and the development of SCC. The included studies reinforce the role of prolonged friction at the waistline, primarily due to saree and dhoti waistbands, in triggering malignant transformation. While SCC is a well-documented cutaneous malignancy, its occurrence in the waist region due to attire-related trauma remains an underrecognized clinical entity.

Clinical presentation and pathophysiology

The reviewed case reports consistently describe a pattern of non-healing ulcers localized to the waist, often preceded by scaling, hyperpigmentation, and keratosis.[13-15] The chronic irritation from tightly tied waistbands leads to repeated epidermal injury, triggering a cycle of inflammation and impaired wound healing. Over time, this results in cellular dysplasia and eventual malignant transformation, a process similar to Marjolin's ulcers seen in chronic wounds.[3,20] The histopathological findings across studies confirm SCC as the predominant malignancy, with varying degrees of differentiation and occasional regional lymph node involvement.[16,21] These findings emphasize the critical role of persistent trauma in skin carcinogenesis, aligning with previous research on pressure-induced malignancies.[17]

Diagnostic challenges and delayed presentation

One of the key challenges identified is the delay in diagnosis, largely due to the benign appearance of initial lesions and the lack of awareness among both patients and healthcare providers. Many individuals dismiss early symptoms, such as pigmentation and mild scaling, as harmless frictional changes.[18] This delay in seeking medical attention allows lesions to progress to invasive SCC, often requiring extensive surgical intervention.[19] The studies reviewed suggest that early biopsy of persistent waist lesions could significantly improve early detection rates and outcomes.[22]

Treatment approaches and prognosis

Surgical excision remains the mainstay of treatment for saree- and dhoti-induced SCC. Wide local excision with adequate margins has been reported as an effective approach, with favorable outcomes in most cases.[14,21] Skin grafting or flap reconstruction is occasionally required for extensive lesions. The risk of lymphatic spread appears to be low, with most studies reporting only reactive lymphadenopathy rather than metastatic involvement.[16] However, delayed presentation and larger tumor size have been associated with increased risk of recurrence and poorer prognosis. These findings highlight the importance of early intervention and patient education.

Preventive strategies and public health implications

Given the cultural significance of sarees and dhotis in South Asian communities, addressing the associated cancer risk requires a balanced approach that respects traditional attire while promoting safer wearing practices. Simple modifications, such as using wider waistbands, avoiding excessive tightening, and opting for softer fabric materials, could significantly reduce the risk of chronic irritation.[17,19] Public awareness campaigns targeting women and elderly men, who are the most affected populations, are crucial for early symptom recognition and timely medical consultation.

In addition, healthcare providers should be trained to recognize early signs of saree- and dhoti-induced SCC, particularly in regions where traditional attire is commonly worn. Incorporating this condition into dermatological and oncological training programs could enhance early detection and management. Future research should explore alternative fastening methods and assess their effectiveness in reducing waistline dermatoses and SCC incidence.

Limitations and future directions

This systematic review is limited by the small number of published studies on saree- and dhoti-induced SCC, with most evidence derived from case reports. The absence of large-scale epidemiological studies makes it difficult to determine the true prevalence of this condition. In addition, variations in case documentation and follow-up hinder a comprehensive analysis of long-term outcomes. Future studies should focus on prospective cohort analyses to better understand risk factors, natural disease progression, and the effectiveness of preventive measures.

CONCLUSION

Saree- and dhoti-induced SCC is a rare but clinically significant condition resulting from chronic mechanical irritation at the waistline. Persistent friction from tightly tied waistbands leads to keratinocyte damage, chronic inflammation, and epithelial dysplasia, ultimately progressing to malignant transformation. Early diagnosis through biopsy and timely surgical excision provides a favorable prognosis, with minimal recurrence.

Raising awareness about this preventable etiology is crucial. Public health initiatives should focus on educating individuals who regularly wear sarees and dhotis about early warning signs, while healthcare providers must be trained to recognize and manage these cases effectively. Preventive measures, such as modifying waistband designs to reduce localized pressure, could significantly lower the risk of dermatoses and SCC development. Strengthening early detection strategies and integrating this condition into dermatological and oncological training can enhance clinical outcomes.

Understanding saree- and dhoti-induced SCC as a distinct entity is essential for improving both prevention and treatment strategies. By promoting awareness, advancing research, and implementing practical interventions, the burden of this preventable malignancy can be significantly reduced.

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